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DEPUTY DIRECTOR

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OFC. OF ENVIRONMENTAL QUALITY CONTROL

February 25, 2004

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Subject: Finding of No Significant Impact (FONSI) for Leeward YMCA (TMK 9-4-161:2; TMK 9-4-161:4), Waipahu, Hawaii

Dear Ms. Salmonson:

The City and County of Honolulu Department of Community Services has reviewed the comments received during the 30-day public comment period that began on October 23, 2002. The agency has determined that this project will not have significant environmental effects and anticipates a Findings of No Significant Impact (FONSI) determination. Please publish this notice in the March 23, 2004 OEQC Environmental Notice.

We have enclosed a completed OEQC Publication Form and four copies of the final EA. Please call Dane Waltjen at 808-523-4073 if you have any questions.

Sincerely,

MICHAEL T. AMII
Director

MTA:ds

Attachment

2004-03-08 FONSI
LEEWARD YMCA

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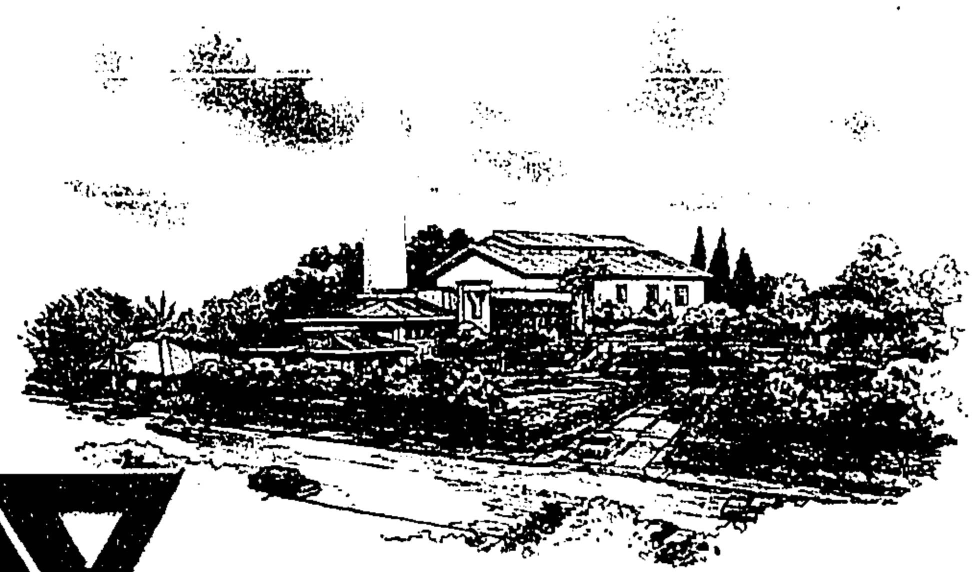

Leeward YMCA

Final Environmental Assessment
(TMK 9-4-161:2; TMK 9-4-161:4)

Prepared for:
Young Men's Christian Association (YMCA)
of Honolulu

Prepared by:

PBR
HAWAII

March 2004

Leeward YMCA

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HAWAII

March 2004

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1.0 INTRODUCTION

This final environmental assessment (EA) has been prepared in compliance with the environmental review requirements of 24 Code of Federal Regulations (CFR) 58 and the environmental requirements of Chapter 343, *Hawai'i Revised Statutes* (HRS) for proposed improvements to the Leeward Young Men's Christian Association (YMCA).

1.1 PROJECT SUMMARY

Project Name:	Leeward YMCA
Applicant:	Young Men's Christian Association (YMCA) of Honolulu
Landowner:	Young Men's Christian Association (YMCA) of Honolulu
Location:	94-440 Mokuola Street, Waipahu, Hawai'i, 96797
Tax Map Key:	9-4-161: 2; 9-4-161: 4
Existing Use:	Two existing buildings used in support of the services of the Leeward YMCA. Facilities include meeting rooms, offices, a multi-purpose room, and parking. The site is also a portion of the former O'ahu Sugar Company mill complex which includes the smokestack and the currently vacant generator/boiler building.
Proposed Action:	Expansion of the current services of the YMCA, which will include: renovation and expansion of the generator/boiler building, adding a swimming pool, improving parking areas, and improving landscaping.
Project Area:	Approximately 4.1 acres
Land Use Designations:	State Land Use: Urban Zoning: Business (B-2)
SMA:	The property is not in the SMA
Actions Requested:	Compliance with the United States Department of Housing and Urban Development environmental review requirements Compliance with Chapter 343, *Hawai'i Revised Statutes*
EA Approving Agency:	City and County of Honolulu, Department of Community Services
Determination:	Finding of No Significant Impact (FONSI)

1.2 LOCATION

The Leeward YMCA is located in Waipahu on a portion of the former O'ahu Sugar Company Mill site (Figure 1) and consists of two parcels identified as TMK 9-4-161: 2 and TMK 9-4-161: 4 (Figure 2). This area is part of the Central O'ahu Development Plan area.

1.3 LAND OWNERSHIP

The landowner is the Young Men's Christian Association (YMCA) of Honolulu.

1.4 IDENTIFICATION OF APPLICANT

The applicant is the Young Men's Christian Association (YMCA) of Honolulu.

1.5 IDENTIFICATION OF THE APPROVING AGENCY

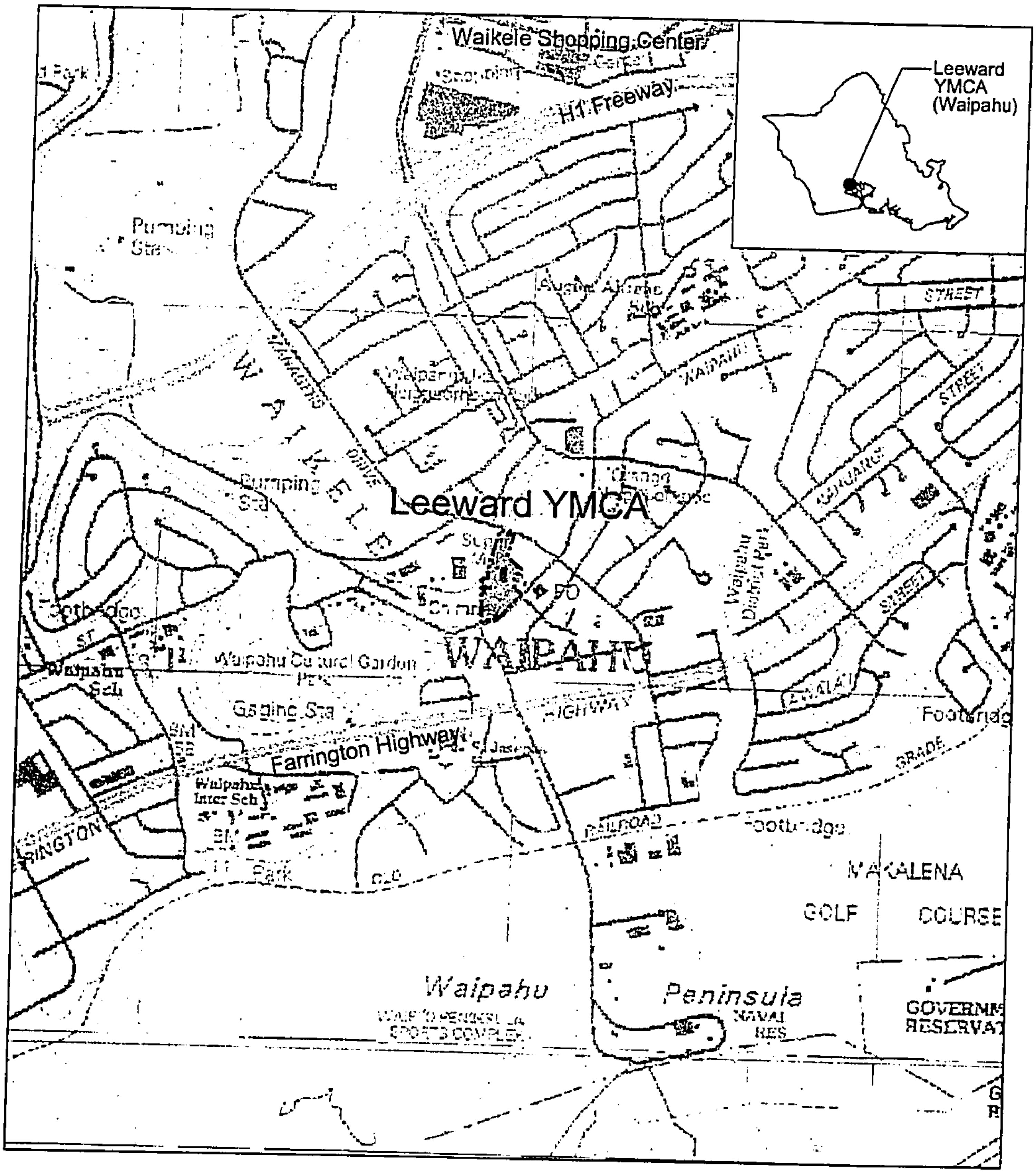
The approving agency is the City and County of Honolulu Department of Community Services.

1.6 IDENTIFICATION OF AGENCIES CONSULTED

The establishment of the Leeward YMCA on a portion of the former O'ahu Sugar Company mill site was described in concept in the *Amfac Commercial and Park Final Environmental Impact Statement*, which was accepted in March 1997. The agencies that reviewed the project include:

CITY AND COUNTY OF HONOLULU
Board of Water Supply
Building Department
Department of Housing and Community Development
Department of Land Utilization
Department of Parks and Recreation
Department of Public Works
Department of Transportation Services
Department of Wastewater Management
Fire Department
Planning Department
Police Department

STATE AGENCIES
Department of Accounting and General Services, Public Works Division
Department of Budget and Finance, Housing Finance and Development Corporation
Department of Business Economic Development and Tourism
Department of Health
Department of Land and Natural Resources, State Historic Preservation Division
Department of Transportation



LEGEND

Leeward YMCA

Source: City and County of Honolulu

Figure 1
Regional Location Map

Leeward YMCA

Waipahu, Oahu

NORTH

LINEAL SCALE (FEET)
600 0 1,200

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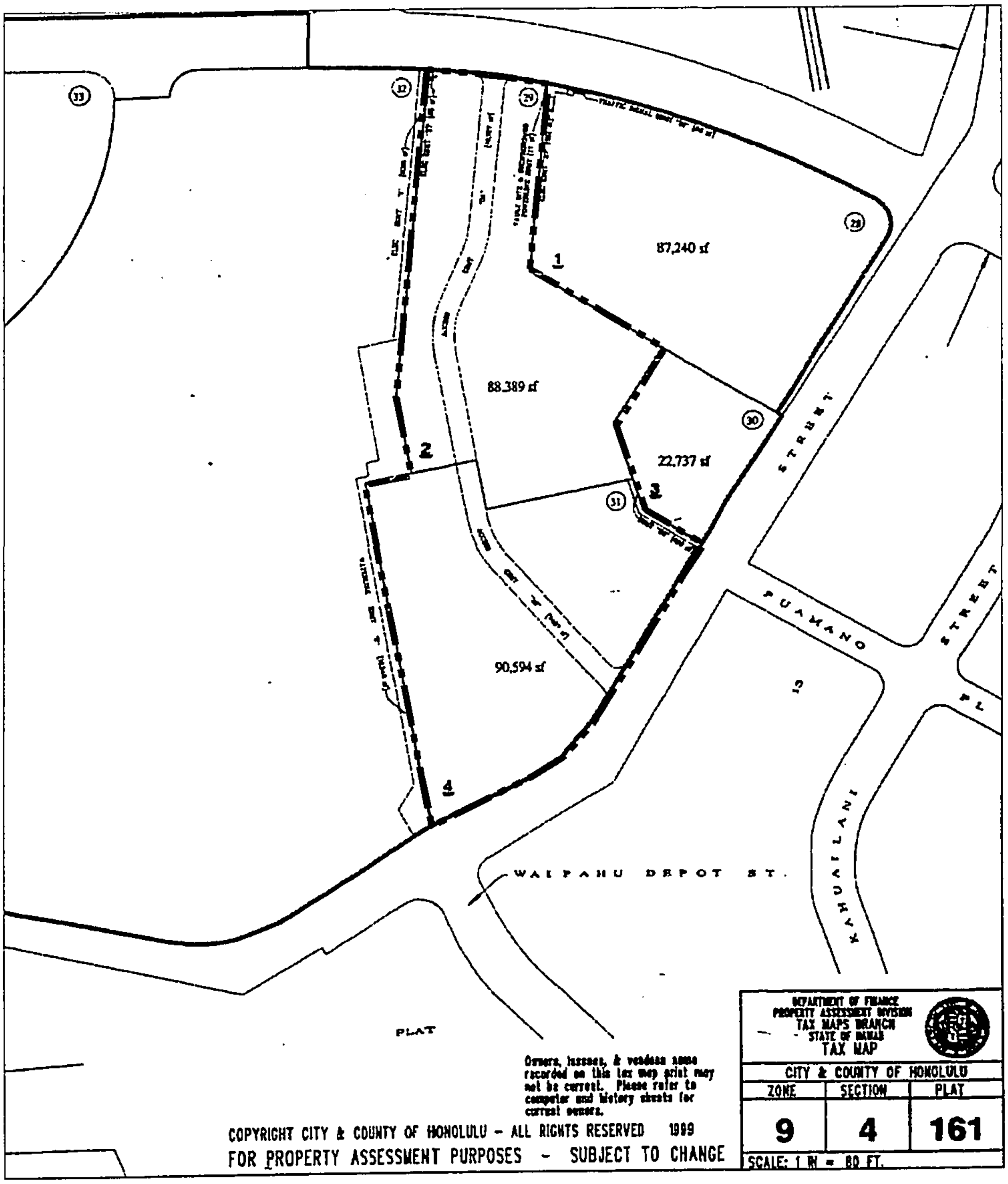


LEGEND

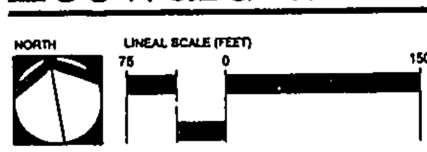
Leeward YMCA

Source: -State of Hawaii, Department of Finance
-City and County of Honolulu

Figure 2
Tax Map Key

Leeward YMCA

Waipahu, Oahu



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Land Use Commission
Office of Environmental Quality Control
Office of Hawaiian Affairs

FEDERAL AGENCIES
US Department of Agriculture, Natural Resources Conservation Service
US Department of the Army, Corps of Engineers
US Department of the Interior, US Geological Survey, Water Resources Division

COMMUNITY ORGANIZATIONS AND INDIVIDUALS
BHP Gas Company
FilCom Center, Inc.
Friends of Hans L'Orange Park
Friends of Waipahu Cultural Garden Park
GTE Hawaiian Tel
Hawaiian Electric Company, Inc.
Waipahu Hongwanji Mission
Waipahu 2000 Update
YMCA of Honolulu, Leeward Branch

1.7 ENVIRONMENTAL REQUIREMENTS

This final environmental assessment has been prepared in accordance and compliance with the environmental requirements of:

- 24 CFR 58 (The United States Department of Housing and Urban Development (HUD) regulations that govern the preparation of environmental documents for entities assuming HUD environmental responsibilities); and

- Chapter 343, Hawaii Revised Statues (The State of Hawai'i Environmental Impact Statement Law).

Specifically, this final environmental assessment has been prepared in compliance with the HUD environmental requirements (24 CFR 58) because the YMCA of Honolulu will be receiving a Community Development Block Grant and a direct grant (Economic Development Initiative) from HUD for the proposed Leeward YMCA improvements. This final environmental assessment also has been prepared in compliance the State of Hawai'i Environmental Impact Statement Law (Chapter 343, HRS) because the State will be contributing funding to the project.

Because Chapter 343, HRS is applicable to the project, this environmental assessment has been prepared to identify whether "significant environmental effects" will result from the proposed Leeward YMCA improvements. According to the Department of Health Rules which are governed by Chapter 343, HRS implementation, if "significant environmental effects" are not identified by an environmental assessment, preparation of a full environmental impact statement is not required, and a "finding of no significant impact"(FONSI) is issued by the approving authority. For this environmental assessment, the accepting agency, the City and County of Honolulu Department of Community Services, has issued a FONSI.

2.0 PROJECT DESCRIPTION, OBJECTIVES, & NEED

This section provides background information, identifies the project's goals and objectives, describes the proposed improvements, and delineates construction activities and approximate costs.

2.1 BACKGROUND INFORMATION

The YMCA of Honolulu (parent organization of the Leeward YMCA) is a not-for-profit, community service organization established in Hawai'i in 1869. During 2000, the YMCA had 86,000 participants in nearly 100 programs delivered through nine branches located throughout O'ahu. The YMCA of Honolulu's annual budget is $18 million. The organization has 160 full-time employees, 800 part-time employees, and 2,600 volunteers. More than 300 community volunteers serve on the YMCA of Honolulu's corporate and branch boards.

The Leeward YMCA, one of the YMCA of Honolulu's nine branches, is located in the heart of Waipahu on an approximately 4 acre site that was formerly part of the O'ahu Sugar Company Mill complex. The YMCA site includes the former O'ahu Sugar Company Administration Building and the Human Resources Building, both of which have been renovated for use by the YMCA. The YMCA of Honolulu has also spent approximately $240,000 to repair the old mill smokestack and retain this structure as a lasting landmark to Waipahu's sugar heritage and sense of place. The site also includes the generator building of the O'ahu Sugar Company Mill complex. The generator building has not been renovated and is currently vacant.

The existing facilities of the Leeward YMCA consist of a multi-purpose room, meeting rooms, offices, indoor and outdoor child care facilities, a teen lounge, and parking areas. These facilities occupy the former O'ahu Sugar Company Administration Building and Human Resources Building and surrounding areas.

Programs currently offered by the Leeward YMCA include:

- A+ After School Programs at public elementary schools
- Before school and after school programs on site
- Holiday/Summer Fun
- Aerobics
- Youth Sports (flag football)
- Substance abuse prevention programs for teens
- Teen action programs
- Youth Employment Programs
- S.T.A.R.S. teen performing arts program
- Driver education

The Leeward YMCA currently has 2,200 members, including 1,700 A+After School Program members. The A+ After School Program is held at various Department of Education school locations throughout the Leeward area and thus the 1,700 A+After School Program members do not use the on-site facilities of the Leeward YMCA.

The current service area of the Leeward YMCA is from Pearl City, Waipahu, 'Ewa and 'Ewa Beach to the Wai'anae Coast. Besides expansion of the Leeward YMCA, there are also plans to build a new YMCA in the Wai'anae area. If this new YMCA is built, the Wai'anae area would then be excluded from the service area of the Leeward YMCA.

2.2 SURROUNDING USES

The Leeward YMCA property can be accessed by Mokuola Street and Waipahu Street. Hans L'Orange Park is directly across Mokuloa Street. Various commercial uses and business uses are across Waipahu Street. Adjacent to the Leeward YMCA to the east is the recently completed Filipino Community Center. Adjacent to the west is vacant land that is proposed for commercial and mixed uses. Beyond this vacant land to the north and northwest is the Alexander & Baldwin Industrial Subdivision. See Figure 3 for photographs of the site and surrounding uses.

2.3 PROJECT DESCRIPTION

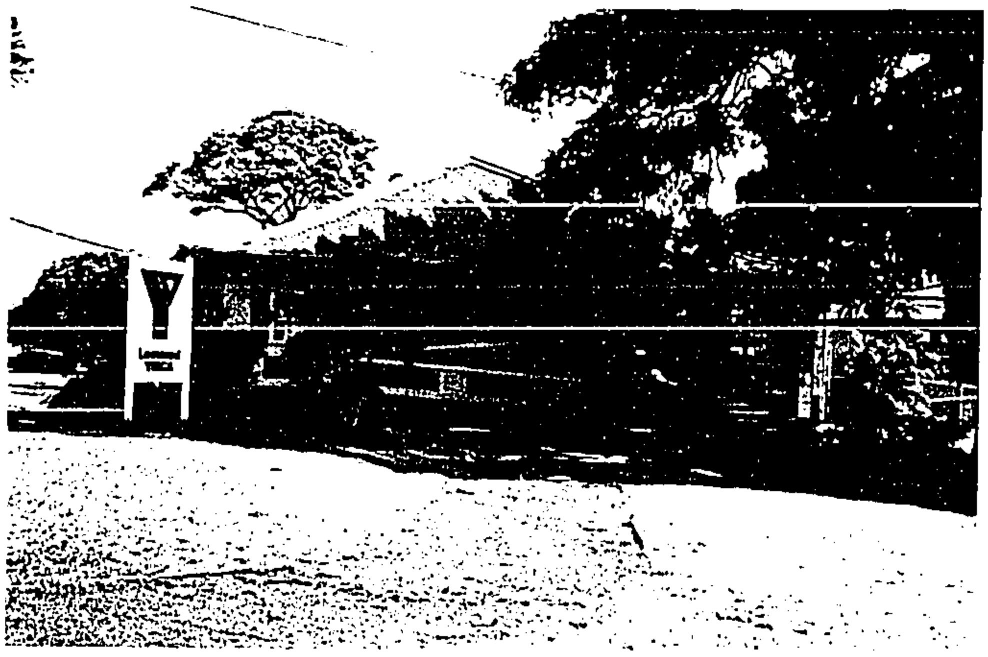
The proposed improvements to the Leeward YMCA subject to this environmental assessment involve the expansion of the facility at its current location to improve and expand services. This expansion includes renovation and expansion of the Generator building which was formerly part of the O'ahu Sugar Company mill complex.

The current plans that are subject to this environmental assessment are to:

- Renovate the Generator building structure to provide space for fitness activities
- Provide a new wing to the renovated generator building to include administration offices, child care facilities, and locker rooms
- Add a 25-yard outdoor swimming pool
- Refurbish and redesign the parking areas
- Re-landscape the entire site

Architectural details of the renovated structure and the new wing will be reminiscent of the plantation era, providing a historical perspective of the Waipahu community. In addition, the old mill smokestack—possibly Waipahu's most dominate landmark and a lasting physical reference to Waipahu's history and cultural roots as a plantation town—will be retained and incorporated into the overall site plan. YMCA of Honolulu has already renovated the smokestack.

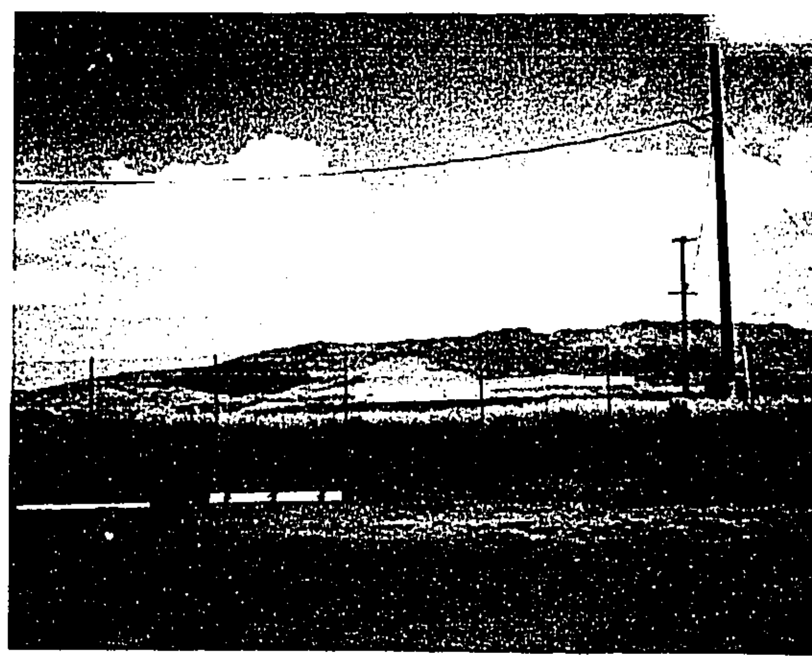
The site plan also includes a location for potential use as a heritage museum building as mentioned in the *Waipahu 2000 Update* and the *Waipahu Town Plan*, although this building is not proposed to be built at this time. As proposed, the heritage museum would be fronting Waipahu Street on a portion of the parcel identified by 9-4-161: 4.



1) The former Oahu Sugar Company Administration building is currently the main facility for the Leeward YMCA.

2) The area between the former Administration building and Human building is currently used for various YMCA activities.

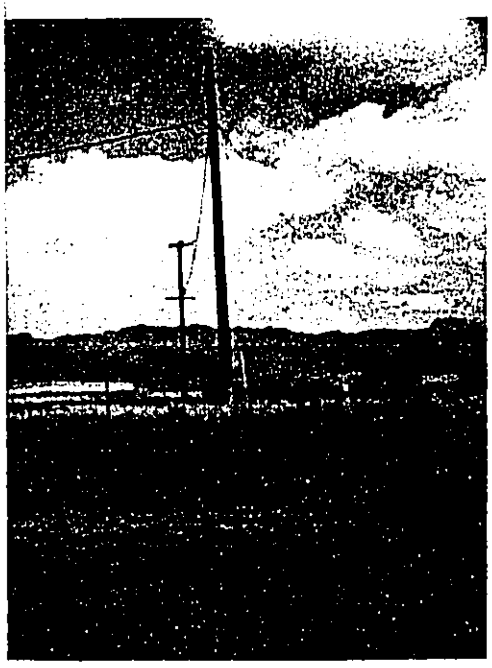
4) The recently completed Filipino Community Center is adjacent to the Leeward YMCA.



5) The area to the west of the Leeward YMCA site is proposed for con industrial uses as part of the Alexander & Baldwin Industrial Subdi

ation building and Human Resources
YMCA activities.

3) The former Oahu Sugar Company Generator building will be renovated and expanded to provide space for fitness activities. The old mill smokestack will be retained as a reference to Waipahu's history and cultural roots as a plantation town. The large banyan tree will be retained.



CA site is proposed for commercial and
& Baldwin Industrial Subdivision.

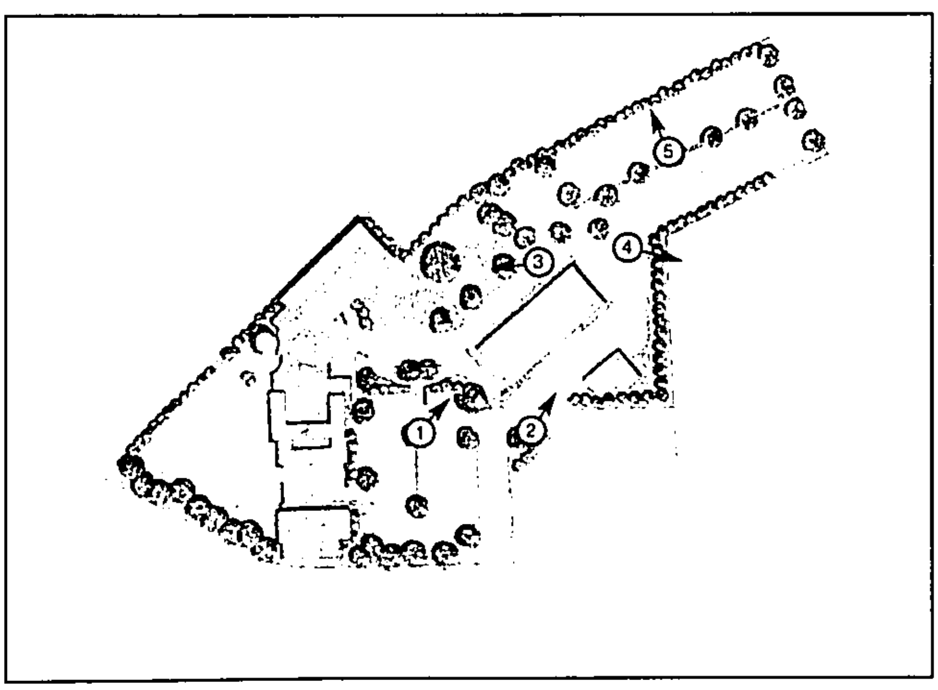


Figure 3
Site Photos

LEEWARD YMCA

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Several existing mature trees on the site will be retained and incorporated into the overall YMCA grounds. These include the large banyan tree between the Administration building and the Generator building, the mahogany tree near the front of the Administration building, and the monkeypod tree within the parking lot accessed by Mokuloa Street (see Figure 4). In addition, where possible the low cut-stone walls on the site will be preserved. Where walls cannot be retained, the rock may be reused for any new walls on the site.

The proposed Leeward YMCA improvements will have no effect on any easements on the property. The property consists of two parcels (see TMK map, Figure 2). The primary easements on these parcels are to allow access to each lot. The easement on parcel 4 is in favor of the owner of parcel 2 and the easement on parcel 2 is in favor of the owner of parcel 4. Since the YMCA owns both parcels the issue of access to and from each parcel is not relevant. The other easement on the property is for a sewer line.

The improvements and expansion of the Leeward YMCA will protect key landmarks of Waipahu through the adaptive reuse of the old O'ahu Sugar Company mill site and retention of the smokestack. The expanded YMCA, along with the adjoining Filipino Community Center, will provide a vital social center for Waipahu, similar to how the old mill comprised the social heart of Waipahu during the plantation era.

For a project rendering and site plan see Figures 4a and 4b.

2.4 OBJECTIVES AND NEED

The objectives of the project are as follows:

1. Improve and expand YMCA services to the Leeward community

2. Renovate the remaining buildings of the O'ahu Sugar Company mill complex for adaptive reuse.

According to a community needs assessment prepared for the YMCA of Honolulu (Phil Balducci & Associates 2001, see Appendix A), if the Wai'anae YMCA is built and the Leeward YMCA is expanded, membership at the Leeward YMCA is expected be approximately 5,755 to 8,000 members. If only the Leeward YMCA is expanded and the Wai'anae YMCA is not built, membership at the Leeward YMCA is expected to be 6,213 to 9,000 members.

These estimates include A+After School Program members. The A+ After School Program is held at various Department of Education school locations throughout the Leeward area and thus the A+After School Program members do not use the on-site facilities of the Leeward YMCA. Without the A+After School Program members, the YMCA estimates membership at the Leeward YMCA be approximately 4,500 to 5,000 members after the proposed improvements.

2.5 COMMUNITY PLANNING PROCESS

The reuse of the O'ahu Sugar Company Mill site has been discussed extensively within the Waipahu community. Including the Leeward YMCA at the O'ahu Sugar Company mill site has been described in many community-based planning efforts including the *Waipahu Livable Communities Initiative* (1998), The *Waipahu Town Heritage Plan* (1996), and the *Waipahu Town Plan: A Special Area Plan for Waipahu* (1995). These plans are discussed further in Section 3.0.

2.6 APPROXIMATE COST AND SCHEDULE

The approximate cost for proposed improvements to the Leeward YMCA is $8,000,000. All proposed improvements are expected to be implemented in one phase. Current plans are for construction to start after funding has been granted and approvals have been obtained.

As of March 2003, a tentative start date for design development is June 2003. It is estimated the project could then be completed within 18 months.

2.7 SUSTAINABLE BUILDING DESIGN

The Office of Environmental Quality Control has issued "Guidelines for Sustainable Building Design in Hawai'i: A planner's checklist" (OEQC May 1999) and has requested that consideration be made in applying sustainable building techniques to projects. The OEQC Guidelines state that "[a] sustainable building is built to minimize energy use, expense, waste and impact on the environment. It seeks to improve the region's sustainability by meeting the needs of Hawai'i's residents and visitors today without compromising the needs of future generations."

In support of sustainable design the following will be considered in planning the proposed Leeward YMCA improvements:

1) The use of glass-asphalt ("glasphalt") in the design of impervious surfaces; and

2) Indigenous and Polynesian introduced plants for use in landscaping.

Where appropriate, other techniques from "Guidelines for Sustainable Building Design in Hawai'i: A planner's checklist" will be considered for inclusion in the proposed Leeward YMCA improvements.

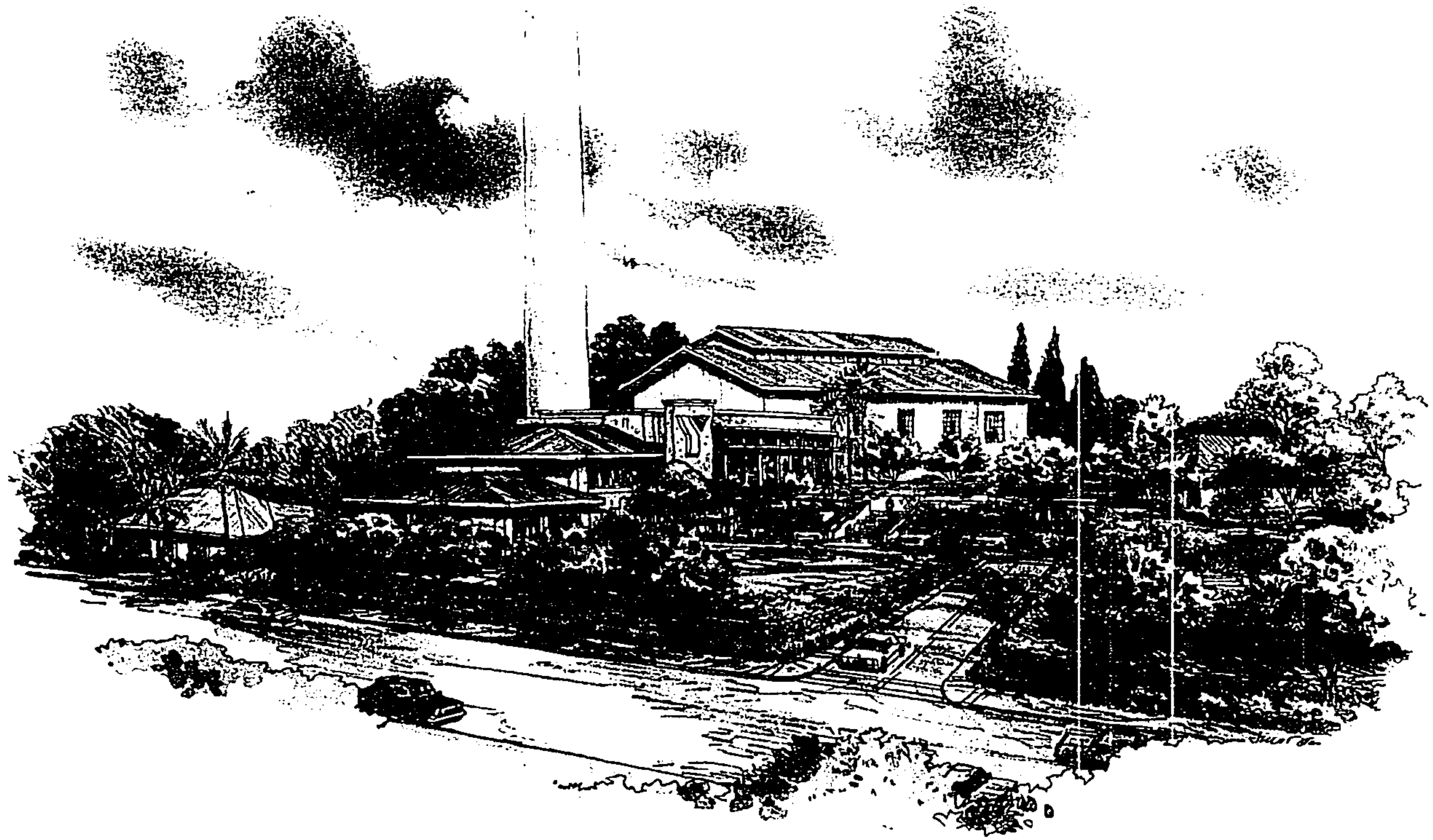
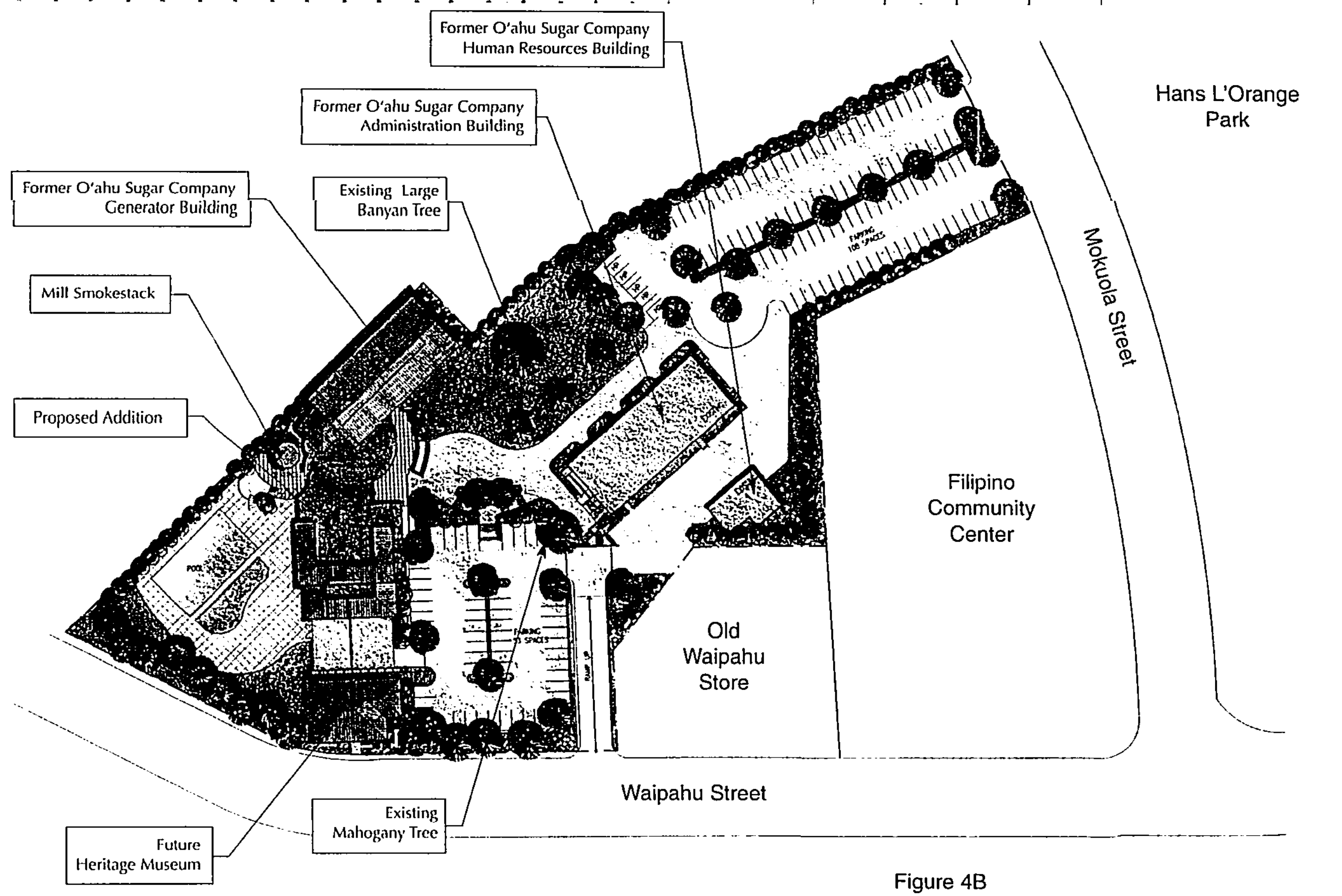


Figure 4A
Project Rendering
LEEWARD YMCA

Source: CDS International



Source: CDS International

Figure 4B
Proposed Site Plan
LEEWARD YMCA

not to scale

3.0 LAND USE CONFORMANCE

The State of Hawai'i and the City and County of Honolulu land use plans, policies, and ordinances, as well as private plans, relevant to the Leeward YMCA are described below.

3.1 STATE OF HAWAI'I

3.1.1 State Land Use District

Chapter 205, HRS, establishes the State Land Use Commission (LUC) and gives this body the authority to designate all lands in the State into one of four districts: Urban, Rural, Agriculture, or Conservation. The Leeward YMCA property is located within the Urban district (Figure 5).

Chapter 205, HRS, also delegates uses in the Urban district to the County, however the Land Use Commission's rules state, in part: "*[the Urban district] shall include land characterized by 'city-like'* concentrations of people, structures, streets, urban level of services and other related land uses." As such, the proposed Leeward YMCA improvements are consistent with the Urban district, and no reclassification is required to implement the proposed project.

3.2 CITY AND COUNTY OF HONOLULU

Relevant land use plans of the City and County of Honolulu that pertain to the Leeward YMCA include the *General Plan* and the *Central O'ahu Development Plan.*

3.2.1 General Plan

As required by the City Charter, the General Plan for the City and County of Honolulu serves two purposes. The first is a statement of the long-range social, economic, environmental and design objectives for the general welfare and prosperity of the people of O'ahu. Second, the General Plan is a statement of broad policies that facilitate the attainment of the objectives of the plan.

The Leeward YMCA is in accord with the following General Plan policies:

> *Policy VII. Physical Development and Urban Design*
> *Objective A, Policy 5: Provide for more compact development and intensive use of urban lands where compatible with the social character of existing communities.*
>
> *Objective F. To promote and enhance the social and physical character of O'ahu's older towns and neighborhoods.*

Policy IX. Health and Education

Objective B, Policy 2: Encourage the provision of informal educational programs for people of all age groups.

Policy X. Culture and Recreation
Objective B, Policy 2: Identify, and to the extent possible, preserve and restore buildings, sites, and areas of social, cultural, historic, architectural, and archaeological significance.

Objective D, Policy 10: Encourage the private provision of recreation and leisure-time facilities and services.

Discussion: The proposed Leeward YMCA improvements conform to many of the objectives and policies of the General Plan. In particular, the improvements and expansion of the Leeward YMCA will contribute to the revitalization and compact development of Waipahu. The adaptive reuse of the old O'ahu Sugar Company mill site (along with the retention of the mill smokestack) will preserve important historical landmarks and provide a link to Waipahu's plantation heritage. Finally, the expanded facilities at Leeward YMCA will allow the YMCA to provide more education, social, and fitness programs to a larger number of community residents. Thus, the proposed Leeward YMCA improvements are expected to have a positive effect on the revitalization and character of historic Waipahu Town.

3.2.2 Sustainable Communities Plan

The *Central O'ahu Sustainable Communities Plan* includes vision statements, policies, and guidelines to direct the development and improvement of Central O'ahu. Pertinent sections applicable to the proposed Leeward YMCA improvements include the following.

3.4 Historic and Cultural Resources

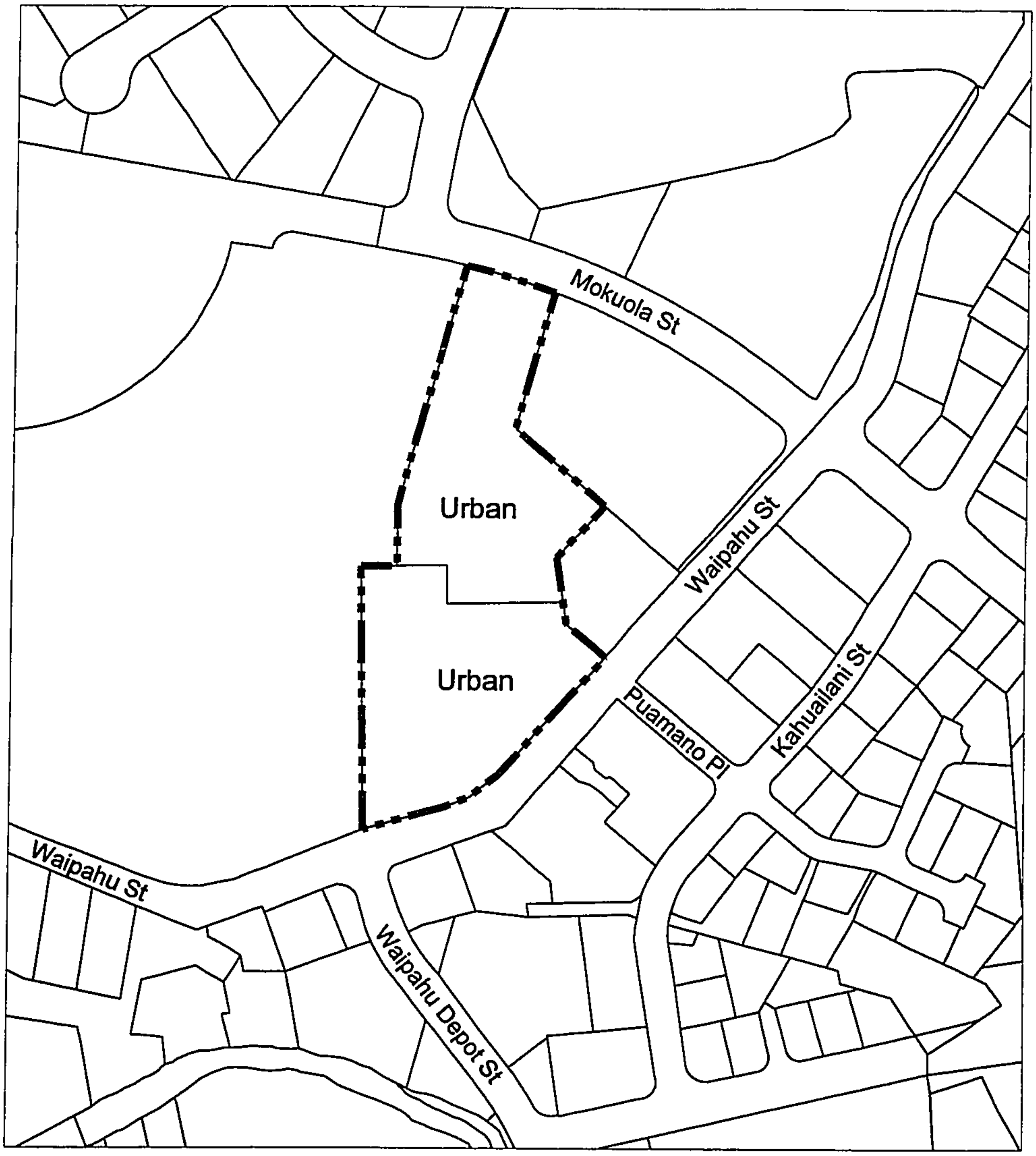
3.4.1 General Policies:

Protection of Key Landmarks. Physical references to Central O'ahu's history and cultural roots should be emphasized to help define Cental O'ahu's unique sense of place. Existing visual landmarks should be protected, and creation on new culturally appropriate landmarks should be supported.

Preservation of Historic Features. Significant historic features from the plantation era and earlier periods should be preserved.

3.4.3.2 Waipahu Sugar Mill Environs

- *The sugar mill stack and boiler room should be retained as visual symbols of Waipahu's plantation town history.*



LEGEND

Leeward YMCA

Urban Land Use District

Figure 5
State Land Use Districts

Leeward YMCA

Waipahu, Oahu

NORTH

LINEAL SCALE (FEET)

100 0 200

PBR HAWAII

Source: City and County of Honolulu

- *A variety of reuse options which are consistent with the purpose of retaining the historic plantation theme of the old town core should be allowed at the Waipahu Sugar Mill site.*

- *Renovations to the sugar mill for adaptive reuse should minimize exterior alterations that substantially change the building profile or accessory structures that define the mill's original purpose.*

- *Public access to the Waipahu Sugar Mill and other privately owned historic buildings in the Old Waipahu Town Anchor area should be encouraged.*

3.5 Waipahu Town

3.5.1.1 Anchor Areas

- *The Sugar Mill Site formerly housed the O'ahu Sugar Company's mill operations. Selected existing structures on the mill site should be retained in future redevelopment of the site.*

- *Community-oriented uses for the site include a Heritage Park/Center with an open market, a YMCA facility, and a Filipino Community Center*

3.5.3.1 Urban Design

- *Structures having historic, cultural, and or visual significance should be retained and renovated as needed. Historic buildings on the mill site and in the Old Town Commercial Area should be identified. Adaptive reuse of these historic buildings should be encouraged.*

3.5.3.2 Old Waipahu Town

Sugar Mill Site

- *Renovations to the sugar mill for adaptive use should retain the visual qualities and building character that defined the mill's original purpose.*

3.5.3.3 Community Facilities Anchor Area

- *Public service uses should be encouraged on large vacant areas within this district.*

- *Spaces between buildings should be developed and landscaped in a manner which provides the area with a unifying visual image and creates the sense of an active people-oriented civic park.*

Discussion: The proposed Leeward YMCA expansion and improvements are in substantial conformance the *Central O'ahu Sustainable Communities Plan*. In particular, the improvements and expansion of the Leeward YMCA will protect key landmarks of Waipahu through the adaptive reuse of the old O'ahu Sugar Company mill site. This adaptive reuse will include retention of the mill smokestack—possibly Waipahu's most dominate landmark and a lasting physical reference to Waipahu's history and cultural roots as a plantation town. The use of the site as an expanded YMCA will also encourage public access to the Waipahu Sugar Mill site, which along with the adjoining Filipino Community Center, will provide a vital social center for Waipahu, similar to how the old mill comprised the social heart of Waipahu during the plantation era.

3.3 ADDITIONAL WAIPAHU PLANS

In anticipation of the closing of the O'ahu Sugar Company mill, in the last decade there have been numerous community-based planning efforts focusing on Waipahu. These plans include: the *Waipahu 2000 Update;* the *Waipahu Livable Communities Initiative* (1998), The *Waipahu Town Heritage Plan* (1996), and the *Waipahu Town Plan: A Special Area Plan for Waipahu* (1995).

3.3.1 Waipahu 2000/Waipahu 2000 Update

Over a nine month period in 1983, Waipahu community groups developed a community master plan titled *Waipahu 2000.* This privately funded plan is often cited as one of the best examples of community-based planning undertaken in Hawai'i. In 1994, with the announced closure of O'ahu Sugar, community concern about the economic vitality of Waipahu Town, and the disposition of the mill site spurred community organizations to revise the *Waipahu 2000* plan. The resulting document is the *Waipahu 2000 Update*. Objectives of the *Waipahu 2000 Update* include: 1) improving Waipahu with well-planned growth; 2) retaining Waipahu's sugar heritage and sense of place; 4) improving the overall physical appearance of Waipahu; and 4) strengthening community ties with youth and family programs.

Discussion: Proposed Leeward YMCA improvements meet these objectives in several ways. First, the improvements will contribute to the well-planned growth of Waipahu by creating a community and social center. Second, the adaptive reuse of the mill buildings will retain Waipahu's sugar heritage and sense of place. Third, compared to the run-down condition of the former mill buildings the proposed improvements will improve the overall physical appearance of Waipahu. Finally, a central focus of the YMCA is providing youth and family programs to strengthen community ties.

3.3.2 Waipahu Town Plan: a Special Area Plan for Waipahu

With the closing of the O'ahu Sugar Company in 1995, the City and County of Honolulu undertook the development of a community-based special area plan for Waipahu. The purpose of the resulting plan, *Waipahu Town Plan: A Special Area Plan for Waipahu,* is to provide comprehensive, long-range objectives to guide land use and public improvements, as well as specific plans for certain improvements—including a YMCA at the mill site—which address the needs and concerns of the community and enhance the long-term livability and economic vitality of Waipahu.

Discussion: Since the *Waipahu Town Plan* shares similar objectives with the *Waipahu 2000 Update*, discussion of how the Leeward YMCA meets these objectives is also similar. Specifically, the proposed Leeward YMCA improvements meet the objectives of the plan by providing an adaptive reuse of the mill building and by creating a vivant social center at the mill site. The plan states: "Development of a new community YMCA in the Waipahu-'Ewa area would more fully serve the growing population of the region" and "the locational advantages of the sugar mill site are compatible with the siting criteria for a YMCA facility." Thus the proposed Leeward YMCA expansion and improvements are a realization of one element of the *Waipahu Town Plan*.

3.3.3 Waipahu Livable Communities Initiative

In 1998, the *Waipahu Livable Communities Initiative* was prepared for the City and County of Honolulu. The intention of the initiative is to improve the quality of transportation facilities and to promote economic revitalization in Waipahu. It is further intended to extend the *Waipahu Town Plan* effort by identifying specific implementation projects. Among the urban design principles set forth in the plan are: 1) "the visual dominance of the sugar mill shall be maintained"; 2) "structures having historic, cultural, and/or visual significance shall be retained and renovated as needed"; and 3) "renovations to the sugar mill for adaptive reuse shall retain the visual qualities and building character that defined the mill's original purpose."

Discussion: The proposed Leeward YMCA expansion and improvements, with the adaptive reuse of the mill building, retention of the smokestack, and architectural details reminiscent of the plantation era, conform to the *Waipahu Livable Communities Initiative*.

3.4 LAND USE ORDINANCE

The Land Use Ordinance (LUO) (Chapter 21, Revised Ordinances of Honolulu) is the City and County of Honolulu's zoning ordinance. Besides zoning regulations, the LUO contains ordinances regulating the use of land and regulations intended to ensure that adequate controls and review mechanisms are in place for proposed land uses.

Discussion: The Leeward YMCA site is zoned Business (B-2) (Figure 6). According to the LUO (Section 21-3.110): "The intent of the B-2 community business district is to provide areas for community-wide business establishments, serving several neighborhoods and offering a wider range of uses than is permitted in the B-1 district." For zoning purposes the Leeward YMCA is considered a meeting facility, which are defined in the LUO as: "permanent facilities for recreation, social or multipurpose use. These may be for organizations operating on a membership basis for the promotion of members' mutual interests or may be primarily intended for community purposes." Meeting facilities are a permitted use in the B-2 district.

The project architect, CDS International, has calculated the off-street parking requirements for the proposed Leeward YMCA improvements based on the requirements of the Land Use Ordinance. All parking requirements for the Leeward YMCA will be handled on the project site. With a total of 28, 297 square feet and various uses, 119 parking stalls will be required. The site plan shown on Figure 4B includes 161 parking stalls.

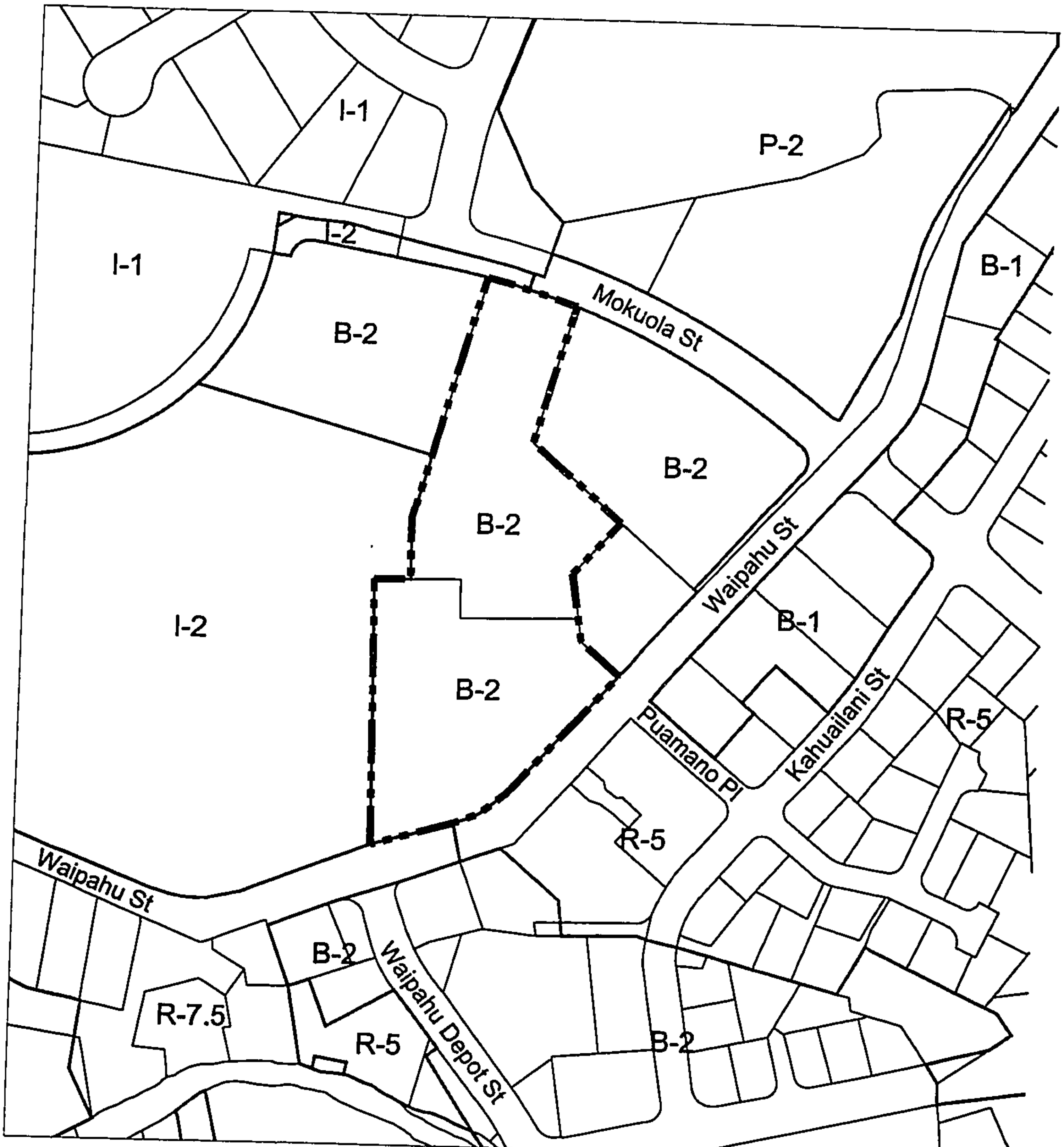
The Filipino Community Center, which also has a large parking lot, adjoins the Leeward YMCA. While there is no current shared parking arrangement between the Leeward YMCA and the Filipino Community Center, a parking agreement could be implemented between the two organizations to allow for "overflow" parking in the case of special events at either facility.

3.5 MILL TOWN CENTER COMMERCIAL & PARK PROJECT URBAN DESIGN PLAN

The Leeward YMCA property is subject to the standards and guidelines of the *Mill Town Center Commercial Urban Design Plan.* The purpose of this plan is to: 1) satisfy a condition of the Unilateral Agreement for Ordinance 98-61 (which changed the zoning of the Oahu Sugar Company mill site to allow commercial, industrial, and business uses); 2) create a cohesive, visually unified project site that is compatible with adjacent properties; and 3) create a project site that will be desirable to future buyers, tenants, and the surrounding community. In accordance with Ordinance 98-61, the *Mill Town Center Commercial Urban Design Plan* is consistent with the design guidelines of the *Waipahu Town Plan* (see section 3.3.2).

Discussion: At the time the *Mill Town Center Commercial Urban Design Plan* and the *Waipahu Town Plan* were adopted it was envisioned that an independent historical group would establish, fund, and manage a Waipahu Town heritage center on the parcel identified by TMK 9-4-161: 4. However a willing organization did not step forward to develop the center and the YMCA of Honolulu has since purchased the site for expanded uses of the Leeward YMCA. True to the intent of the Waipahu communty's desire for a heritage center, the Leeward YMCA site plan (see Figure 4B) provides space for heritage museum, although this building is not proposed to be built at this time.

The *Mill Town Center Commercial Urban Design Plan* states that "any redevelopment adjacent to the existing Waipahu Store within the Heritage Park/Center site should seriously consider consolidation of off-site parking at the rear of the future buildings to promote a pedestrian-friendly streetscape." However this not practical now that the YMCA has acquired the Heritage Park/Center site for use as part of the Leeward YMCA. With its expanded uses on two parcels, the YMCA requires more space and more parking then originally planned. In addition, to be able to provide an adaptive reuse of the existing mill buildings, the site plan for the Leeward Y must conform to existing limitations of the site. Working with the site constraints, the most functional plan is to maintain the existing parking lot at its current location, which fronts Waipahu Street, although additional landscaping between the parking lot and Waipahu Street will be provided. It should be noted that the heritage museum is proposed to front Waipahu Street, which, along with the parking lot landscaping, will contribute to a pedestrian-friendly streetscape.



LEGEND

- Leeward YMCA
- County Zoning Boundary

B-1: Neighborhood Business
B-2: Community Business
P-2: General Preservation
I-1: Limited Industrial
I-2: Intensive Industrial
R-5: Residential
R-7.5: Residential

Figure 6
County Zoning

Leeward YMCA

Waipahu, Oahu

NORTH

LINEAL SCALE (FEET)

100 0 200

PBR HAWAII

Source: City and County of Honolulu

3.6 LIST OF PERMITS

The following permits will be required as part of the project:

Table 1
Required Permits and Approvals

Permit/Approval	Responsible Agency
ADA Accessibility	Disability and Communication Access Board
Building Permit for Building, Electrical, Plumbing, Sidewalk/Driveway and Demolition work	Department of Planning and Permitting
Grubbing, Grading, and Stockpiling Permit	Department of Planning and Permitting
Places of Assembly	Honolulu Fire Department
Sewer Connection Permits	Department of Planning and Permitting
Water	Board of Water Supply
Permit to Excavate Public Right-of-Way (Trenching)	Department of Planning and Permitting

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4.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT, POTENTIAL IMPACTS OF THE PROPOSED ACTION, AND MITIGATIVE MEASURES

The environment surrounding the Leeward YMCA includes the physical or natural environment and the human or social environment. This section describes the existing conditions, potential impacts to the environment, and mitigative measures.

4.1 HUD ENVIRONMENTAL REQUIREMENTS (24 CFR 58)

Because the YMCA of Honolulu will be receiving a Community Development Block Grant for the proposed Leeward YMCA improvements, and because the City and County of Honolulu Department of Community Services will be the approving agency for this environmental assessment, this environmental assessment is prepared in compliance with 24 CFR 58. The appropriate environmental review document to be used with Part 58 regulations is the HUD Statutory Worksheet (Appendix B). The following information is provided in fulfillment of the requirements of the HUD Statutory Worksheet.

4.1.1 Historic Properties

With the closing of the O'ahu Sugar Company in 1995, then landowner Amfac Property Development Corporation, began seeking new uses for the mill site. The Amfac Commercial and Park project was proposed, as was the use of a portion of the mill site for the Leeward YMCA.

As part of the redevelopment of the mill site various studies were prepared, including a final environmental impact statement (EIS) (*Amfac Commercial and Park, Waipahu Central Oahu TMK 9-4-02: 04, Final Environmental Impact Statement* (PBR Hawaii 1997)) and an archaeological inventory survey (*Archaeological Inventory Survey at Waipahu, Waikele, Oahu (9-4-2: por. 4)*, (Cleghorn 1996), see Appendix C).

In 1996 the State of Hawai'i Department of Land and Natural Resources Historic Preservation Division reviewed and accepted the archaeological inventory survey (see acceptance letter in Appendix C). In their review comments the State Historic Preservation Division stated: "we believe it is unlikely that historic sites will be found and believe that this project will have 'no effect' on historic sites."

The site is not currently listed on the National Register of Historic Places. However, in their comment letter on the Leeward YMCA Draft Environmental Assessment, the State Historic Preservation Division stated: "we believe that the former mill site meets the criteria of eligibility for the National Register of Historic Places."

Potential Impacts and Mitigative Measures

While the O'ahu Sugar Company mill site is not listed on the National Register of Historic Places, it is an important part of Waipahu's history and culture. The YMCA has already renovated the former Administration Building and Human Resources Building for use for YMCA programs and services. As part of the proposed improvements, the generator building will also be renovated. The mill smokestack—possibly Waipahu's most dominate landmark and a lasting physical reference to Waipahu's history and cultural roots as a plantation town—will also be retained and incorporated in to the overall Leeward YMCA site plan.

After meeting with a representative from the State Historic Preservation Division at the Leeward YMCA site, it was determined that the proposed improvements to the Generator Building are subject to compliance with Section 106 of the National Preservation Act of 1966.

To comply, a Memorandum of Agreement (MOA) between the YMCA of Honolulu and the State of Hawaii Historic Preservation Officer was drafted. Under this agreement YMCA of Honolulu agrees to:

- Provide photographic documentation of the existing Generator Building before the renovation
- Incorporate the architectural characteristics of the building as part of the renovation
- Create an on-site historical exhibit within the renovated building

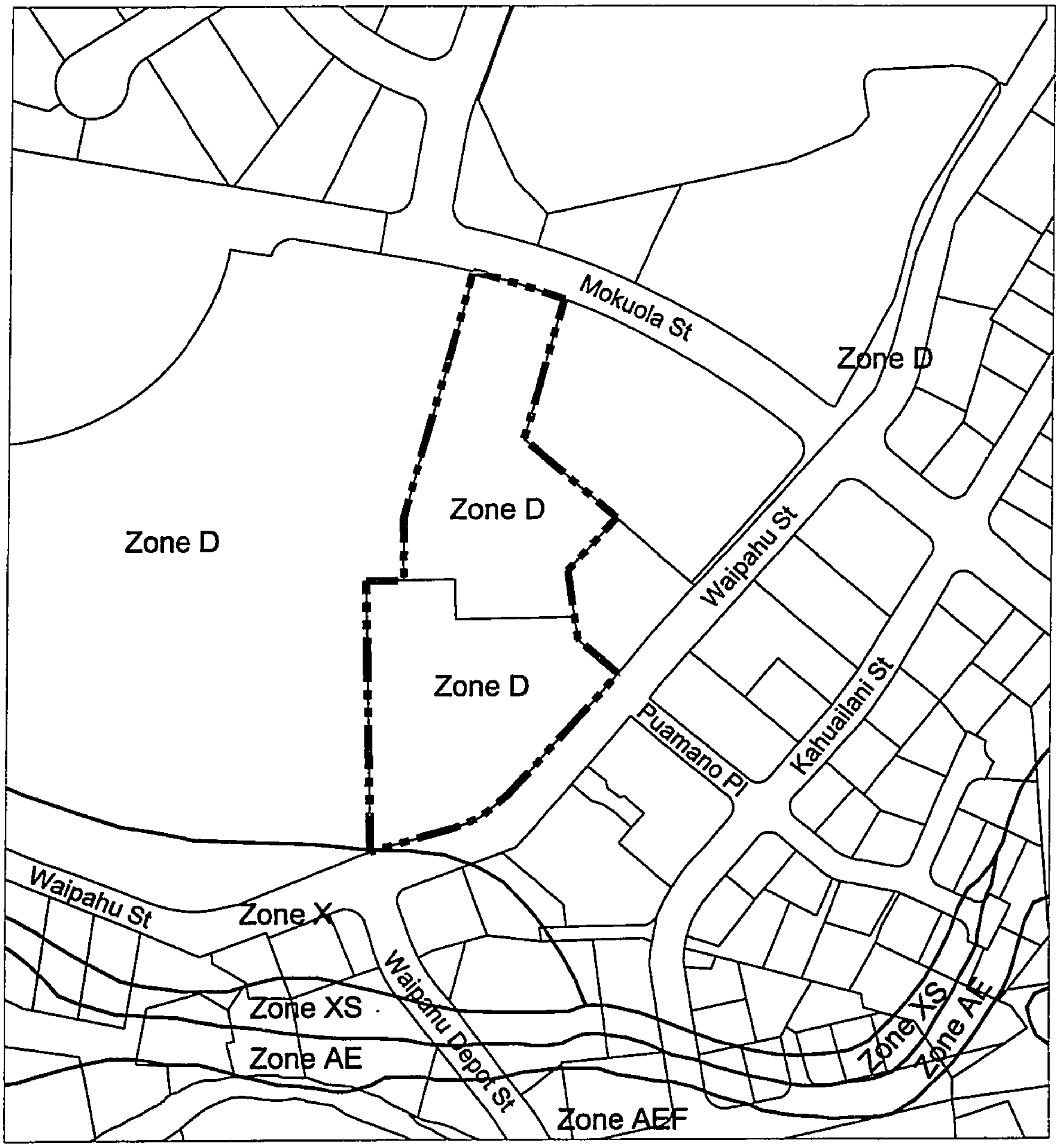
The signatories to the MOA are: The City and County of Honolulu Department of Community Services, the Hawaii State Historic Preservation Officer, the Young Men's Christian Association of Honolulu, and the Historic Hawaii Foundation. The Office of Hawaiian Affairs (OHA) was also contacted, but they declined to be a signatory.

In addition to the MOA, the City and County of Honolulu consulted with the National Advisory Council on Historic Preservation (Council). In reply, the Council stated that their participation was not required.

The MOA was signed by all signatories and compliance with Section 106 of the National Preservation Act of 1966 was achieved on February 27, 2004. Appendix D contains: 1) the MOA; 2) a letter to, and response from, the National Advisory Council on Historic Preservation; 3) the letter to OHA asking if they would like to be a signatory to the MOA.

4.1.2 Floodplain Management

As identified by the Federal Insurance Rate Map (FIRM) (Figure 7)(FIRM Map 15003C0240 E, November 20, 2000) the Leeward YMCA is located outside of the 100-year floodplain boundary and outside of the floodway boundary. It is within "Zone D." The Zone D designation indicates areas where flood hazards are undetermined.



LEGEND

Leeward YMCA

Flood Zone Boundary

D: Undetermined but possible flood hazards
X: Outside the 100-year and 500-year floodplains
XS: Minimal flood hazards
AE: 100-year floodplain
AEF: Floodway area in Zone AE

Source: Flood Insurance Rate Map #15003C0240E

Figure 7
Flood Insurance Rate Map
Leeward YMCA
Waipahu, Oahu

NORTH

LINEAL SCALE (FEET) 100 0 200

PBR HAWAII

Potential Impacts and Mitigative Measures

Because the Leeward YMCA is located in an area where flood hazards are undetermined, and is out of the 100-year floodplain and the floodway, the proposed improvements are not expected to: 1) be highly susceptible to flooding; 2) change the 100-year floodplain; or 3) affect the floodway.

4.1.3 Wetlands Protection

The Leeward YMCA is not within a wetland area nor will it have an adverse impact on an adjacent wetland area. This determination has been made by reviewing the USDI FWS Pearl Harbor, Hawaii USGS Quadrangle Map.

The nearest wetland is located approximately one-third of a mile from the site. The nearest coastline is approximately one half mile from the site.

Potential Impacts and Mitigative Measures

Because the Leeward YMCA is not located within or adjacent to a wetland the proposed improvements will have no impact on wetlands and no mitigative measures are proposed.

4.1.4 Coastal Zone Management

The proposed Leeward YMCA improvements are consistent with the Hawai'i Coastal Zone Management (CZM) program and meet the criteria of the general consistency certification approved by the State of Hawai'i Department of Business, Economic Development, and Tourism (see Appendix E for the Consistency Determination).

Potential Impacts and Mitigative Measures

Because the proposed improvements to the Leeward YMCA are consistent with the Hawai'i Coastal Zone Management (CZM) program and meet the criteria of the general consistency certification approved by the State of Hawai'i Department of Business, Economic Development, and Tourism, no impacts to coastal zones are anticipated and no mitigative measures are proposed.

4.1.5 Endangered Species/Flora and Fauna

The Department of Interior list of Endangered Species and Critical Habitats has been reviewed and the proposed Leeward YMCA improvements will not affect any listed or proposed endangered or threatened species or critical habitats. The U.S. Fish and Wildlife Service has reviewed the proposed Leeward YMCA improvements and concurs that no federally listed endangered species or posed or designated critical habitat occur on the project site (see Appendix F).

As the former O'ahu Sugar Company mill complex, the site of the Leeward YMCA has been highly modified for industrial use over the past century. As a result, no threatened or endangered plant or animal species are known to exist on the Leeward YMCA. Further, the existing vegetation is representative of introduced species and the site is not known to be a habitat for any threatened or endangered plant or animal species.

In addition, no wetlands, streams, estuaries, or other habitats that could accommodate threatened or endangered plant or animal species are present on the Leeward YMCA property or the surrounding area. The flora consists of exotic weedy species due to previous disturbance (clearing), and industrial and residential use of the land. Birds and animals common to urban areas, such as rats, mice, and domesticated and feral cats and dogs, were sighted or are presumed to exist on the site.

Potential Impacts and Mitigation Measures

New landscaping, including trees, will be provided as part of the proposed Leeward YMCA improvements. Plant materials will be selected to maximize the efficient use of irrigation water while enhancing the urban setting. The use of native plants will be considered where site conditions and aesthetic considerations permit.

The proposed Leeward YMCA improvements should not have a negative impact to birds or introduced wildlife in the area. Birds and the introduced wildlife will most likely benefit from landscape improvements.

4.1.6 Farmlands Protection

The proposed improvements to the Leeward YMCA will not require the conversion of farmland to non-agricultural uses. According to the Agricultural Lands of Importance to the State of Hawai'i (ALISH) system, the Leeward YMCA site is located within "Existing Urban Development" and does not include lands classified as "Prime," "Unique," or "Other Important" agricultural land (Figure 8). In addition, the State Land Study Bureau Detailed Land Classification system has classified the Leeward YMCA site as "Urban."

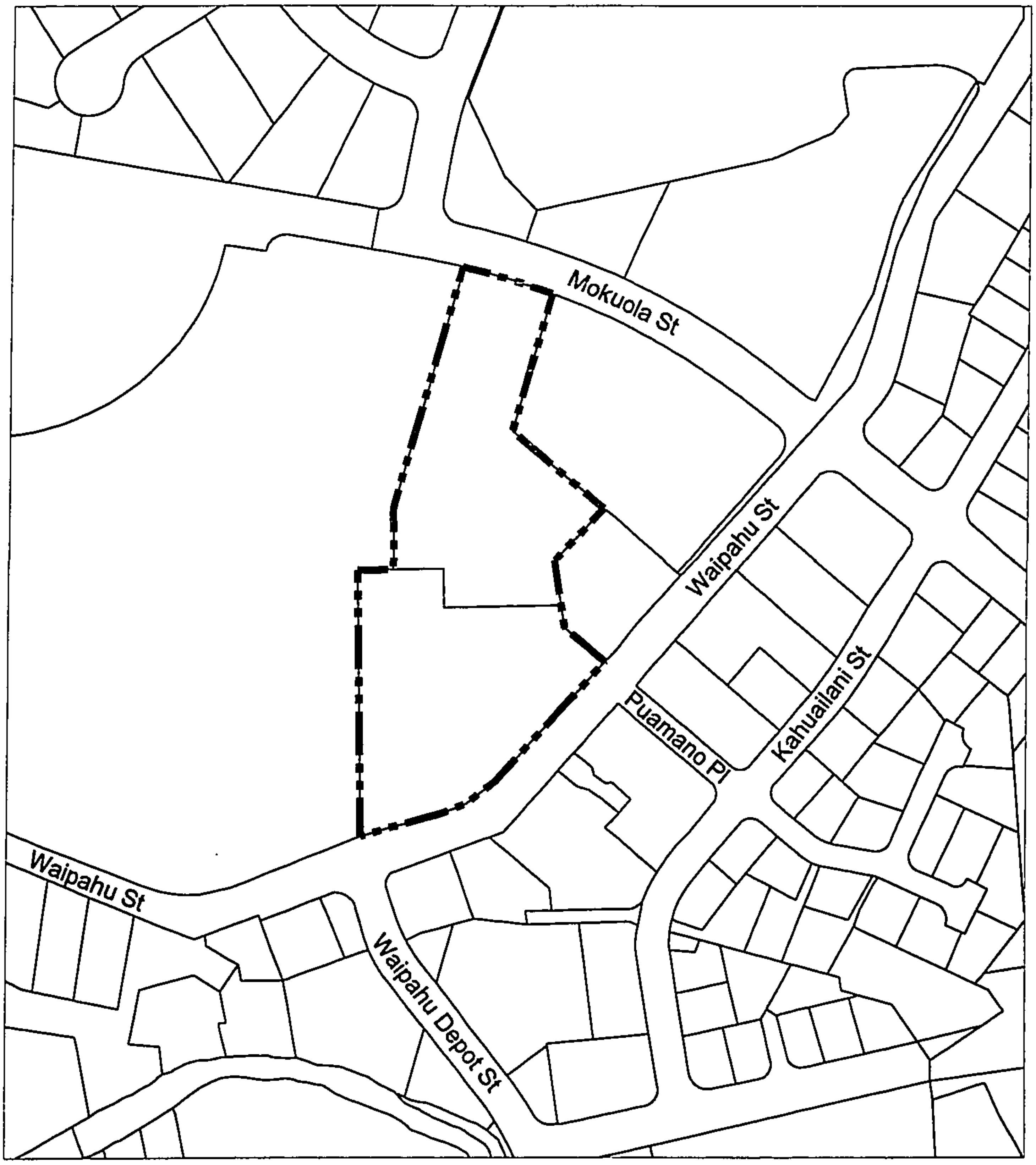
Potential Impacts and Mitigation Measures

Since the site of the Leeward YMCA is not considered farmland, the proposed improvements will have no impact on farmland and no mitigative measures are proposed.

4.1.7 Air Quality

In general, air quality in Hawai'i is excellent due to the predominant northeast trade winds. Some localized conditions, such as heavy traffic at intersections, can negatively impact air quality. Air quality in the vicinity of the Leeward YMCA is most likely affected by emissions from motor vehicle traffic on nearby roadways.

According to the Environmental Protection Agency (EPA) there are no "non-attainment" sites in the State of Hawai'i. A non-attainment area is defined as a locality where air pollution levels persistently exceed National Ambient Air Quality Standards. Because there are no "non-attainment"



LEGEND

Leeward YMCA
Prime Lands
Other Lands
Outside ALISH Lands

Source: -City and County of Honolulu
-State of Hawaii, Department of Agriculture
-State of Hawaii, Office of Planning

Figure 8
Agricultural Lands of Importance to the State of Hawaii (ALISH)

Leeward YMCA

Waipahu, Oahu

NORTH

LINEAL SCALE (FEET)

100 0 200

PBR HAWAII

sites in Hawai'i, the entire state is considered by the EPA to be in attainment for all criteria pollutants. Thus the Leeward YMCA is located within an "attainment area."

In addition, the Leeward YMCA is not located near a power plant or sugar mill and is not adjacent to a traffic thoroughfare that generates CO concentration in excess of the 8 hour standard of 10 mg/m^3 at project site. This is substantiated by an Air Quality Impact Analysis study (Ogden Environmental and Energy Services Co. 1996, see Appendix G) that was conducted for the project site as part of the *Amfac Commercial and Park Final Environmental Impact Statement* (PBR Hawaii 1997). According to the study, maximum 8-hour CO concentrations were not predicted to exceed 10 mg/m^3 at the project site at any time.

Potential Impacts and Mitigative Measures

Long-term air quality impacts are not expected due to the proposed improvements at the Leeward YMCA. Because air quality in Waipahu is primary impacted from vehicle emissions, and because the proposed improvements are not expected to substantially increase traffic in the area, it may be concluded that the proposed improvements will not substantially alter air quality in the vicinity.

Short-term air quality impacts due to the proposed improvements may result from construction activities. During construction, air quality in the area may be impacted by exhaust generated from construction equipment and fugitive dust. All construction activities will implement best management practices to reduce any negative air quality impacts and comply with the provisions of Hawai'i Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.1-33, Fugitive Dust. A combination of measures such as watering exposed soils, minimizing the amount of disturbed area, and rapid establishment plant materials will be implemented as appropriate. Exhaust emissions from construction equipment are not likely to exceed established air quality standards.

4.1.8 Water Quality

According to the HUD-EPA (Region IX) Sole Source Aquifer Memorandum of Understanding of 1990, the Leeward YMCA need not be referred to EPA for evaluation because it involves the construction of public facilities that will be served by an existing publicly owned and operated sewerage system (Section II.B.1).

Potential Impacts and Mitigation Measures

Because the Leeward YMCA will be served by an existing publicly owned and operated sewerage system, no impacts to aquifers are anticipated and no mitigative measures are proposed.

4.1.9 Noise

The Leeward YMCA is located approximately five miles from Hickam Air Force Base, approximately six miles from Honolulu International Airport, approximately seven miles from

Wheeler Air Force Base, and approximately 7 miles from the Barbers Point Naval Air Station (See Figure 9).

Current sources of noise near the Leeward YMCA include vehicle and air traffic. The Alexander and Baldwin Industrial subdivision to the west of the Leeward YMCA property could possibly be a source of noise in the future, although presently much of the subdivision is vacant. There are no residential uses adjacent to the property. None of the exiting or proposed uses for the former O'ahu Sugar Company mill complex are noise sensitive uses.

An acoustic study for the Leeward YMCA site was prepared in 1996 (*Acoustic Study of the Amfac Commercial and Park Project Waipahu, Central Oahu* (Ebisu 1996), see Appendix H) as part of the *Amfac Commercial and Park Final Environmental Impact Statement* (PBR Hawaii 1997). The EIS was prepared to assess the impacts of converting the O'ahu Sugar Company Mill complex into the Amfac Commercial and Park project, which includes the Leeward YMCA site. The acoustic study considered traffic noise level increases and impacts associated with the Amfac Commercial and Park project within the project site as well as along public roadways expected to service the project.

Potential Impacts and Mitigative Measures

While the Leeward YMCA is within several miles of a civil airport and military airfields, it is believed to be outside of the 55 db contour line for all of the surrounding air facilities. According to 24 CFR, Subpart B, Section 51.101(a)(8), "sites with a day-night average sound level of 65 and below area acceptable and allowable".

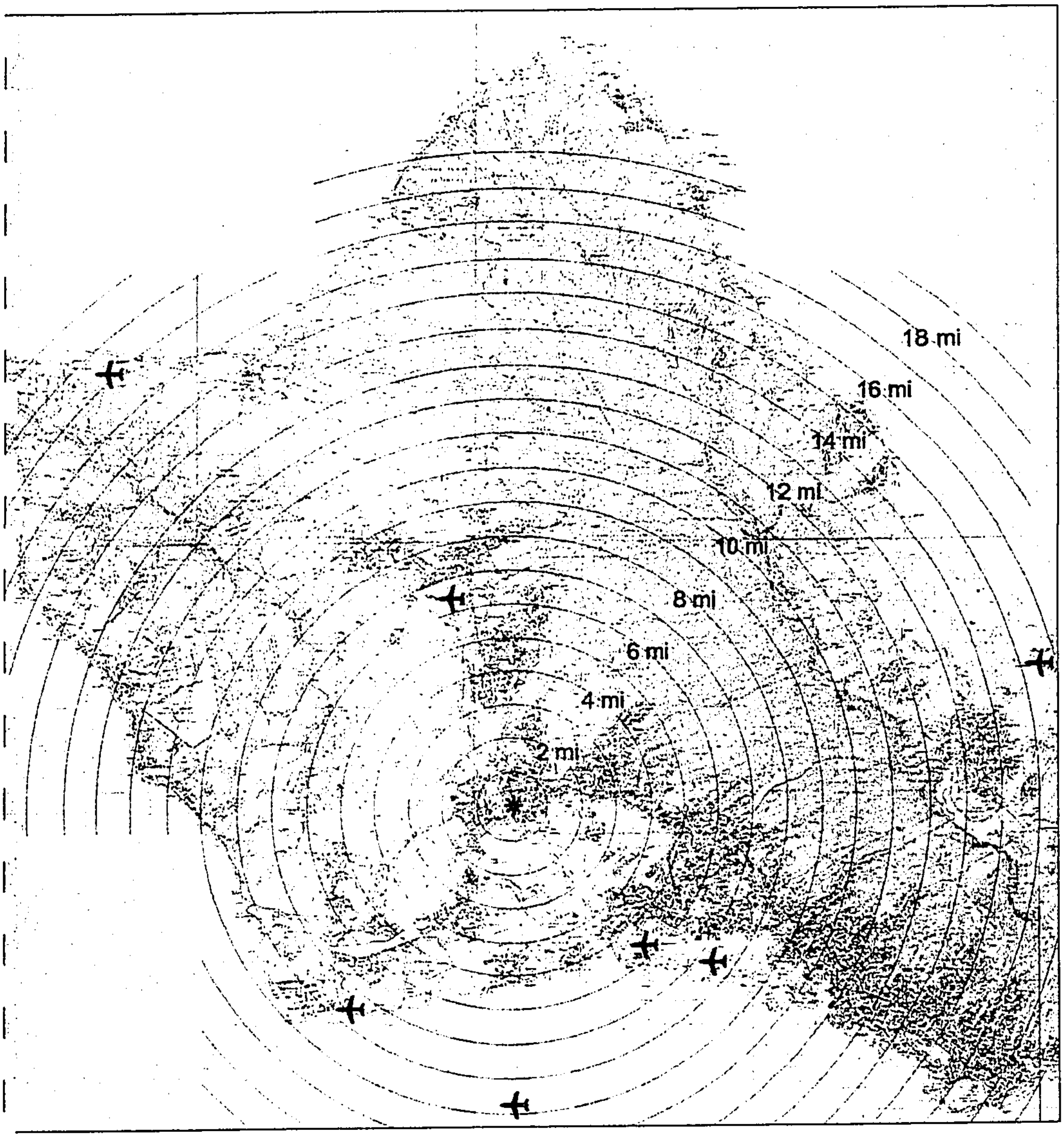
According to the acoustic study (Ebisu 1996), the loudest traffic noise affecting the site is expected to come from Waipahu Street. However the 65 Ldn (day-night average sound level) setback from Waipahu street is 64 feet and the buildings of the Leeward YMCA are outside of this setback and therefore are not subject to day-night average sound level above 65. In addition, the proposed improvements to the Leeward YMCA do not involve residential development.

The acoustic study (Ebisu 1996) also concludes that traffic noise increases resulting from project generated traffic are not considered to be significant and are not expected to generate adverse noise impacts.

Long-term noise impacts due to the proposed Leeward YMCA improvements are not expected to be significant. Since a substantial increase in noise sources is not anticipated, noise levels are not expected to significantly increase over existing levels.

Short term noise impacts will be generated during construction. Proper mitigating measures (such as limiting construction to daylight hours) will be employed to minimize the noise impacts. All project activities will comply with the State Department of Health's Administrative Rules, Chapter 11-46, "Community Noise Control" and will be monitored to ensure compliance.

Because long-term noise levels are not expected to be significant, no noise mitigation measures are planned as part of the project.



Legend

✱ Approximate Location of Leeward YMCA

✈ Airport

Figure 9
Distance to Airports
Leeward YMCA

Waipahu, Oahu

NORTH

LINEAR SCALE (FEET)
10000 0 20000

PBR HAWAII

Source: USGS Topographical Map

4.1.10 Thermal/Explosives Hazards

Industrial facilities handling explosive or fire-prone materials such as liquid propane, gasoline, or other storage tanks are not adjacent to or visible from the Leeward YMCA site.

The proposed improvements to the Leeward YMCA will expose neither people or buildings to explosive or flammable fuels or chemical containers.

Potential Impacts and Mitigative Measures

Because industrial facilities handling explosive or fire-prone materials such as liquid propane, gasoline, or other storage tanks are not adjacent to or visible from the Leeward YMCA site, no potential impacts from hazardous industrial operations are anticipated and no mitigative measures are proposed.

Because the proposed improvements to the Leeward YMCA will expose neither people or buildings to explosive or flammable fuels or chemical containers, no impacts are expected and no mitigative measures are proposed.

4.1.11 Airport Clear Zones

The Leeward YMCA is located approximately five miles from Hickam Air Force Base and approximately six miles from Honolulu International Airport (Figure 9)

Potential Impacts and Mitigative Measures

Because the Leeward YMCA is located approximately five miles from Hickam Air Force Base and approximately six miles from Honolulu International Airport there will be no impacts to airport clear zones and no mitigative measures are proposed.

4.1.12 Solid Waste Disposal

The Leeward YMCA site is served by adequate and acceptable:

- Municipal water supply
- Municipal sanitary sewers and waste water disposal
- Private trash collection and solid waste disposal

Potential Impacts and Mitigative Measures

For more information on infrastructure systems see section 4.2.10.

4.1.13 Toxic Chemicals and Radioactive Wastes

A Phase I Environmental Site Assessment report (Clayton Group Services 2000, see Appendix I-1) was prepared for a portion of the former O'ahu Sugar Company mill site (TMK 9-4-161:4). The report recommended further study to assess the soil in the vicinity of a former underground storage tank on the property for possible petroleum contamination and to sample and analyze ash located in and around the smoke stack. According to the recommendations of the Phase I report, a follow-up Subsurface Investigation and Ash Sampling report (*Subsurface Investigation and Ash Sampling at the Former Oahu Sugar Mill Property*, Clayton Group Services 2000, see Appendix I-2) was prepared.

The Subsurface Investigation and Ash Sampling report included the following findings:

- Total Resource Conservation and Recovery Act (RCRA) Metals analyses of the two ash samples indicated no concentrations of metals (including arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) above either Department of Health (DOH) Tier 1 Action Levels or the EPA Preliminary Remediation Goals (PRGs).
- The total petroleum hydrocarbon scan (TPH-Scan) indicated that three of the six soil samples had no detectable concentration of TPH. The remaining three samples indicated TPH samples far below the DOH Tier 1 Action Level.
- The benzene, toluene, ethylbenzene, and xylenes (BTEX) analyses indicated no detectable concentrations of BTEX.
- The polynuclear aromatic hydrocarbon (PAH) analyses indicated detectable concentrations of PAHs above the DOH Tier 1 Action Levels for benzo(a)pyrene and fluoranthene in one soil sample.

In addition to the Phase I Environmental Site Assessment report, the State of Hawaii Department of Health Office of Hazard Evaluation and Emergency Response (HEER) was contacted and asked to check their files and database for records of potential problems on the site related to toxic or radioactive chemicals. In response HEER stated that they do not have any information pertaining to the site (see Appendix I-3)

The Leeward YMCA site:

1) Is not near an industry disposing of chemicals or hazardous wastes;

2) Is not on an EPA Superfund National Priorities CERCLA, or equivalent State list;

4) Is not located within 3,000 feet of a toxic or solid waste landfill site; and

3) Does not have an underground storage tank.

In addition, there are no unresolved concerns that could lead HUD to be determined to be a Potential Responsible Party (PRP).

Potential Impacts and Mitigative Measures

Because the Leeward YMCA site was previously used as sugar mill, there were concerns related to the historical use of chemicals used, stored, or spilled on site. Because of these concerns, a Environmental Site Assessment report was prepared (Clayton Group Services 2000, see Appendix I-1). Following the recommendations of the Phase I report, a Subsurface Investigation and Ash Sampling report was prepared (Clayton Group Services 2000, see Appendix I-2). The report found that one of the six soil samples indicated a detectable concentration of benzo(a)pyrene and fluoranthene above DOH Tier 1 Action Levels. However, when the Leeward YMCA improvements are constructed, the area from which this sample was taken will be capped by the deck of the pool.

All findings, conclusions, and recommendations made by Clayton will be implemented during all phases of planning, design, and construction of the proposed Leeward YMCA.

4.1.12 Flood Insurance

The Leeward YMCA *is not within* a Special Flood Hazard Area identified on a current Flood Insurance Rate Map (FIRM). As identified by the FIRM (Figure 7)(City and County of Honolulu 150001, Panel 0240E, November 20, 2000) the Leeward YMCA is located outside of the 100-year floodplain boundary and outside of the floodway boundary. It is within "Zone D." The Zone D designation indicates areas where flood hazards are undetermined.

Potential Impacts and Mitigation Measures

Because the Leeward YMCA is not within a Special Flood Hazard Area identified on a current FIRM, flood insurance protection is not required.

4.1.13 Environmental Justice

The Leeward YMCA is located in a predominantly minority and low-income neighborhood, however the Leeward YMCA site and the surrounding neighborhood do not suffer from disproportionately adverse environmental effects on minority and low-income populations relative to the community at large.

Potential Impacts and Mitigation Measures

The proposed Leeward YMCA improvements will strengthen the Leeward YMCA's ability to carry out the mission of the YMCA of Honolulu, which is to put "Christian principles into practice through programs that build healthy spirit, mind, and body for all." The long-term result will enhance the social fabric and well-being of the community and contribute to an educated and responsible citizenry with the abilities to positively contribute to Hawai'i's social and economic well-being.

In addition, the adaptive reuse of the existing structures of the O'ahu Sugar Company Mill site will contribute toward the revitalization of Waipahu, while at the same time retaining the historic aspects of the mill site. It is also expected that the Leeward YMCA, along with the adjoining Filipino Community Center, will provide vital social centers for Waipahu, similar to how the old mill comprised the social heart of Waipahu during the plantation era.

As such the notion of environmental justice has been evaluated and there will be no activity performed with HUD funds that will in any way create discrimination or isolation of minority or low class income individuals based on the siting or purpose of the Leeward YMCA.

4.1.14 Unique Natural Features and Areas

The name "Wai-pahu" means "bursting water" or "water bursting from the ground" indicating the natural springs that once characterized the region. To investigate whether there are any remaining springs in the area, we contacted Waipahu Cultural Garden Park, which is nearby the Leeward YMCA site. Yoshiko Yamaguchi and Jimmy Yamaguchi (formerly employed at the Board of Water Supply) have been cultivating taro and watercress at the park for several years. Mrs. Yoshiko Yamaguchi confirmed that water for the taro lo'i is provided by fresh springs from the Pearl Harbor Aquifer, and may be accessed by digging shallow holes in the park land.

Other than the springs, there are no other unique natural features on the site, as the property is in a urban area and is not near public or private scenic areas. Because the site and the surrounding area was previously used for decades as a sugar plantation, there are no unique natural resources visible on the site.

Potential Impacts and Mitigative Measures

Regarding the natural spring in the Waipahu Cultural Garden Park, Mrs. Yamaguchi indicated there has been no significant changes in water availability in recent years, although there were seasonal variations when Oahu Sugar Company was in operation. Because Mr. and Mrs. Yamaguchi (and others) consume the taro and watercress cultivated at the park, they have had the Department of Health test the quality of the spring water on at least two occasions and it was found not to be contaminated. The water is apparently very clear and cool (which is necessary for taro cultivation).

Because the Leeward YMCA site is in a urban area and was previously used for decades as a sugar plantation, it is not likely that natural resources will be adversely affected or affect the project and no mitigative measures are warranted or proposed.

4.1.15 Site Suitability, Access, and Compatibility with Surrounding Development

The Leeward YMCA site has not been used as a dump, sanitary landfill, or a mine waste disposal area.

There is paved access to the site.

There is no indication of:

- Distressed vegetation

- Waste materials/containers
- Soil staining, pools of liquid
- Loose/empty drums
- Oil/chemical spills (see Section 4.1.1.3)
- Abandoned machinery, cars, refrigerators, etc.
- Transformers, fill/vent pipes, pipelines, drainage structures

The proposed Leeward YMCA improvements are compatible with the surrounding area in terms of:

- Land use—the surrounding land uses are urban
- Height, bulk, mass—the proposed improvements primarily will be renovation of an existing building
- Building type (low/high-rise)
- Building density
-

The Leeward YMCA will not be unduly influenced by:

- Building deterioration
- Postponed maintenance
- Obsolete public facilities
- Transition of land uses
- Incompatible land uses
- Inadequate off-street parking

There are no air pollution generators nearby that would adversely affect the site, such as

- Heavy industry
- Incinerators
- Power generating plants
- Oil refineries
- Cement plants
- Large parking facilities (1,000 or more cars)—the Waikele shopping center is approximately one half mile away
- Heavy traveled highway (6 or more lanes)—the H-1 freeway is approximately one half mile away

Potential Impacts and Mitigative Measures

The proposed Leeward YMCA improvements are consistent with the existing uses on the site and the surrounding area. The improvements will contribute to the well-planned growth of Waipahu by creating, along with the adjoining Filipino Community Center, a community and social center. In addition, the adaptive reuse of the mill buildings will retain Waipahu's sugar heritage and sense of place. Finally, compared to the run-down condition of the former mill buildings the proposed improvements will improve the overall physical appearance of Waipahu.

4.1.16 Soil Stability, Erosion, and Drainage

The Leeward YMCA site generally has average slopes of one to seven percent. There is no evidence of slope erosion or unstable slope conditions on or near the site. Further there is no evidence of ground subsidence, high water table, or other unusual conditions on the site.

There is no visual evidence of soil problems (foundation cracking or settling, basement flooding, etc.) in the neighborhood of the site.

Soil borings to address the soil stability of the site have not been made, however, because of the past use of the site for industrial uses (including substantial buildings and heavy machinery), it is unlikely that the soils of the site are unstable, marginal, or unsatisfactory.

There is no indication of cross-lot runoff, swales, or drainage flows on the property. In addition, there is are no visual indications of filled ground. Further there are no active rills or gullies on the site.

Wastewater from the Leeward YMCA flows into the City and County of Honolulu sewer system, therefore a report of the soil conditions suitable for on-site septic systems has not been prepared or submitted.

Because of the previous use of the site as the O'ahu Sugar Company mill and decades of urban uses, a soils report is not deemed necessary, nor are structural borings or a dynamic soil analysis/ geological study deemed necessary.

Potential Impacts and Mitigative Measures

During the construction phases of the project, there is a potential for the generation of dust and for water-borne soil erosion. Construction activities will follow strict erosion control measures specified by applicable Federal, State, and City regulations. Prior to issuance of a grading permit by the City and County of Honolulu, an erosion control plan and best management practices required will be submitted describing the implementation of appropriate erosion control measures. These generally include use of cut-off ditches, temporary ground cover, and use of detention areas. In addition, a watering program will be implemented to minimize soil loss through fugitive dust emissions during construction. After construction, establishment of permanent landscaping along the roadway will serve as long-term erosion control for unpaved areas.

4.1.17 Nuisances and Hazards

The Leeward YMCA will not be affected by the following natural hazards:

- Faults, fracture
- Cliffs, bluffs, crevices
- Slope-failures from rains
- Unprotected water bodies

- Fire hazard materials
- Wind/sand storm concerns
- Poisonous plants, insects, animals
- Hazardous terrain features

The Leeward YMCA will not be affected by the following built hazards and nuisances:

- Hazardous streets
- Dangerous intersections
- Through traffic
- Inadequate separation of pedestrian/vehicle traffic
- Inadequate screened drainage catchments
- Hazards in vacant lots
- Chemical tank-car terminals
- Other hazardous chemical storage
- Children's play areas located next to freeway or other high traffic ways
- Inadequate street lighting
- Quarries or other excavations
- Dumps/sanitary landfills or mining
- Railroad crossing
- High-pressure gas or liquid petroleum transmission lines on site
- Overhead transmission lines
- Hazardous cargo transportation routes
- Oil or gas wells
- Industrial operations

The Leeward YMCA will not be affected by the following nuisances:

- Gas, smoke, fumes
- Odors
- Vibration
- Glare from parking area
- Vacant/boarded-up buildings
- Unsightly land uses
- Front-lawn parking
- Abandoned vehicles
- Vermin infestation
- Industrial uses

Potential Impacts and Mitigative Measures

The proposed Leeward YMCA improvements will not be affected by or affect natural hazards. For more information on natural hazards specific to Hawai'i see Section 4.2.4. The proposed improvements also will not be affected by built hazards and nuisances such as roadway traffic, inadequate drainage, or odors and vibrations, as the these problems either do not exist on the site or site plan has been designed to minimize such problems.

4.1.18 Schools, Parks, Recreation, and Social Services

The local school system is not expected to be negatively impacted by the proposed improvements to the Leeward YMCA. The Leeward YMCA currently offers the following programs that are complementary to the public school system:

- A+ After School Programs at public elementary schools
- Before school and after school programs on site
- Holiday/Summer Fun
- S.T.A.R.S. teen performing arts program
- Youth Sports (flag football)

Hans L'Orange Park is directly across Mokuola Street from the Leeward YMCA.

Social services will be available on the Leeward YMCA site, including the following programs currently being offered by the Leeward YMCA:

- Substance abuse prevention programs for teens
- Teen action programs
- Youth Employment Programs

4.1.19 Emergency Health Care, Fire, and Police Services

Emergency health care providers are located within a reasonable proximity to the Leeward YMCA. The closest hospital with 24-hour emergency services is the St. Francis West Medical Center. The approximate response time from the St. Francis West Medical Center to the Leeward YMCA is approximately 10 minutes by ambulance service.

Police services are located within a reasonable proximity to the Leeward YMCA. The City and County of Honolulu Police Department maintains a Waipahu Substation that is open 24 hours a day. The approximate response time from the Waipahu Substation to the Leeward YMCA is three minutes.

Municipal fire fighting protection is provided by the Waipahu Fire Station located on Leonui Street, The approximate approximately response time from Waipahu Fire Station to the Leeward YMCA is four to six minutes.

Potential Impacts and Mitigative Measures

There may be an unavoidable and occasional need for emergency health care services. However, the Leeward YMCA is not expected to have a long-term adverse impact on emergency medical services.

There may be an occasional and unavoidable demand for police protection services associated with Leeward YMCA, however, it is anticipated that the existing police service will not be adversely affected by the proposed improvements.

In their comment letter on the draft environmental assessment the Police Department stated: "This proposed project should have negligible impact on the services and facilities of the Honolulu Police Department."

There may be an occasional and unavoidable demand for fire protection services associated with the Leeward YMCA. Existing levels of fire protection services and facilities are considered adequate to service the proposed project. Within the project site private water system will be provided where all appurtenances, hydrant spacing, and fire flow requirements meet Board of Water Supply standards. In addition the first floor of the most remote structure will be within 150 of both parking areas, which will be accessible to fire vehicles and apparatus. The applicant will advise the Fire Department of project implementation to permit adequate planning and advance notice of project completion.

4.1.20 Commercial/Retail and Transportation

Commercial/Retail

Commercial/Retail shopping services are located in the vicinity of the Leeward YMCA along Waipahu Street. The Alexander and Baldwin Industrial subdivision is located to the north of the Leeward YMCA.

The Leeward YMCA is accessible to employment, shopping, and services by both public transportation and private vehicle. Fixed route bus service is provided to Waipahu by the City Department of Transportation Services, which currently contracts with O'ahu Transit Services (OTS) for operation of TheBus. Waipahu is serviced by seven bus routes, #47, #48, # 49, #50, #51, #52, and # 62.

The approaches to the Leeward YMCA are convenient, safe, and attractive.

Potential Impacts and Mitigative Measures

The proposed improvements to the Leeward YMCA are expected to have a positive impact on nearby commercial and other services.

Although the proposed improvements may increase the number of people traveling to the Leeward YMCA by bus, this potential increase in bus ridership is not expected to be significant.

4.2 ADDITIONAL ENVIRONMENTAL CONSIDERATIONS

The following additional environmental considerations are provided in addition to the HUD environmental requirements (24 CFR 58) in fulfilment of the State of Hawai'i Environmental Impact Statement Law (Chapter 343, HRS).

4.2.1 Climate

In Waipahu, trade wind showers are relatively common and although heavy rains occur at times, most of the showers are light and of short duration. Normal annual rainfall is greater than 40 inches, three-fourths of which occurs during the wet season from October through April. Normal precipitation in January, the wettest month, is over 6 inches, and in June, the driest month, averages one and one-half inches.

Surface winds are generally around 13 to 24 miles per hour from the northeast. There are some seasonal changes in prevailing wind direction in winter with southerly Kona winds. Strong winds do occur at times in connection with storm systems moving through the area. Daily variations include diurnal effects of winds from the southwest quadrant during the night and morning hours, shifting to the northeast during the day.

Potential Impacts and Mitigative Measures

The proposed improvements to the Leeward YMCA are not expected to have a significant effect on climatic conditions and no mitigative measures are planned. Project landscaping may help to decrease any localized temperature increases resulting from the increase in paved areas.

4.2.2 Topography

The Leeward YMCA site generally has average slopes of one to seven percent. Until 1995, the site and the surrounding area was used as a sugar mill and plantation. As a result, the original topography has been altered from its natural state. The area surrounding the Leeward YWCA generally has average slopes of 1 to 7 percent, with the ground surface generally sloping in the southerly (makai) direction.

Potential Impacts and Mitigative Measures

The site already has been extensively modified by improvements related to the O'ahu Sugar Company mill. The proposed improvements will require vegetation removal, earthwork, and grading. All grading operations will be conducted in full compliance with dust, erosion control and other requirements of the City and County of Honolulu Grading Ordinance. All construction activities will comply with the provisions of Chapter 11-60.1, Hawai'i Administrative Rules, on fugitive dust. A grading permit is required to modify the topography.

4.2.3 Soils

There have been three soil suitability studies prepared for Hawai'i whose principal focus has been on describing the physical attributes of land and the relative productivity of different land types for agricultural production. These are (1) the Land Study Bureau Detailed Land Classification, (2) the U.S. Department of Agriculture Soil Conservation Service Soil Survey, and (3) the Agricultural Lands of Importance to the State of Hawai'i (ALISH).

4.2.3.1 Land Study Bureau Detailed Land Classification

The Land Study Bureau Detailed Land Classification (1965 through 1972) series was produced by the Land Study Bureau (LSB) of the University of Hawai'i for each island. The LSB classification system groups land into homogeneous units called Land Types, describes their condition and environment, delineates the areas on aerial photo base maps, rates the lands on their overall quality (productivity) in relation to other lands, and appraises their performance under selected alternative agricultural crops. This series of reports were produced with the intention of developing a land inventory and productivity evaluation based on statewide "standards" of crop yields and levels of management.

The Leeward YMCA site has been used for urban and industrial uses for nearly a century. The parcel has therefore, not been classified under the Land Study Bureau system since its uses foreclosed an agricultural crop production potential.

4.2.3.2 Soil Conservation Service Soil Survey

The Soil Conservation Service Soil Survey (1972) series for each island was prepared by the U.S. Department of Agriculture Soil Conservation Service (SCS) and the University of Hawai'i Agricultural Experiment Station. These reports are somewhat similar to those of the Land Study Bureau, except that they are patterned after a soil classification procedure adapted for nationwide, uniform application. Soil types are ranked according to their suitability for most kinds of crops. Also provided are listings of crops commonly grown on the soil types and their expected productivity under present management.

The USDA Soil Survey classifies the Leeward YMCA site as containing mostly silty clay soils of the Waipahu Series, (WzC and WzA) which are characterized as generally level soils in areas with rainfall of 25 to 35 inches annually. Runoff is medium and the erosion hazard is moderate.

4.2.3.3 Agricultural Lands of Importance to the State of Hawai'i

The Agricultural Lands of Importance to the State of Hawai'i (ALISH) (1977) system includes the entire state. The ALISH system consists of the mapped identification of three broad classes of agricultural land based, in part, on the criteria established by the Soil Conservation Service; Prime, Unique, and Other Important Agricultural Land.

The Leeward YMCA site is not classified in any category by the ALISH system most likely due to its use of the past century for urban and industrial uses (Figure 8).

Potential Impacts and Mitigative Measures

During the construction phases of the project, there is a potential for the generation of dust and for water-borne soil erosion. Construction activities will follow strict erosion control measures specified by applicable Federal, State and City regulations. Prior to issuance of a grading permit by the City and County of Honolulu, an erosion control plan and best management practices required for the NPDES permit will be submitted describing the implementation of appropriate erosion control measures. These generally include use of cut-off ditches, temporary ground cover, and use of detention areas. In addition, a watering program will be implemented to minimize soil loss through fugitive dust emissions during construction. After construction, establishment of permanent landscaping along the roadway will serve as long-term erosion control for unpaved areas.

4.2.4 Natural Hazards

Natural hazards affecting the Hawaiian Islands include hurricanes, volcanic eruptions, earthquakes, and flooding. Volcanic hazards in the area are considered minimal due to the extinct status of former volcanoes that comprise O'ahu.

Most earthquake activity in Hawai'i is related to volcanic rather than tectonic activity. Thousands of small earthquakes occur in Hawai'i each year, and moderate and disastrous earthquakes have rocked the islands in the past. Seismic hazards in the area are no greater than other locations on O'ahu.

Hurricanes have directly impacted Hawai'i twice in the past two decades. Both events were centered on Kaua'i. Hurricane 'Iwa struck in 1982 and Hurricane 'Iniki in 1992. While these events are relatively rare in Hawai'i, they do occur, and call for advanced planning and state and county policy considerations. The Waipahu area, as the rest of the island or state, is no more or less vulnerable to the destructive winds and torrential rains associated with hurricanes.

As identified by the Federal Insurance Rate Map (FIRM) (Figure 7), the Leeward YMCA is located outside of the 100-year floodplain boundary and outside of the floodway boundary. It is within "Zone D." The Zone D designation indicates areas where flood hazards are undetermined.

Potential Impacts and Mitigation Measures

The improvements to the Leeward YMCA will not exacerbate any natural hazard conditions. The improvements will be constructed in compliance with all City requirements, although these requirements do not preclude potential damage from earthquakes or other natural hazards. Landscaping, particularly trees may be subject to damage from hurricanes and possibly from earthquakes.

4.2.5 Archaeological and Historic Resources

Several archaeological surveys or reconnaissance surveys have been conducted in the Waipahu area and in the vicinity of the Leeward YMCA. In 1996, Paul L. Cleghorn, Ph.D. (1996) of Pacific Legacy, Inc. conducted an archaeological survey for the area proposed to be developed into the AMFAC Commercial and Park project (which includes the Leeward YMCA property) to determine if any potentially significant archaeological resources are present on the property. The study entailed research of previous studies and a surface survey. No traditional archaeological sites were observed on the surface of the project area.

In 1993 and 1994, Robert L. Spear (1993, 1994) conducted two reconnaissance surveys for the Amfac Industrial Subdivision area proposed for the area adjacent to the AMFAC Commercial and Park project. No archaeological sites were found and Spear concluded that the area had been extensively disturbed. Other earlier studies by McAllister (1933), Cox and Stasack (1970), and Folk (1990) were researched. Folk recorded three historic-period dressed stone walls along Waipahu Street and dressed curbstones along Waipahu Street and Makaaloha Street. The wall segments along Waipahu Street range in height from 0.2 to 3.0 m and are constructed of basalt boulders which have been flaked and dressed to form rectangular blocks. It appeared that the walls were constructed without mortar.

An open excavation trench was observed in the area northeast of the AMFAC Commercial and Park project. The trench revealed that approximately 40 cm of fill has been deposited over the area. Much of the fill contains coral gravel which was observed scattered over most of the unpaved surface in the vicinity of the mill. The excavation trench also showed deeper disturbance (a pipe and wooden post) extending to a meter below surface. These data suggest that there is a low likelihood that subsurface archaeological deposits occur within the area. However, there may be a possibility that historic period deposits may be present.

Cleghorn (1996) concluded that no traditional archaeological sites were found in the AMFAC Commercial and Park area (which includes the Leeward YMCA site) and it appears unlikely that there will be potentially significant subsurface archaeological deposits of prehistoric age in the area.

In 1996, the State Historic Preservation Division reviewed and accepted the archaeological report by Cleghorn. In their review comments, the State Historic Preservation Division stated: "we believe it is unlikely that historic sites will be found and believe that this project will have 'no effect' on historic sites."

Based on the studies of the Leeward YMCA site and the immediate vicinity and the comments from the State Historic Preservation Division, it is concluded that it is unlikely that any significant archaeological sites will be found.

Potential Impacts and Mitigation Measures

Because no significant archaeological resources are expected to be found on or in the area of the Leeward YMCA, no potential impacts are anticipated. Despite the unlikeliness of finding archaeological resources, all construction plans will include the following language as normally recommended by the State Historic Preservation Division:

> Should historic remains such as artifacts, burials, concentrations of shell or charcoal be encountered during the construction activities, work shall cease immediately in the immediate vicinity of the find and the find shall be protected from further damage. The contractor shall immediately contact the State Historic Preservation Division at 692-8015 which will assess the significance of the find and recommend an appropriate mitigation measure, if necessary.

4.2.6 Cultural Impacts

Before the 19th century, Hawaiians had cleared much of the land and settled in the Waipahu area, which, at the time, was a wealthy source of fishing resources. As many as 27 fish ponds ringed the shoreline. These ponds were the property of the ali'i of the area. The abundant fresh water in the area supported numerous taro lo'i. Although the ahupua'a, was called "Waikele" by the early Hawaiians, the area eventually became known as "Waipahu." The name "Wai-pahu" which means "bursting water" or "water bursting from underground," referred to the natural springs that once characterized the area. It was also home of the legendary shark goddess Ka'ahupahau.

Historically, Waipahu evolved as a result of its economic mainstay, the O'ahu Sugar Company. Originally called O'ahu Plantation, the sugar operation was established in 1897 and was a major determinate of the town's growth and prosperity. With expansive amounts of land, abundant water, and a newly installed railway system, the OR&L, which linked the Leeward area to the port of Honolulu, Waipahu gradually changed from a fishing and wetland farming community to a successful sugar plantation town.

As a primary source of employment, the plantation attracted a mixture of immigrant workers, which formed a community of various cultures, traditions, and lifestyles. Waipahu became a classic example of a sugar plantation town. For Waipahu, the most widely recognized element of its past is its sugar plantation heritage.

The following cultural practitioners were asked if they were aware of any cultural practices occurring on the Leeward YMCA site (on the site of the former Oahu Sugar Mill above Waipahu): Puakea Nogelmeier, Lynette Cruz, Stephen Kubota, Kaimipono Orr, Shad Kane, and Poni Kamauu (in the order in which they were contacted, see Section 7.0, References). Those first contacted deferred commenting to others and provided the names of other practitioners to contact. The final two, Shad Kane and Poni Kamauu, provided the following comments about the project site.

Shad Kane (2003) stated the following:

> *The property on which the Oahu Sugar Mill and presently Leeward YMCA is built is extremely important from a Hawaiian cultural perspective. Although we refer to the area as Waipahu it was anciently referred to as Waikele and home of district Chiefs. Some cultural resources can still be seen today in the surrounding properties. Some of these resources are at risk today due to development plans.*

There are many mo'olelo regarding this area. I would be surprised if no one feels their presence today.

In response to a request for some of the mo'olelo (history, legend, or record) that Mr. Kane referred to, he responded:

There are a lot of historical accounts of the cultural significance of the area around and including the property that sugar mill is situated on. Perhaps the easiest source to use is "Sites of Oahu" by Sterling and Summers. Just check the information under "Waikele."

The following are two mo'olelo excerpts from *Sites of Oahu* (Sterling and Summers 1978):

Ke-one-kui-lima-laula-o-Ewa

Located on site of Oahu Sugar Mill above Waipahu.

This is the story of why Ke-one-kui-lima-laula-o-Ewa (The-land-of holding-hands-over-the-breadth-of-Ewa) was named. It was named because of two chiefs whose names I do not know. I know something of what they did and here is the brief tale. The older brother, who was chief of Oahu resided at Waikele, while his younger brother resided at Waikiki. This brother did not feel kindly toward the other and wished to rebel and this was what he did. The chiefs of old were fond of catching tiger sharks and killed men for bait. The fish was caught under the direction of the kahuna. He (the younger chief) did as he was told and caught a big fish. The shark was divided from head to tail, the contents removed and the skin saved. A house-like structure was made to put inside and the skin sewed over it. The sharp teeth of the shark were left as they were and a place was made for the chief to sit. Let us leave him with his plot and turn to his brother who was unaware of it all. While the chief lived quietly in Waikele, his kahuna foresaw what was to come. One day the kahuna said to the chief, "O chief, your brother has a fish and is thinking of coming to you to let him bring the fish to Waikele for you to take care of. The chief's messenger will soon arrive and when he comes to tell you of your brother's request, refuse him." This was the chief's answer, "Why should I refuse to grant my brother his wish?" The kahuna replied, "He will kill you for it is a human fish and is coming to rebel against you and seize your kingdom." "I do not believe that he will come to harm me." "Aye, you O chief, will suffer a cruel death but I, the kahuna, have a narrow path." Two weeks had not passed after the kahuna warned the chief, when the messenger arrived from Waikiki. The messenger brought deceitful words according to the wishes of his own chief and at last the chief consented. He went back to report that all was well saying, "Let us go. Let us stand and go at once." Bundles were made ready, bundles of stone wrapped in ti leaves, securely tied as gifts to the chief of Waikele. A manele carrier was made for the fish to lie on, then it was carried along. The chief sat inside of it. Those of Waikiki, Honolulu, Kapalama, Kalihi, Moanalua, Halawa and along all the places as far as Waiawa *went too. They all carried the same thing, stones, wrapped and tied as far as Waipahu. The fish was taken to the plain.*

The heedless chief sat waiting for his brother's fish with food ready for all in the house. He sat unaware of the approach of death and when the kahuna saw the large procession of the Waikiki chief, above Waipahu, he turned and fled out of sight.

As the kahuna vanished the fish came up from the other side. Then the war leaders paired the men off, each pari with a bundle of Poi (pa'i ai), that is, a bundle of stones (that looked like a bundle of 'a'i ai). They went arm in arm preceded by the fish. The procession moved with their shouts of "O Ewa, go arm in arm!" (E Ewa e - e kui na lime. E Ewa e - kui na lima). While most of the people shouted the fish reached the opposite side and wherever it went, the procession followed. They went around, surrounding the chief's five houses until they were fifty deep but the line of marchers had not come to an end. As they went around until they were fifty deep, the chief (of Waikiki) knew that they had arrived and came out of the fish. He ordered them to throw their stones killing all of the others and the government became the younger brother's. Because of this going arm in arm in unity, the plain above Waipahu, on the lower side of the old government road was called Ke-one-kui-lima-laula-o-Ewa (The land of going arm in arm on the breadth of Ewa). So that travelers around the world may know where this Arm-in-arm land is, it is where the Oahu Sugar Mill is erected above Waipahu.

Na Wahi Pana o Ewa
Ka Loea Kalaiaina, June 10, 1899
Newsp.

Another version:

When the woman who had lost her tapa beater came finally to Waikele and found her beater being used by another woman she claimed it as hers rightfully. The woman who found the beater returned it to its owner and also offered her hospitality which she accepted. As the woman from Kahuku began her return trip the woman from Waikele accompanied her a little ways up the hill to the plain above. From her home to the plain above the trail was narrow so that the two women were obliged to go single file. When they reached the plateau above they were able to walk side by side which they did, linking their arms and thus they crossed this plain together before parting. Hence the name "Ke-one-kui-lima-laula-o-Ewa".

Simeon Nawaa
As told to E. S., March 22, 1954

Poni Kamauu (2003) shared a similar opinion about the importance of this area for a number of reasons. The place names of the area, "Waikele" (literally "muddy water"), "Waipi'o" (literally "curved water"), and "Waipahu" (literally "bursting water"), share the word "wai" or water. Areas with readily available water were desirable settlement areas for ancient Hawaiians, and especially for ali'i (chiefs), and signified a lifestyle of wealth and prosperity. Besides the readily available water, Mr. Kamauu noted that the abundance of water allowed the successful cultivation of food crops. Today, a handful of Hawaiians who have been living in Waipahu through generations, practice the traditional cultivation of crops using the moon phases as a planting schedule. This method has since been adopted by other ethnicities, such as the Filipino, Japanese, and Portuguese.

The Ahupuaa of Waipio, in which Waipahu falls on, is often referred to in chants at "pi'o i ka lewa" (literally the "arch in the sky"), referring to the beautiful arches of the rainbow signifying the presence of alii. Waipahu would also be a desirable residence for alii because of the close proximity to the shoreline of Pearl Harbor. Today, many families of Kahuna (priestly) lineages still reside in Waipahu and continue to serve its community as their kupuna (elders) have for hundreds of years.

Mr. Kamauu also noted that Vancouver wrote that the area was covered with "sweet grass" (sugar cane or "ko"). Sugar cane was commonly planted around kalo loi (taro fields). This native cultivation of ko pre-dated Oahu Sugar Company's sugar plantation fields. As "choice" land for alii for food and water, Mr. Kamauu noted that this area was also a gathering place. Before the construction of the H-1 and H-2 Freeways, all those traveling to and from Kunia to Honolulu, or Ewa and Waianae to Honolulu, would have to pass through Waipahu, so Waipahu remained a gathering place. Oahu Sugar Company's mill in Oahu also helped to reinforce Waipahu as a gathering place (employment, banking, business and retail center). The beauty of Waipahu and the areas surrounding it is appreciate through a song entitled Pā'au'au Waltz, collected by Charles E. King. It speaks of the various winds that welcome the area, the beautiful pearl oysters, and also utilizes that ancient name Polea, which we consider today the areas of Waipio, Waikele, and Waipahu:

Ha'aheo Pā'au'au la i ka nani
Kilakila i ka paia ka Moa'e
E walea ana paha i ka 'olu
I ka ho'oheno a ka i'a hāmau leo

Hui: Pau'ole ko'u ho'ohihi i ka nani o Pā'au'au
Na wai e 'ole ka 'i'ini
Ua noho a kupa i laila
Uluwehi wale ia home Maka'ala i ke kai of Polea
Ho'olale a'e ana e 'ike i ka nani o Pā'au'au

O ka pā'olu mai a ke kaomi
Ho'oulu mau ana i ka Moa'e
Pā iho i ka 'olu o Ka'ena loko
Nolu i ke alo a'o Waipi'o

Potential Impacts and Mitigation Measures

With the closure of the mill and sugar operations in 1995 the stage was set for a new era of Waipahu. As part of this new era, the Leeward YMCA will contribute toward the revitalization of Waipahu, while at the same time retaining the historic aspects of the mill site through adaptive reuse of the mill buildings. As part of this adaptive reuse, the mill smokestack will be retained on the site of the

Leeward YMCA to provide a historical landmark and a link to Waipahu's plantation heritage. It is also expected that the Leeward YMCA, along with the adjoining Filipino Community Center will, provide vital social centers for Waipahu, similar to how the old mill comprised the social heart of Waipahu during the plantation era. As one resident stated:"Waipahu is exploding with new people and stores. A YMCA would anchor the community. I hope they build a big one." (quoted in the Community Needs Assessment, Phil Balducci & Associates, Inc., 2001).

Waipahu, including the project site is a culturally important area to Native Hawaiian cultural practitioners. Mr. Kamauu points out that Waipahu is said to be the point in which Oahu experienced an incredible explosion during the pilipapā[1] (the joining of two lands). Much of the area, has changed, from fields of ko to residential subdivisions, and the loss of importance of Waipahu as a gathering place as residents and visitors bypassed the town by traveling on the H-1 and H-2 Freeways and the closure of the Oahu Sugar Company. However, development of the former Oahu Sugar Mill site (including the proposed Leeward YMCA, the new Filipino Community Center, the expansion of Hans L'Orange Park to allow for semi-professional baseball, A&B Industrial Park, and commercial zoning) will help Waipahu to regain its stature as a gathering place, albeit not at the same stature as it once was.

As a mitigative measure, the mo'olelo of this area will be depicted on the walls of the building and will be taught to the children using the Leeward YMCA.

4.2.7 Economic Impacts

The YMCA of Honolulu (parent organization of the Leeward YMCA) is a not-for-profit organization. Its major sources of funding are: 1) membership and program fees; 2) government contracts for services such as the A+ After School Program and counseling for at-risk youth; and 3) donations from individuals, corporations, and foundations. The YMCA of Honolulu's annual budget is $18 million.

The YMCA of Honolulu has 160 full-time employees, 800 part-time employees, and 2,600 volunteers. More than 300 community volunteers serve on the YMCA of Honolulu's corporate and branch boards.

Currently, the Leeward YMCA has 13 full-time employees and 96 part-time employees.

The proposed Leeward YMCA improvements are estimated to cost $8,000,000.

Potential Impacts and Mitigation Measures

The proposed improvements will generate short-term construction employment and associated other jobs in the economy generated by sales to construction companies or the expenditure of wages by workers.

[1]This word is not found in the Hawaiian Dictionary, but is often heard in ancient chants and oral traditions.

After construction of the proposed improvements it is estimated that there will be 13 additional full-time employees and 36 additional part-time employees (a full-time equivalent of 30.5 jobs). At least 51 percent of these jobs will be available to low and moderate income persons.

In the larger context, the expansion of the Leeward YMCA will allow the YMCA to provide increased programs and services. The goal of these programs and services is to positively enhance the social fabric and well being of the community, ultimately contributing to an educated and responsible citizenry with the abilities to positively contribute to Hawai'i's social and economic well being.

4.2.8 Social Impacts

Waipahu was a busy plantation town for nearly a century, centered around the operations of the O'ahu Sugar Mill. The plantation prospered for decades. O'ahu Sugar workers lived in camps throughout the surrounding region, and Waipahu grew below the mill site. Its shops served a wide region.

The O'ahu Sugar Mill ceased operations in 1995 and today, Waipahu stands at the center of urban growth on O'ahu, lying at the intersection of the island's major highways and between O'ahu's urban core and the areas designated for future urban expansion. Development in Central O'ahu and 'Ewa will continue to have an impact on Waipahu.

Waipahu's population has grown steadily over the last 100 years. By 1990, Waipahu had 51,295 residents. Of these, 31,364 persons (61%) were in the area of historic Waipahu Town. While there is a slightly younger population in Waipahu than on O'ahu as a whole, some areas in Waipahu Town have large numbers of persons over 65 years of age. Waipahu residents are less likely than others on O'ahu to have moved in the last five years, especially ones living near the mill.

Waipahu is viewed by many in Hawai'i as a predominantly Filipino community. In Waipahu Town, Filipinos comprise the largest ethnic group (45.7%). Most of the population is Hawai'i-born (60.3%), but slightly more than a quarter of the residents are foreign-born (26.7%).

Waipahu is a working-class town. Approximately 44 percent of those living in Waipahu are working in service, precision craft, or operator/laborer jobs. The 1990 Census showed unemployment in Waipahu to be slightly higher (0.9% more) than for the island as a whole. The situation worsened during the 1990s. By early 1994, unemployment was estimated at 7 percent, when the island rate was 4.4 percent (Community Resources, Inc., 1994). In 1995, Waipahu lost jobs as O'ahu Sugar ceased operations and Arakawa Store closed.

The 1990 Census data indicates that household income in Waipahu is comparable to the O'ahu annual average, but per capita income was significantly lower in Waipahu Town ($10,888 versus $16,256 for O'ahu in 1990).

Major community planning efforts have resulted in clear statements of community aims (*Waipahu Livable Communities Initiative* (1998), The *Waipahu Town Heritage Plan* (1996), the *Waipahu*

Town Plan: A Special Area Plan for Waipahu (1995), and the *Waipahu 2000 Update* (1995). Looking at the possibility of future development, Waipahu residents stress the importance of:

- Preserving the plantation heritage;
- Parks and recreation areas;
- A Filipino community center;
- More parking; and
- Alleviating traffic congestion.

For Waipahu, redevelopment of the central commercial and industrial area supports community life.

According to the mission statement of the YMCA of Honolulu: "The YMCA of Honolulu is a fellowship dedicated to putting Christian principles into practice through programs that build healthy spirit, mind, and body for all." The YMCA of Honolulu's theme is "We build strong kids, strong families, and strong communities." In addition the YMCA of Honolulu is committed to promoting values. Specifically they focus on four core values—caring, honesty, respect, and responsibility.

The YMCA of Honolulu conducts programs in the following seven areas of emphasis:

1) Developing positive social values and leadership.
2) Strengthening families.
3) Developing healthy lifestyles.
4) Developing a sense of community.
5) Improving opportunities for youth at risk.
6) Promoting international and intercultural understanding.
7) Promoting appreciation and concern for the environment.

Potential Impacts and Mitigative Measures

The proposed Leeward YMCA improvements will strengthen the Leeward YMCA's ability to carry out the mission of the YMCA of Honolulu. The long-term result will enhance the social fabric and well being of the community and contribute to an educated and responsible citizenry with the abilities to positively contribute to Hawai'i's social and economic well being.

In addition, the adaptive reuse of the existing structures of the O'ahu Sugar Company Mill site will contribute toward the revitalization of Waipahu, while at the same time retaining the historic aspects of the mill site. As part of this adaptive reuse, the mill smokestack will be retained on the site of the Leeward YMCA to provide a historical landmark and a link to Waipahu's plantation heritage. It is also expected that the Leeward YMCA, along with the adjoining Filipino Community Center, will provide vital social centers for Waipahu, similar to how the old mill comprised the social heart of the Waipahu during the plantation era.

4.2.9 Traffic and Circulation

The Leeward YMCA site can be accessed from both Waipahu Street and Mokuola Street.

Waipahu Street is a two lane collector road that runs east-west between Kunia Road and Kamehameha Highway. It is a major collector/distributor road through Waipahu, serving residences, small commercial areas, parks, and schools. Certain segments of Waipahu Street are narrow with curving alignments. Near the Leeward YMCA, Waipahu Street is signalized at Depot Road, Mokuola Street, and Paiwa Street.

Mokuola Street is a two-lane street that currently runs north-south between Farrington Highway and Puko Street. Work is currently underway to connect Mokuola Street north of Puko Street to Managers Drive. When this connection is made, Mokuola Street/Managers Drive will become a major mauka-makai road aligned through the middle of the Waipahu town core. It will serve as the primary spine road for the Alexander and Baldwin Industrial Subdivision to the north of the Leeward YMCA site and to residences further north.

Potential Impacts and Mitigation Measures

As part of an environmental impact statement completed in 1997 for the Amfac Commercial and Park project (PBR HAWAII 1997), in 1996 a traffic report was prepared to analyze the potential traffic impacts and circulation needs of the Waipahu area in light of the redevelopment of the O'ahu Sugar Company mill site (see Appendix J). Locating the Leeward YMCA on a portion of the mill site was included as one of the assumptions of the traffic report.

Under existing conditions (1996), the traffic report concluded that the intersection of Waipahu Street and Paiwa Street and the intersection of Waipahu Street and Mokuola Street were both operating at unacceptable levels of service (LOS E or F). Under future conditions, which are based on the assumptions of increased traffic from new development at the mill site (including the Leeward YMCA) and the connection of Mokuola Street with Managers Drive (among other assumptions) these intersections were expected to operate at LOS D, which is not an optimum level of service, but is considered acceptable.

4.2.10 Infrastructure

4.2.10.1 Water System

The Board of Water Supply owns and maintains the water system that services the Waipahu region.

The existing facilities of the Leeward YMCA are served from this system. In addition, in the vicinity of the Leeward YMCA, there is a 36-inch water main in the Alexander and Baldwin Industrial Subdivision.

Potential Impacts and Mitigative Measures

In their comment letter on the draft environmental assessment the Board of Water Supply stated: "The existing water system is presently adequate to accommodate the proposed school improvements." However, the availability of water will be determined when the Building Permit applications are submitted to the Board of Water Supply for review and approval.

The proposed Leeward YMCA improvements are estimated to accommodate up to 5,800 additional members and up to a full-time equivalent of 30.5 additional employees. However not all members will use the Leeward YMCA facilities each day. Based on a full-time equivalent amount of 600 members and staff at the site per day, and an estimated demand of 30 gallons per day per person, the members and staff will generate a demand of approximately 1,800 gallons of water per day.

All water system improvements will be designed in accordance with the Water System Standards and Approved Materials List and Standard Details for Water System Construction of the Board of Water Supply.

When water is made available, the Leeward YMCA will be required to pay the Board of Water Supply Water System Facilities Charges for resource development, transmission, and daily storage. Further, the proposed improvements are subject to Board of Water Supply Cross-Connection Control and Backflow Prevention requirements before the issuance of the building permit applications.

For fire protection purposes, multi-storied buildings will be equipped with sprinkler systems. Fire hydrants will be installed within 150 feet anywhere along the first floor of buildings without sprinklers and within 150 feet of the face of buildings with sprinklers.

In compliance with the Fire Department's comments on the draft environmental assessment:

1. A private water system will be provided where all appurtenances, hydrant spacing, and fire flow requirements meet Board of Water Supply standards;

2. The first floor of the most remote structure will be within 150 of both parking areas, which will be accessible to fire vehicles and apparatus; and

3. Civil drawings will be submitted for review by the Fire Department.

4.2.10.2 Wastewater Facilities

The existing wastewater system in the area is owned and maintained by the City and County of Honolulu. A 12-inch sewer stub currently exists in the Alexander and Baldwin Industrial subdivision.

Potential Impacts and Mitigative Measures

Wastewater generated from the proposed Leeward YMCA improvements will be transmitted to the City and County of Honolulu sewer system.

The proposed Leeward YMCA improvements are estimated to accommodate up to 5,800 additional members and up to a full-time equivalent of 30.5 additional employees. However not all members will use the Leeward YMCA facilities each day. Based on a full-time equivalent amount of 600 members and staff at the site per day, and an estimated amount of wastewater of 25 gallons per person per day, the members and staff will generate approximately 1,800 gallons of wastewater per day.

The proposed wastewater system improvements will be designed and constructed in accordance with Department of Environmental Services Design Standards and will require their review and final approval. It is assumed that the existing off-site wastewater collection, treatment and disposal system is presently adequate to accommodate the additional demand.

All wastewater plans will conform to the applicable provisions of the State Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems."

4.2.10.3 Drainage

The Leeward YMCA site is outside of any flood boundaries (see section 4.1.2), is not a shoreline property, and lies entirely outside of the coastal flood zone attributable to either high wave action or tsunami. A drainage study has been done for the project site as part of an environmental impact statement completed in 1997 for the Amfac Commercial and Park project (*Amfac Commercial and Park Final Environmental Impact Statement* (PBR Hawaii 1997)). The EIS was prepared to assess the impacts of converting the Oahu Sugar Company Mill complex into the Amfac Commercial and Park project. Locating the Leeward YMCA on a portion of the mill site was discussed in the EIS and included as one of the assumptions of the drainage report.

Potential Impacts and Mitigative Measures

Because the project largely involves renovation of existing facilities already on the site (such the generator building and the existing parking lots) the proposed improvements are not expected to significantly alter the current overall drainage patterns of the site. Any increase in storm runoff quantity due to an increase in impervious areas created because of the project will be retained on-site in above-ground basins and/or belowground storage facilities. Project engineering and design will pay special attention to post-construction best management practices.

Due to the location of the site, the proposed Leeward YMCA improvements are not expected to either affect or be affected by natural flood hazards. The improvements will be designed to comply with all federal, state, and county laws regarding drainage, erosion control, and non-point source pollution. During the construction phases, any possible impact to water quality will be minimized and mitigated by the implementation of appropriate erosion control requirements.

4.2.10.4 Electrical and Communication Facilities

Primary electrical, telephone, and cable television service for the Waipahu area is provided by Hawaiian Electric Company (HECO), GTE Hawaiian Tel, and Oceanic Cable.

Potential Impacts and Mitigative Measures

Present electrical, telephone, and cable television capacities are adequate to support the proposed improvements.

4.2.10.5 Solid Waste Disposal

On O'ahu, residential and commercial wastes are hauled to landfills, the incinerator, or transfer stations. A waste-to-energy combustor, H-POWER (Honolulu Program of Waste Energy Recovery) located at the Campbell Industrial Park incinerates about 1,800 tons of combustible waste per day. The electricity generated is bought by Hawaiian Electric Company. Currently, the H-POWER facility receives all residential and commercial packer truck wastes on the island.

The Waimānalo Gulch Landfill, which opened in 1989, is the City's primary solid waste disposal facility and is located mauka of Farrington Highway near Kahe Point. The site accepts residential, commercial and nonhazardous industrial solid wastes, demolition debris and ash and residue from the H-POWER waste-to-energy facility. Wastewater treatment sludge, septic tank wastes and cesspool pumpings are accepted, provided such disposal is in accordance with the landfill's operating guidelines. The site also handles special wastes such as spent lime, contaminated foods and asbestos.

Potential Impacts and Mitigative Measures

The proposed Leeward YMCA improvements do not involve the disposal of hazardous materials nor the siting of sanitary landfills or closing of open dumps.

The proposed improvements will comply with the State Department of Health and the City and County of Honolulu Department of Facility Maintenance requirements to ensure that all aspects of the project conform to the program goals and objectives of the Integrated Solid Waste Management Act, Chapter 342G, Hawai'i Revised Statues, and the County's approved integrated solid waste management plans in accordance with a schedule and time frame satisfactory to the Department of Health.

Vegetation removed from the property during the construction will be chipped and then hauled to a green waste disposal site for composting. Green waste will be disposed of in compliance with all state and county laws and ordinances.

Solid waste generated during the operation of the project will be collected by a private collection service and disposed of by the City and County of Honolulu, Department of Environmental Services, Refuse Division.

5.0 DESCRIPTION OF ALTERNATIVES

In compliance with the provisions of Title 11, Department of Health, Chapter 200, Environmental Impact Statement Rules, Section 11-200-17(f), *the "known feasible" alternatives to the proposed project are limited to those that would allow the objectives of the project to be met, while minimizing potential adverse environmental impacts.* As such, the proposed improvements for the Leeward YMCA have been evaluated in terms of the following.

5.1 NO ACTION ALTERNATIVE

The no action alternative will not accomplish the objectives of improving and expanding YMCA services to the Leeward community and renovating the remaining buildings of the O'ahu Sugar Company Mill complex for adaptive reuse.

The no action alternative would also ignore the recommendations of the numerous other community-based planning recommendations for the O'ahu Sugar Company Mill site contained in the *Waipahu Livable Communities Initiative* (1998), The *Waipahu Town Heritage Plan* (1996), and the *Waipahu Town Plan: A Special Area Plan for Waipahu* (1995).

5.2 ALTERNATIVES

The YMCA of Honolulu obtained the land at the site of the Leeward YMCA in anticipation of renovating the existing on-site buildings of the former O'ahu Sugar Company mill for YMCA services and programs. Currently they have renovated two of the buildings. With this project they will complete the renovation of the on-site buildings. As such, alternative locations for the expansion of services and programs were not considered at this time, as the decision to locate the Leeward YMCA at its current location has already been made, and alternative locations for the Leeward YMCA have already been considered and rejected.

Including the Leeward YMCA at the O'ahu Sugar Company mill site has been discussed in many community-based planning efforts including the *Waipahu Livable Communities Initiative* (1998), The *Waipahu Town Heritage Plan* (1996), and the *Waipahu Town Plan: A Special Area Plan for Waipahu* (1995).

5.3 PREFERRED ALTERNATIVE

Improving and expanding YMCA services at the existing Leeward YMCA site is the preferred and most suitable alternative because:

- The YMCA of Honolulu already owns the property and there is room to expand
- The remaining buildings of the O'ahu Sugar Company mill complex will be renovated for adaptive reuse.
- It is consistent with community desires and recommendations as expressed in several planning documents.

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6.0 DETERMINATION, FINDINGS, AND REASONS SUPPORTING THE DETERMINATION

To determine whether the proposed Leeward YMCA improvements may have a significant impact on the environment, all expected consequences, including primary, secondary, cumulative, and short- and long-term impacts, have been evaluated. Based on the research performed and studies evaluated, the Approving Authority (City and County of Honolulu Department Community Services) has issued a Finding of No Significant Impact (FONSI).

6.1 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 impacts will occur. According to the Rules, an action shall be determined to have a significant impact on the environment if it meets any one of the following criteria:

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

The site of the Leeward YMCA has already been extensively modified by improvements related to the O'ahu Sugar Company mill. No areas defined as "wetlands" were found to be located within the Leeward YMCA site and no endangered plant or animal species are known to exist on the property. The proposed improvements will also be designed in compliance with all federal, state, and county laws regarding drainage and non-point source pollution.

Based on analysis of previous archaeological studies and surveys, no significant archaeological resources are expected to be found in the area. If, however, archaeological resources are discovered, work will cease and the State Historic Preservation Division will be contacted to assess the significance of the find and to recommend appropriate mitigation measures.

Therefore, based on the above, there will be no irrevocable commitment to loss or destruction of any natural or cultural resources.

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

Since the site of the Leeward YMCA has already been extensively modified by improvements related to the O'ahu Sugar Company mill site and has been previously improved as the center of the mill complex, the actual "natural environment" that may have been associated with the project site has already been curtailed by many years of urban activity. Further, the site is in the State Urban district and is zoned "Business" (B-2) by the City and County of Honolulu. Neighboring uses include an industrial subdivision and the Filipino Community Center. Thus the proposed use as a YMCA is consistent with designated State and County land use designations and will not curtail the range of beneficial uses of the environment. Further, the use of the site as a YMCA will enhance the current social and recreational uses in the area and retain important cultural aspects of the Mill site and thus could be determined to be the best use of the property.

(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 improvements are 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 Leeward YMCA improvements will significantly contribute to the economic and social welfare of Waipahu residents by providing a range of social services along with fitness facilities. As such, it is expected that the Leeward YMCA will have a positive effect on the community. In addition, the proposed improvements will create a total of 49 full and part time jobs (a full-time equivalent of 30.5 jobs), at least 51 percent of which will be available to low and moderate income persons.

(5) **Substantially affects public health;**

Impacts to public health may be temporarily affected by air, noise, and water quality impacts during construction, however, these will be of a short-term duration, and insignificant, especially when weighed against the positive social, economic, and fitness benefits associated with the Leeward YMCA.

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

The proposed improvements to the Leeward YMCA are not expected to involve negative secondary impacts. Planned and established land use patterns within Waipahu will not be negatively or significantly altered and unplanned population changes are not expected as a result of the project. Positive secondary effects are expected in the form of increased positive social impacts within Waipahu and throughout the service area of the Leeward YMCA.

(7) **Involves a substantial degradation of environmental quality;**

The proposed improvement to the Leeward YMCA will not involve a substantial degradation of environmental quality on-site or in the surrounding area. As previously stated, the site of the Leeward YMCA has already been extensively modified by improvements related to the O'ahu Sugar Company mill site. As such, the actual "natural environment" that may have been associated with the project site has already been curtailed by previous uses and by many years of urban activity. The improvements will be designed to comply with all federal, state, and county laws regarding drainage, erosion control, and non-point source pollution. There are no anticipated impacts that would degrade environmental quality. New landscaping provided as part of the improvements will enhance the surrounding environment by providing new plant materials.

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

The proposed Leeward YMCA improvements will not have a cumulative negative effect on the environment. The use of the site for a YMCA is consistent with the urban uses designated for the State Land Use Urban District, and is also consistent with the City and County of Honolulu General Plan, the Central O'ahu Development Plan, the *Waipahu Livable Communities Initiative* (1998), the *Waipahu Town Heritage Plan* (1996), and the *Waipahu Town Plan: A Special Area Plan for Waipahu* (1995). As such, the proposed improvements to the Leeward YMCA are well thought-out and are not expected to have undesirable cumulative effects. The commitment of fiscal resources to construct proposed improvement, however, will foreclose other uses of those resources.

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

No threatened or endangered plant or animal species are known to exist on the subject property. In addition, no wetlands, streams, estuaries or other habitats that could accommodate threatened or endangered plant or animal species are present on the subject property or the surrounding area. The flora consists of exotic weedy species due to previous disturbance (clearing), and industrial and use of the land. Birds and animals common to urban areas, such as rats, mice, and domesticated and feral cats and dogs, were sighted or are presumed to exist on the site.

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

Long-term air quality impacts of the Leeward YMCA are considered to be those associated with everyday use of the project. The most significant long-term emission sources will be motor vehicles, with the most significant tailpipe emission being Carbon Monoxide (CO). As in the rest of Hawai'i, trade winds can be expected to mitigate the majority of emission impacts. Short term potential impacts on air quality (fugitive dust and construction equipment exhaust emissions) may result due to construction activity, however, these impacts will be limited by appropriate construction practices.

The proposed improvements will be designed to comply with all federal, state, and county laws regarding drainage, erosion control, and non-point source pollution, therefore the affect on water quality due to the improvements is expected to be negligible. During construction phases, any possible impact to water quality will be minimized and mitigated by the implementation of appropriate erosion control requirements.

Short term noise impacts will be generated by construction of the proposed improvements, however these will be mitigated by adherence to the State Department of Health's Administrative Rules, Chapter 11-46, "Community Noise Control" and will be monitored to ensure compliance. Proper mitigating measures (such as limiting construction to daylight hours) also will be employed to minimize construction noise impacts.

Long-term noise impacts may be generated by automobiles entering the site and human activity. These are unavoidable impacts but are not considered to be significant due the surrounding land uses (an industrial subdivision and the Filipino Community Center) and the greater urban uses in the surrounding Waipahu Town.

(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 Leeward YMCA is not located in or near an environmentally sensitive area and therefore is not expected to affect or be affected by flood plains, tsunami zones, beaches, erosion-prone areas, geologically hazardous land, estuaries, or freshwater or coastal waters.

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

The proposed Leeward YMCA improvements include renovation of existing buildings and landscaping, and therefore will not significantly alter established view plains identified in county or state plans or studies.

(13) Requires substantial energy consumption.

The proposed Leeward YMCA improvements will not require substantial energy consumption relative to other similar projects.

6.2 DETERMINATION

On the basis of the above criteria, the discussion of impacts and mitigative measures contained in this document, and the comments received in the review of the draft environmental assessment, the Approving Authority (City and County of Honolulu Department Community Services) of this environmental assessment has determined that the proposed Leeward YMCA improvements will not have a significant effect on the environment. Pursuant to Chapter 343, Hawaii Revised Statues, the Approving Authority has issued a Finding of No Significant Impact (FONSI).

7.0 REFERENCES

Austin, Tsutsumi & Associates, Inc. (1996) *Traffic Impact Analysis Report for the O'ahu Sugar Company Property.* Prepared for Amfac/JMB Hawaii, Inc., Honolulu, Hawai'i 1996.

Baker, H.L. et al. (1965) *Detailed Land Classification, Island of Hawai'i.* L.S. Land Study Bureau, University of Hawai'i.

Clayton Group Services (2000) *Phase I Environmental Site Assessment of the Former Oahu Sugar Mill (TMK [1]9-4-161: Parcel 4) Located on Waipahu Street Waipahu, Oahu, Hawaii for YMCA of Honolulu, Oahu, Hawaii.*

Clayton Group Services (2000) *Subsurface Investigation and Ash Sampling at the Former Oahu Sugar Mill Property (TMK [1]9-4-161: Parcel 4) Waipahu, Oahu, Hawaii.*

Cleghorn, Paul, Ph.D. (1996) *Archaeological Inventory Survey at Waipahu, Waikele, O'ahu.* Honolulu, Hawai'i.

Community Resources, Inc. (1994) *Socio-economic Impact Assessment of Amfac Industrial Subdivision, Waipahu, O'ahu.* Prepared for O'ahu Sugar Company, Ltd. Honolulu, Hawai'i.

Cruz, Lynette (2002) E-mail correspondence, December 29.

Ebisu, Y. & Associates. (1996) *Acoustic Study for the Amfac Commercial and Park Project, Waipahu, Central O'ahu.* Prepared for Amfac/JMB Hawaii, Inc., Honolulu, Hawai'i.

Folk, William. (1990) *Archaeological Reconnaissance for the Proposed Waipahu Street Widening Project, Waipahu, Waikele, O'ahu.* On file, State Historic Preservation Division, Honolulu..

Hawai'i State Department of Agriculture. *Agricultural Lands of Importance to the State of Hawai'i.* Honolulu, Hawai'i, 1977.

Honolulu City and County Department of General Planning. *General Plan: Objectives and Policies.* Honolulu, Hawai'i, 1992.

Honolulu City and County Planning Department. *Central O'ahu Sustainable Communities Plan Public Review Draft.* Honolulu, Hawai'i, 2002.

Honolulu City and County Planning Department (1998) *Waipahu Livable Communities Initiative.* Honolulu, Hawai'i.

Honolulu City and County Planning Department (1995) *Waipahu Town Plan: A Special Area Plan for the Central O'ahu Development Plan.* Honolulu, Hawai'i.

Kamauu, Poni (2003) Telephone interview, January 6.

Kane, Shad (2002) E-mail correspondence, December 30.

Kubota, Stephen (2002) E-mail correspondence, December 30.

McAllister, J. Gilbert (1933) "Archaeology of O'ahu." *Bishop Museum Bulletin 104.* Bishop Museum Press, Honolulu.

Nogelmeier, Puakea (2002) E-mail correspondence, December 29.

Ogden Environmental and Energy Services Co. (1996) *Air Quality Impact Analysis, Amfac Commercial and Park Development.* Prepared for Amfac Property Development Corp., Honolulu, Hawai'i.

Orr, Kaimipono (2002) E-mail correspondence, December 30.

Orr, Kaimipono (2002) E-mail correspondence, December 31.

PBR HAWAII (1997) *Amfac Commercial and Park, Waipahu Central Oahu TMK 9-4-02: 04, Final Environmental Impact Statement.* Prepared for Amfac Property Development Corp., Honolulu, Hawai'i.

Phil Balducci & Associates (2001) *YMCA of Honolulu: Community Needs Assessment — Waipahu/Wai'anae.* Prepared for the YMCA of Honolulu.

Spear, Robert D. (1993) "A Reconnaissance Survey Letter Report of the Waikele Industrial Subdivision Waipahu, O'ahu, Hawai'i." On file, State Historic Preservation Division, Honolulu.

Spear, Robert D. (1996) "An Addendum to the A Reconnaissance Survey Letter Report of the Waikele Industrial Subdivision Waipahu, O'ahu, Hawai'i." On file, State Historic Preservation Division, Honolulu.

Sterling and Summers (1978) *Sites of Oahu.* Bishop Museum: Honolulu.

United States Department of Agriculture Soil Conservation Service (1972) *Islands of Kaua'i, O'ahu, Maui, Moloka'i, and Lāna'i, State of Hawai'i.*

Waipahu 2000 Update Committee (1995) *Waipahu 2000 Update.* Waipahu, Hawai'i.

8.0 COMMENTS ON THE DRAFT ENVIRONMENTAL ASSESSMENT & RESPONSES

The draft environmental assessment was sent to the following agencies, organizations, and individuals. Where indicated the agency, organization, or individual submitted comments.

AGENCY	DEA Mail Date	Date of Comments
STATE		
Department of Business Economic Development and Tourism—Planning Office	10/23/02	
Department of Health	10/23/02	11/18/02
Department of Land and Natural Resources—Historic Preservation Division	10/23/02	10/30/02
Office of Environmental Quality Control	10/23/02	11/22/02
Waipahu Library	10/23/02	
CITY AND COUNTY OF HONOLULU		
Board of Water Supply	10/23/02	11/4/02
City Councilmember Gary Okino	10/23/02	
Department of Community Services	10/23/02	
Department of Parks and Recreation	10/23/02	11/14/02
Department of Planning and Permitting	10/23/02	11/25/02
Department of Transportation Services	10/23/02	12/2/02
Fire Department	10/23/02	11/8/02
Police Department	10/23/02	11/12/02
Waipahu Neighborhood Board (#22)	10/23/02	11/22/02
FEDERAL		
Housing and Urban Development	10/25/02	11/7/02
COMMUNITY/PRIVATE		
Filipino Community Center	10/23/02	
Hawaii Plantation Village	10/23/02	
Waipahu Community Association	10/23/02	

The following pages contain comment letters received and responses.

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BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

NOV 22 2002

In reply, please refer to:
File:
02-279/epo

November 18, 2002

Mr. Tom Schnell
PBR Hawaii
1001 Bishop Street
Pacific Tower, Suite 650
Honolulu, Hawaii 96813-3484

Dear Mr. Schnell:

Subject: Draft Environmental Assessment (DEA)
Leeward YMCA
Tax Map Key: 9-4-161:002 & 004

Thank you for the opportunity to review and comment on the subject proposal. The DEA was routed to the various branches of the Environmental Health Administration. We have the following comments:

Clean Water Branch (CWB)

1. The applicant should contact the Army Corps of Engineers to identify whether a federal permit (including a Department of Army permit) is required for this project. A Section 401 Water Quality Certification is required for "Any applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters...", pursuant to Section 401(a)(1) of the Federal Water Pollution Act (commonly known as the "Clean Water Act");

2. A National Pollutant Discharge Elimination System (NPDES) general permit coverage is required for the following discharges to waters of the State:

   a. Discharge of storm water runoff associated with industrial activities, as define in Title 40, Code of Federal Regulations, Sections 122.26(b)(14)(i) through 122.26(b)(14)(ix) and 122.26(b)(14)(xi);

   b. Discharge of storm water runoff associated with construction activities that involve the disturbance of five (5) acres or greater, including clearing, grading, and excavation;

   c. Discharge of treated effluent from leaking underground storage tank remedial activities;

   d. Discharge of once through cooling water less than one million gallons per day;

   e. Discharge of hydro-testing water;

   f. Discharge of construction dewatering effluent;

   g. Discharge of treated effluent from petroleum bulk stations and terminals; and

   h. Discharge of treated effluent from well drilling activities.

   Any person requesting to be covered by a NPDES general permit for any of the above activities should file a Notice of Intent with the Department of Health, Clean Water Branch (CWB) at least thirty (30) days prior to commencement of any discharges to State waters;

3. If construction activities involve the disturbance of one acre or greater, including clearing, grading, and excavation, and will take place or extend after March 10, 2003, an NPDES general permit coverage is required for discharges of storm water runoff into State waters; and

4. The applicant may be required to apply for an individual NPDES permit if there is any type of activity in which wastewater is discharged from the project into State waters.

If you have any questions, please contact the Clean Water Branch at (808) 586-4309.

Wastewater Branch (WWB)

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems". We reserve the right to review the detailed wastewater plans for conformance to applicable rules.

If you have any questions, please contact the Wastewater Branch at (808) 586-4294.

Environmental Planning Office (EPO)

This project is located in the Pearl Harbor watershed. Pearl Harbor is currently listed under section 303(d) of the Clean Water Act as being impaired by nutrients, turbidity, and suspended solids. The impaired status of these waters requires that the Department of Health establish Total Maximum Daily Loads (TMDLs) suggesting how much the existing pollutant loads should be reduced in order to attain water quality standards in the stream and estuary waters.

Mr. Tom Schnell
November 18, 2002
Page 3

Although these TMDLs are yet to be established and implemented, a first step in achieving TMDL objectives would be to prevent any project-related increases in pollutant loads. We expect that this would be accomplished through the proper application of suitable best management practices in all phases of the proposed project. During the post-construction operational phase, we suggest that special attention be given to minimizing polluted runoff from parking areas and outdoor pool decks.

A TMDL technical study of water quality in the Pearl Harbor watershed is underway. When TMDLs are established for the streams draining into Pearl Harbor, the State will establish pollutant load allocations for the lands surrounding the streams and develop an implementation plan to improve their water quality. One of the components of this implementation plan will be to reduce the polluted runoff entering the streams under the City's NPDES storm water permit. To facilitate this process we suggest that the applicant identify the receiving waters for runoff generated from the YMCA site and collected by the City storm drain system; discuss the terms of any existing or planned City storm drain connection permits (do they allow for disposal of swimming pool water?); and plan additional pollutant load reduction practices for future management of the storm drain system.

We encourage Leeward YMCA participate in the TMDL development process and to consult with the Department of Health Clean Water Branch (Engineering Section) to discuss how project-related water pollution control permitting may be linked with TMDL implementation.

If you have any questions, please call David Penn of the Environmental Planning Office at (808) 586-4337.

Sincerely,

GARY GILL
Deputy Director
Environmental Health Administration

c: CWB
WWB
EPO

PBR HAWAII

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January 8, 2003

Mr. Gary Gill, Deputy Director,
Environmental Health Administration
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

SUBJECT: **LEEWARD YMCA DRAFT ENVIRONMENTAL ASSESSMENT, TMK 9-4-161:2; TMK 9-4-161:4**

Dear Mr. Gill:

Thank you for your letter regarding the Leeward YMCA Draft Environmental Assessment (EA) dated December 2, 2002 (02-279/epo). We offer the following responses to your comments:

Clean Water Branch (CWB)

1. Per your comment, the applicant has been advised to contact the Army Corps of Engineers to identify if a federal permit (including a Department of the Army Permit) is required for the proposed improvements to the Leeward YMCA.

2-4. If required, the applicant will secure the appropriate NPDES permit(s) before commencing construction.

Wastewater Branch (WWB)

All wastewater plans will conform the applicable provisions of the State Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems." We acknowledge that you reserve the right to review the detailed wastewater plans for conformance to the applicable rules.

Environmental Planning Office (EPO)

Regarding your concerns about preventing project-related increases in pollutant loads, any increase in storm runoff quantity due to an increase in impervious areas created because of the project will be retained on-site in above-ground basins and/or belowground storage facilities. Project engineering and design will pay special attention to post-construction best management practices, including minimizing polluted run-off from parking areas and the outdoor pool deck.

Mr. Gary Gill
SUBJECT: LEEWARD YMCA DRAFT ENVIRONMENTAL ASSESSMENT,
TMK 9-4-161:2; TMK 9-4-161:4
January 8, 2003
Page 2

Regarding your concern about Total Maximum Daily Loads (TMDLs) and reducing polluted runoff, the Leeward YMCA improvements will conform to all TMDLs standards in effect at the time of construction. A drainage study has been done for the project site as part of an environmental impact statement completed in 1997 for the Amfac Commercial and Park project (*Amfac Commercial and Park Final Environmental Impact Statement* (PBR Hawaii 1997)). The EIS was prepared to assess the impacts of converting the Oahu Sugar Company Mill complex into the Amfac Commercial and Park project. Locating the Leeward YMCA on a portion of the mill site was discussed in the EIS and included as one of the assumptions of the drainage report.

Storm runoff from the former Oahu Sugar Company site flows to three drainageways in the vicinity of the property: the Waikele Stream, the Kapakahi Stream, and the Kahu/Wailani Stream Drainage Channel. These drainageways eventually drain into Pearl Harbor.

A permit is required for connection to the City's storm sewer system. In addition, discharging swimming pool water requires a city "Permit to Discharge Effluent." The Leeward YMCA will comply will all requirements when obtaining these permits.

We appreciate your participation in the review of the draft EA.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Associate

cc: Glenn Tsugawa/YMCA of Honolulu
Paul Kobata/Dept. of Community Services
Genevieve Salmonson/OEQC

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C

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING, ROOM 555
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NOV - 1 2002

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FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

October 30, 2002

Mr. Tom Schnell
PBR Hawaii
Pacific Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

LOG NO: 31058
DOC NO: 0210co15
Architecture

Dear Mr. Schnell:

SUBJECT: Section 106 (NHPA) Review
Department of Housing and Urban Development (HUD)
Chapter 6E (HRS) Review
Draft Environmental Assessment
Oahu Sugar Company Mill Complex
TMK 1-7-003:004, Honolulu, Oahu

Thank you for the letter dated October 23, 2002, regarding the proposed expansion of current services to the YMCA. Because of the HUD involvement the Section 106 review should also be included.

We concur that through the previous archaeological survey that it is unlikely that archaeological historic sites will be found. However, we disagree with the determination that the former mill site is not eligible for listing on the National Register of Historic Places. The site is not listed but we believe that the former mill site meets the criteria of eligibility for the National Register of Historic Places.

If the agency (HUD) still believes that the mill site is not eligible, HUD should prepare information on the property and request a formal determination of eligibility from the Keeper of the National Register. If the agency (HUD) agrees that the property meets the criteria, we request that an inventory of the existing structures be completed, including a Historic Resources Inventory Form and black and white photographs.

We believe that to have a finding of 'no adverse effect' any alterations to the structures should be in accordance with the Secretary of the Interiors Standards for Rehabilitation (standards). We would request to review the documents at appropriate review points to insure compliance with the standards.

Mr. Tom Schnell
Page Two

Thank you for the opportunity to comment. If you have any questions please have your staff contact Tonia Moy at 692-8030.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

CO:jk

PBR HAWAII

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January 8, 2003

Mr. Don Hibbard, Administrator
Historic Preservation Division
State of Hawaii
Department of Land and Natural Resources
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawai'i 96707

ATTN: Ms. Tonia Moy

SUBJECT: **LEEWARD YMCA DRAFT ENVIRONMENTAL ASSESSMENT, TMK 9-4-161:2; TMK 9-4-161:4**

Dear Mr. Hibbard:

Thank you for your letter regarding the Leeward YMCA Draft Environmental Assessment (EA) dated October 30, 2002 (LOG NO: 31058; DOC NO: 0210co15). We offer the following responses to your comments:

We note that you concur with the conclusion in the draft EA that through the previous archaeological surveys it is unlikely that archaeological historic sites will be found.

Regarding your concern about the eligibility of the mill site for the National Register of Historic Places, on December 3, 2002, we met on the site with Tonia Moy of your staff. After discussion with Ms. Moy it was determined that the Generator building meets the criteria of eligibility for the National Register of Historic Places. In further discussion with Ms. Moy regarding the specific renovation plans for the building, it was determined that the proposed renovations may have an "adverse effect" on the portion of the building that will connect to the new wing, however this adverse effect would be mitigated if a substantial portion of the building is retained and renovated according to the "Standards for Rehabilitation". It should be noted that the YMCA of Honolulu is committed to the implementation of the Waipahu 2000 Update, the Waipahu Special Area Plan, and the Mill Town Center Commercial and Park Urban Design Plan and already has restored the old mill smokestack, the former Administration building, and the former Human Resources building.

We would like to initiate a Section 106 review of the proposed improvements to the Generator building. As part of this review we will complete an inventory of the existing structures, including a Historic Resources Inventory Form and black and white photographs. Available architectural plans of the proposed improvements will also be provided. The Historic Hawaii Foundation and the Office of Hawaiian Affairs will also be contacted and documentation of input from the Waipahu Neighborhood Board and the Waipahu Community Association for the project will be provided.

Mr. Don Hibbard
SUBJECT: LEEWARD YMCA DRAFT ENVIRONMENTAL ASSESSMENT, TMK 9-4-161:2; TMK 9-4-161:4
January 8, 2003
Page 2

At the appropriate time, the YMCA of Honolulu will also prepare a Memorandum of Agreement to be signed by the State Historic Preservation Officer and the Department of Housing and Urban Development detailing measures to minimize or mitigate the adverse affects to the Generator building.

We thank you and the efforts and advice of Ms. Tonia Moy in guiding us through this process. We look forward to working with you and your staff during the Section 106 review of the proposed improvements to the Generator building.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Associate

cc: Glenn Tsugawa/YMCA of Honolulu
Pravin Desai/CDS International
Paul Kobata/Dept. of Community Services
Genevieve Salmonson/OEQC

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GOVERNOR

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235 SOUTH BERETANIA STREET
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TELEPHONE (808) 586-4185
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GENEVIEVE SALMONSON
DIRECTOR

NOV 25 2002

November 22, 2002

Mr. Glenn Tsugawa
Young Men's Christian Association of Honolulu
1441 Pali Highway
Honolulu, Hawai'I 96813

Mr Paul Kobata
City and County of Honolulu, Department of Community Services
711 Kapi'olani Boulevard, Suite 1422
Honolulu, Hawai'I 96813

Mr. Tom Schnell
PBR Hawai'I
1001 Bishop Street, Suite 650
Honolulu, Hawai'I 96813

Dear Messrs Tsugawa, Kobata, and Schnell:

The Office of Environmental Quality Control has reviewed the draft environmental assessment for the Leeward YMCA, Tax Map Key 9-4-161, parcels 2 and 4, in the judicial district of 'Ewa. We have reviewed the document and offer the following comments for your consideration.

1. **Phase II Site Environmental Assessment:** The draft environmental assessment makes note of this document; please disclose the specific findings (heavy metal concentrations, semi-volatiles and volatile organic concentrations, dibenzodioxin and dibenzofuran concentrations, etc.) of the Phase II Site Environmental Assessment and what mitigative measures were or will be undertaken at the site and in the surrounding parcels, such as at the Filipino Community Center, the Alexander & Baldwin Industrial Subdivision, the future commercial mixed use development, and/or Hans L'Orange Park.
2. **Retention of historic mill smokestack:** In the recent past, another historic sugar mill smokestack at 'Aiea, listed on the State Register for historic places was demolished. Please discuss what mechanisms are proposed to ensure that the Waipahu smokestack (which the DEA states is not listed or eligible for listing on the historic registers) will be preserved.
3. **Unique regional features:** The Pearl Harbor aquifer discharges fresh water in springs at various locations along the shoreline region of the estuary. In section 4.1.14, please describe if there are any spring discharges (from the Pearl Harbor aquifer) in any nearby parks in the region
4. **Nuisances and hazards, and air quality:** In light of the proposed nearby commercial mixed use development, and the A&B Industrial Park, please discuss potential impacts from industrial operations, gas, smoke and fumes to the proposed facility.
5. **Use of glasphalt aggregate in resurfacing paved areas.** To the extent possible, please consider using glass-asphalt aggregate in resurfacing paved areas.
6. **Sustainable building guidelines.** We recommend that you visit our website below, and incorporate appropriate sustainable building guidelines in the design of future projects.

Please see guidance documents for environmental assessment preparation at our Internet Website at http://www.state.hi.us/health/oeqc/index.html. Thank you for the opportunity to comment. If you have any questions, please contact Mr. Leslie Segundo, Environmental Health Specialist at (808) 586-4185 (voice) or at lsegund@mail.health.state.hi.us (electronic mail)

Sincerely,

GENEVIEVE SALMONSON
Director

PBR HAWAII
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February 18, 2004

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

SUBJECT: LEEWARD YMCA DRAFT ENVIRONMENTAL ASSESSMENT, TMK 9-4-161:2; TMK 9-4-161:4

Dear Ms. Salmonson:

Thank you for your letter regarding the Leeward YMCA Draft Environmental Assessment (EA) dated November 22, 2002. We offer the following responses to your comments:

1) **Phase II Environmental Site Assessment:** Subsequent to the filing of the Leeward YMCA Draft EA, we received an Phase I Environmental Site Assessment (ESA) report for a portion of the Leeward YMCA site (TMK 9-4-161:4) prepared by Clayton Group Services and dated February 28, 2000. This ESA supercedes the Phase II ESA conducted by Brewer Environmental Services in 1996 for the Amfac Commercial and Park Final Environmental Impact Statement (PBR Hawaii 1997).

   The Phase I ESA recommended further study to assess the soil in the vicinity of a former underground storage tank on the property for possible petroleum contamination and to sample and analyze ash located in and around the smoke stack. To follow up, Clayton Group Services prepared a Subsurface Investigation and Ash Sampling report (dated May 4, 2000). As these reports reflect the most recent site conditions and testing results, we will include them as appendices to the final EA, rather than the Phase II ESA prepared by Brewer Environmental Services in 1996.

   The Subsurface Investigation and Ash Sampling report included the following findings and recommendations:
   - Total Resource Conservation and Recovery Act (RCRA) Metals analysis of the two ash samples indicated no concentrations of metals (including arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) above either Department of Health (DOH) Tier 1 Action Levels or the EPA Preliminary Remediation Goals (PRGs).
   - The total petroleum hydrocarbon scan (TPH-Scan) indicated that three of the six soil samples had no detectable concentration of TPH. The remaining three samples indicated TPH samples far below the DOH Tier 1 Action Level.
   - The benzene, toluene, ethylbenzene, and xylenes (BTEX) analysis indicated no detectable concentrations of BTEX.

   - The polynuclear aromatic hydrocarbon (PAH) analysis indicated detectable concentrations of PAHs above the DOH Tier 1 Action Levels for benzo(a)pyrene and fluoranthene in one soil sample. However, when the Leeward YMCA improvements are constructed, the area from which this sample was taken will be capped by the deck of the pool.

   All findings, conclusions, and recommendations made by Clayton will be implemented during all phases of planning, design, and construction of the proposed Leeward YMCA.

   The reports produced by Clayton were limited to a portion of the Leeward YMCA site (TMK 9-4-161:4). For information regarding mitigation measures undertaken at surrounding parcels, refer to the Amfac Commercial and Park Final Environmental Impact Statement (PBR Hawaii, March 1997) and the Filipino Community Center Final Environmental Assessment (R.M. Towill Corporation 1999).

2) **Retention of historic mill smokestack:** The YMCA of Honolulu has already restored the mill smokestack, spending approximately $240,000 for the Oak Park Chimney Company to scrape, patch, and resurface this landmark structure. In addition, the unilateral agreement and purchase agreement for the Leeward YMCA site required the adaptive reuse to the extent practical of the mill smokestack. To comply with this requirement the YMCA of Honolulu paid for the renovation of the smokestack and the site plan for the proposed Leeward YMCA improvements incorporates the smokestack as a vital visual element.

   Further, the retention of the mill smokestack and the retention of Wapahu's sugar heritage and sense of place is discussed in numerous community-based plans for Waipahu such as the *2000 Update;* the *Waipahu Livable Communities Initiative* (1998), The *Waipahu Town Heritage Plan* (1996), and the *Waipahu Town Plan: A Special Area Plan for Waipahu* (1995). The relationship of the proposed improvements to these plans is discussed in Section 3 of the Draft EA, which also clearly states the intention of retaining the mill smokestack.

   After contact with the State Historic Preservation Division it was determined that while the Oahu Sugar Company mill site is not listed on the National Register of Historic Places, it may be eligible to be listed. The draft EA erroneously stated it was not eligible. This will be corrected in the final EA.

   In addition, the YMCA is now finalizing all requirements pursuant to complying with Section 106 of the National Historic Preservation Act. This information will be included in the final EA, which will be completed after the Section 106 requirements are finalized

3) **Unique regional features:**The name "Wai-pahu" means "bursting water" or "water bursting from the ground" indicating the natural springs that once characterized the region. To investigate whether there are any remaining springs in the area, we contacted Waipahu

Cultural Garden Park, which is nearby the Leeward YMCA site. Yoshiko Yamaguchi and Jimmy Yamaguchi (formerly employed at the Board of Water Supply) have been cultivating taro and watercress at the park for several years.

Mrs. Yoshiko Yamaguchi confirmed that water for the taro lo'i is provided by fresh springs from the Pearl Harbor Aquifer, and may be accessed by digging shallow holes in the park land. Mrs. Yamaguchi indicated there has been no significant changes in water availability in recent years, although there were seasonal variations when Oahu Sugar Company was in operation.

Since Mr. and Mrs. Yamaguchi (and others) consume the taro and watercress cultivated at the park, they have had the Department of Health test the quality of the water on at least two occasions and it was found not to be contaminated. The water is apparently very clear and cool (which is necessary for taro cultivation).

4) **Nuisances and hazards, and air quality:** The covenants codes and restrictions (CC&Rs) of the nearby industrial park prohibit noxious uses, therefore impacts are not expected from gas, smoke, and fumes from the industrial park.

5) **Use of glasphalt aggregate in resurfacing paved areas:** The possible use of glasphalt in the design of paved areas is mentioned in section 2.7, "Sustainable Building Design" of the draft EA.

6) **Sustainable building guidelines:** Section 2.7, "Sustainable Building Design" of the draft EA references "Guidelines for Sustainable Building Design in Hawaii: A planner's checklist" (OEQC May 1999). Where appropriate, techniques from these guidelines will be considered for inclusion in the proposed Leeward YMCA improvements.

We appreciate your participation in the review of the draft EA.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Associate

cc: Glenn Tsugawa/YMCA of Honolulu
Dane Waltjen/Dept. of Community Services

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BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

NOV - 7 ’02

November 4, 2002

Mr. Tom Schnell
PBR Hawaii
1001 Bishop Street
Pacific Tower, Suite 650
Honolulu, Hawaii 96813

Dear Mr. Schnell:

Subject: Your Letter of October 23, 2002 on the Draft Environmental Assessment for Leeward YMCA, TMK: 9-4-161: 2, 4

Thank you for the opportunity to review the subject document for the proposed improvements at the Leeward YMCA.

We have the following comments to offer:

1. The existing water system is presently adequate to accommodate the proposed YMCA improvements.

2. The availability of water will be confirmed when the building permits are approved. When water is made available, the applicant will be required to pay our Water System Facilities Charges for resource development, transmission and daily storage.

3. The proposed project is subject to Board of Water Supply Cross-Connection Control and Backflow Prevention requirements prior to issuance of the building permit applications.

If you have any questions, please contact Joseph Kaakua at 527-6123.

Very truly yours,

for CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Office of Environmental Quality Control

PBR HAWAII

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January 8, 2003

Mr. Clifford S. Jamile
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

SUBJECT: LEEWARD YMCA DRAFT ENVIRONMENTAL ASSESSMENT, TMK 9-4-161:2; TMK 9-4-161:4

Dear Mr. Jamile:

Thank you for your letter regarding the Leeward YMCA Draft Environmental Assessment (EA) dated November 4, 2002.

Thank you for confirming the existing water system is presently adequate to accommodate the proposed YMCA improvements.

We acknowledge: 1) the availability of water will be confirmed when the building permits are approved; 2) when water is made available, the applicant will be required to pay the Board of Water Supply's Water System Facilities Charges; 3) the proposed improvements are subject to Board of Water Supply Cross-Connection Control and Backflow Prevention requirements before the issuance of the building permit applications.

Your comments will be incorporated into the final EA.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Associate

cc: Glenn Tsugawa/YMCA of Honolulu
Paul Kobata/Dept. of Community Services
Genevieve Salmonson/OEQC

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DEPARTMENT OF PARKS AND RECREATION
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JEREMY HARRIS
MAYOR

WILLIAM D. BALFOUR, JR.
DIRECTOR

EDWARD T. "SKIPPA" DIAZ
DEPUTY DIRECTOR

NOV 22 2002

November 14, 2002

Mr. Tom Schnell
PBR Hawaii
Pacific Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Schnell:

Subject: Draft Environmental Assessment, Leeward YMCA
TMK 9-4-161:2 & 4

Thank you for the opportunity to review and comment on the Draft Environmental Assessment relating to the renovation and expansion of the generator/boiler building, new swimming pool, improved parking and landscaping of the Leeward YMCA.

The Department of Parks and Recreation has no comment on Draft Environmental Assessment.

Should you have any questions, please contact Mr. John Reid, Planner, at 692-5454.

Sincerely,

W.D. Balfour

WILLIAM D. BALFOUR, JR.
Director

WDB:mk
(17334)

cc: Mr. Paul Kobata, Department of Community Services
Office of Environmental Quality Control
Mr. Don Griffin, Department of Design and Construction

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

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James Leonard, AICP
Managing Director
Hilo Office

Vincent Shigekuni
Senior Associate

Grant Murakami, AICP
Associate

January 8, 2003

Mr. William D. Balfour, Jr.,
Director
Department of Parks and Recreation
City and County of Honolulu
1000 Uluohia Street, Suite 309
Kapolei, Hawaii 96707

SUBJECT: LEEWARD YMCA DRAFT ENVIRONMENTAL ASSESSMENT, TMK 9-4-161:2; TMK 9-4-161:4

Dear Mr. Balfour:

Thank you for your letter regarding the Leeward YMCA Draft Environmental Assessment (EA) dated November 12, 2002. We note that the Department of Parks and Recreation has no comment.

We appreciate your participation in the review of the draft EA.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Associate

cc: Glenn Tsugawa/YMCA of Honolulu
Paul Kobata/Dept. of Community Services
Genevieve Salmonson/OEQC

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DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
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TELEPHONE (808) 523-4414 • FAX (808) 527-6743 • INTERNET: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

NOV 2 6 2002

[redacted]
Acting Director

2002/ELOG-3081(BA)

November 25, 2002

Mr. Tom Schnell
PBR Hawaii
Pacific Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Schnell:

Draft Environmental Assessment
Leeward YMCA
94-440 Mokuola Street – Waipahu
Tax Map Keys 9-4-161: 2 and 4

The Department of Planning and Permitting appreciates the opportunity to review the Draft Environmental Assessment (EA) for the expansion to the existing Leeward YMCA. We offer the following comments:

Urban Design Plan

The EA should mention that the property is subject to the standards and guidelines of the *Mill Town Center Commercial Urban Design Plan* (dated July 3, 2000), including the following:

Parking. The EA should identify the parking lot along Waipahu Street as existing or proposed. The UDP requires redevelopment opportunities adjacent to the existing Waipahu Store site to seriously consider consolidation of off-street parking located at the rear of buildings and away from Waipahu Street, to promote a pedestrian-friendly streetscape. A brief analysis of the parking requirements (based on the Land Use Ordinance) in comparison to what is being proposed should be provided.

Landscaping. The EA should identify any existing significant landscape features. The site plan should indicate the location of the existing Mahogany tree (near Admin Building), large monkey pod tree (between Admin and Generator Buildings), and large plumeria tree. The preservation or alteration of the low cut-stone walls should also be addressed.

Mr. Tom Schnell
PBR Hawaii
November 25, 2002
Page 2

Civil Engineering

Easements. The EA should discuss the project's impact on the existing designated access easements.

The project will require submittal of a drainage report. Any excavation within the public right-of-way will also require a trenching permit.

Should you have any questions, please feel free to contact Bonnie Arakawa of my staff at 527-5837.

Sincerely yours,

LORETTA K. C. CHEE
Acting Director of Planning and Permitting

LKCC:lh
doc190204

cc: OEQC
DCS, CBED Office of Special Projects

PBR HAWAII
LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

WM. FRANK BRANDT, FASLA, Chairman
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VINCENT SHIGEKUNI, Principal
JAMES LEONARD, AICP, Principal, Hilo Office
GRANT MURAKAMI, AICP, Senior Associate
TOM SCHNELL, AICP, Associate
RAYMOND T. HIGA, ASLA, Associate
KEVIN NISHIKAWA, ASLA, Associate

Honolulu Office
1001 Bishop Street
Pacific Tower, Suite 650
Honolulu, Hawaii 96813-3484

October 7, 2003

Mr. Eric G. Crispin, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

SUBJECT: **LEEWARD YMCA DRAFT ENVIRONMENTAL ASSESSMENT, TMK 9-4-161:2; TMK 9-4-161:4**

Dear Mr. Crispin:

We thank the Department of Planning and Permitting for comments dated November 25, 2002 (2002/ELOG-3081(BA)) from former Acting Director Loretta K.C. Chee regarding the Leeward YMCA Draft Environmental Assessment (EA). We offer the following responses to these comments:

Urban Design Plan

The final EA will be revised to mention that the property is subject to the standards and guidelines of the *Mill Town Center Commercial Urban Design Plan*.

Parking. The parking lot along Waipahu Street is existing, but will be reconfigured to provide improved access and allow for improved views of the Administration Building and the renovated Generator Building.

While the Mill Town Center Commercial Urban Design Plan states that redevelopment adjacent to the existing Waipahu Store should seriously consider consolidation of off-street parking at the rear of future buildings to promote a pedestrian-friendly streetscape, as you know from our meeting with you on July 18, 2003, and your subsequent discussion with YMCA President Don Anderson, the current site plan conforms to existing limitations of the site (topography and historical preservation) and provides for the adaptive reuse of the Generator building as a key element of the YMCA complex. Retaining the existing parking lot at its current location also provides an accurate historical perspective of the Administration and Generator buildings in keeping the focus of the mill complex as the heart of the Waipahu community. The mill complex distinguishes Waipahu from other communities and establishes a sense of place for the community.

As discussed, the site plan provides space for a future heritage museum fronting Waipahu Street and the YMCA is committed to improving the pedestrian environment along Waipahu Street fronting the property to include human elements that support a sense of community. This could include a widened sidewalk, appropriate landscaping, and the possibility of future sidewalk cafes, farmer's market stalls, and other elements.

Regarding parking requirements, the project architect, CDS International, has calculated the off-street parking requirements for the proposed Leeward YMCA improvements based on the requirements of the Land Use Ordinance. All parking required for the Leeward YMCA can be accommodated on the project site. With a proposed total of 28,297 square feet and various uses, 119 parking stalls will be required. The site plan shown on Figure 3B of the draft EA includes 161 parking stalls. This information will be included in the final EA.

Landscaping. In the final EA significant existing landscape features will be identified, including the mahogany tree near the Administration building and the large banyan tree between the Administration and Generator buildings (erroneously identified in the *Mill Town Center Commercial Urban Design Plan* as a monkeypod tree). The site plan in the final EA will also be revised to identify these trees. In addition, in the final EA it will be stated that where possible the low cut-stone walls on the site will be preserved, and where walls cannot be retained, the rock may be reused for any new walls on the site.

Civil Engineering

Easements. The Leeward YMCA improvements proposed in the EA will have no effect on any easements on the property. The property consists of two parcels (TMKs 9-4-161 & 2; 9-4-161: 4). The primary easements on these parcels are to allow access to each lot. The easement on parcel 4 is in favor of the owner of parcel 2 and the easement on parcel 2 is in favor of the owner of parcel 4. Since the YMCA owns both parcels the issue of access to and from each parcel is not relevant. The other easement on the property is for a sewer line. This information will be included in the final EA.

Drainage Report. A drainage study has been done for the project site as part of an environmental impact statement completed in 1997 for the Amfac Commercial and Park project (*Amfac Commercial and Park Final Environmental Impact Statement* (PBR Hawaii 1997)). The EIS was prepared to assess the impacts of converting the Oahu Sugar Company Mill complex into the Amfac Commercial and Park project. Locating the Leeward YMCA on a portion of the mill site was discussed in the EIS and included as one of the assumptions of the drainage report. At the appropriate time, either this drainage report or an updated report will be submitted to the Department of Planning and Permitting. We acknowledge that any excavation within the public right-of-way will require a trenching permit.

We appreciate the Department of Planning and Permitting's participation in the review of the draft EA.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Associate

cc: Glenn Tsugawa/YMCA of Honolulu
Paul Kobata/Dept. of Community Services
Genevieve Salmonson/OEQC
Pravin Desai/CDS International

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DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
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JEREMY HARRIS
MAYOR

CHERYL D. SOON
DIRECTOR

GEORGE "KEOKI" MIYAMOTO
DEPUTY DIRECTOR

DEC - 5

December 2, 2002

TPD10/02-04431R

Mr. Tom Schnell
PBR Hawaii
Pacific Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Schnell:

Subject: Leeward YMCA

In response to your October 23, 2002 letter, we reviewed the draft environmental assessment (EA) for the subject project. The following comments are the result of this review:

1. Page 5 of the draft EA states that the Leeward YMCA currently has 2,200 members. The document further goes on to state that the future membership at the Leeward YMCA could be as high as 9,000 members. A traffic impact study should be completed addressing the project's impact on traffic and pedestrians on the surrounding roadway system. The traffic impact study should also discuss: 1) the impact the proposed child care and fitness activities facilities would have (it has been our experience that these types of facilities pose traffic operational and parking concerns) on the surrounding area; 2) how pick-ups and drop-offs for the various programs will be handled on-site; and 3) the necessity for left-turn sacs leading into/out of the site.

2. Figure 3B shows the proposed site plan for the Leeward YMCA. It is unclear whether the driveway serving the parking area off of Mokuola Street is connected to the driveway for the Waipahu Street parking area. If the driveways are connected, traffic controls should be installed to deter cut-through traffic.

3. All parking requirements for the Leeward YMCA should be handled on the project site and not on the City's right-of-way. The traffic impact study should elaborate on how this will be done, especially during special events/activities that may result in additional traffic volume. "Front-lawn parking" may be beneficial during such events and should be considered in the design of the project.

4. On Page 26, the statement is made that the Leeward YMCA will not be affected by hazardous streets, dangerous intersections, through traffic, inadequate separation of pedestrian/vehicle traffic and inadequate street lighting. The traffic impact study should address how this statement relates to Mokuola and Waipahu Streets, as well as to the anticipated users of the project site.

5. On Page 28 of the draft EA, the statement is made that the bus ridership to the Leeward YMCA would not significantly increase as a result of the improvements proposed. The traffic impact study should discuss the level of increase expected, based on the forecasted increase in membership. The Leeward YMCA should also be designed to encourage safe and legal pedestrian crossings.

6. Page 37 of the draft EA discusses the future traffic impacts at the intersection of Waipahu Street and Paiwa Street, and the intersection of Waipahu Street and Mokuola Street. The assumptions, including any planned traffic mitigation measures, used in the traffic analysis should be documented as part of this discussion.

Should you have any questions regarding these comments, please contact Faith Miyamoto of the Transportation Planning Division at 527-6976.

Sincerely,

Cheryl D. Soon

CHERYL D. SOON
Director

cc: Ms. Genevieve Salmonson
Office of Environmental Quality Control

Mr. Paul Kobata
Department of Community Services

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

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January 8, 2003

Ms. Cheryl D. Soon, Director
Department of Transportation Services
City and County of Honolulu
650 South King Street, 3rd Floor
Honolulu, Hawaii 96813

SUBJECT: **LEEWARD YMCA DRAFT ENVIRONMENTAL ASSESSMENT, TMK 9-4-161:2; TMK 9-4-161:4**

Dear Ms. Soon:

Thank you for your letter regarding the Leeward YMCA Draft Environmental Assessment (EA) dated December 2, 2002 (TPD10/02-0443). We offer the following responses to your comments:

1. While the Leeward YMCA has 2,220 current members, 1,700 of these members are off-site participants in the YMCA's A+ Afterschool Program which is held at various Department of Education school locations throughout the Leeward area. With the proposed improvements, the YMCA estimates that on-site membership will increase to a total of 4,500 to 5,000 members. The estimate of 9,000 members given in the draft EA includes both on-site and off-site members. The high estimate also was based on the proposed Waianae YMCA not being built, however plans for the Waianae YMCA are progressing. This membership information will be clarified in the final EA.

   As stated in the draft EA, a traffic impact study was prepared as part of an environmental impact statement completed in 1997 for the Amfac Commercial and Park project (*Amfac Commercial and Park Final Environmental Impact Statement* (PBR Hawaii 1997)). The EIS was prepared to assess the impacts of converting the Oahu Sugar Company Mill complex into the Amfac Commercial and Park project. Locating the Leeward YMCA on a portion of the mill site was discussed in the EIS and included as one of the assumptions of the traffic report. In the time since the EIS and traffic impact study were completed, plans for the Leeward YMCA have not changed significantly, while plans for the commercial component of the project (which was the major traffic generator) have stalled.

   The Department of Transportation Services reviewed the *Amfac Commercial and Park Draft Environmental Impact Statement* (which included the traffic impact study) and did not comment on the traffic study at that time (see attached letter). A copy of the traffic impact study is available upon request. The traffic impact study will be included as an appendix to the final EA.

2. The driveway serving the parking area off of Mokuola Street and the driveway for the Waipahu Street parking area are not connected. Through traffic will not be allowed within the property between Mokuola Street and Waipahu Street.

3. All parking requirements for the Leeward YMCA will be accommodated on the project site. The project architect, CDS International, has calculated the off-street parking requirements for the proposed Leeward YMCA improvements based on the requirements of the Land Use Ordinance (see attached). With a total of 28,297 square feet and various uses, 119 parking stalls will be required. The site plan contained in the EA includes 161 parking stalls.

   The Filipino Community Center, which also has a large parking lot, adjoins the Leeward YMCA. While there is no current shared parking arrangement between the Leeward YMCA and the Filipino Community Center, a parking agreement could be implemented between the two organizations to allow for "overflow" parking in the case of special events at either facility.

4. The statement that the proposed Leeward YMCA improvements will not be affected by hazardous streets, dangerous intersections, through traffic, inadequate separation of pedestrian/vehicle traffic, and inadequate street lighting is based on observations of current conditions in the vicinity of Mokuola and Waipahu Streets as well as the conclusion of the traffic impact study which states that traffic is expected to operate at an increased level of service in the future.

5. The completed traffic impact study did not analyze bus rider ship to the Leeward YMCA as a result of the proposed improvements. The final EA will be revised to state that the proposed improvements may increase the number of people traveling to the Leeward YMCA by bus.

6. The discussion on page 37 of the draft EA summarizes the conclusions of the traffic impact study. The traffic impact study will be included as an appendix to the final EA.

We appreciate your participation in the review of the draft EA.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Associate

cc: Glenn Tsugawa/YMCA of Honolulu
Paul Kobata/Dept. of Community Services
Genevieve Salmonson/OEQC

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DEPARTMENT OF TRANSPORTATION SERVICES

CITY AND COUNTY OF HONOLULU

PACIFIC PARK PLAZA
711 KAPIOLANI BOULEVARD, SUITE 1200
HONOLULU, HAWAII 96813

JEREMY HARRIS
MAYOR

CHERYL D. SOON
DIRECTOR

JOSEPH M. MAGALDI, JR.
DEPUTY DIRECTOR

TSP1/97-00020R

February 21, 1997

PBR HAWAII
RECEIVED
FEB 25 1997
Project
Project No.

MEMORANDUM

TO: PATRICK T. ONISHI, CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

ATTN: LIN WONG

FROM: CHERYL D. SOON, DIRECTOR

SUBJECT: AMFAC COMMERCIAL AND PARK PROJECT

In response to the December 23, 1996 letter from PBR Hawaii, the draft environmental impact statement (DEIS) for the subject project was reviewed. The second paragraph on page 2-12 discusses the improvement of Waipahu Street. This paragraph should be revised to indicate that no agreement has been reached on the improvements to Waipahu Street to the west of the entrance to Hawaii's Plantation village. Continued coordination with this department will be necessary to resolve this matter.

Should you have any questions regarding these comments, please call Faith Miyamoto of the Transportation System Planning Division at Local 6976.

Cheryl D. Soon
CHERYL D. SOON

cc: Office of Environmental
Quality Control
✓Mr. Vincent Shigekuni, PBR Hawaii

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

March 7, 1997

Ms. Cheryl D. Soon, Director
Department of Transportation Services
City and County of Honolulu
Pacific Park Plaza
711 Kapiolani Boulevard, Suite 1200
Honolulu, Hawaii 96813

Dear Ms. Soon:

SUBJECT: AMFAC COMMERCIAL AND PARK DRAFT ENVIRONMENTAL IMPACT STATEMENT

Thank you for your review of the Draft Environmental Impact Statement (DEIS) for the proposed Amfac Commercial and Park project. We have reviewed your letter of February 21, 1997 and will revise the second full paragraph on page 2-12 to read as follows:

Amfac is proposing to bear the entire cost of improving Waipahu Street, as shown on the detailed plans for the improvements along Waipahu Street, (less any amounts that various utility companies may be responsible for via Ordinance 2412) from the western portion of Hans L'Orange Park to the entrance of Hawaii's Plantation Village, so long as the City agrees to improve Waipahu Street to the east and west of this area as is currently needed for either capacity and/or safety reasons. DTS has recently indicated that they generally concur with Amfac's plans for Phase IA, IB, and Road "X". No agreement has yet been reached on the improvements to Waipahu Street to the west of the entrance of Hawaii's Plantation Village. Continued coordination with the Department of Transportation Services will be necessary to resolve this matter.

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

1001 BISHOP STREET, PACIFIC TOWER, SUITE 650, HONOLULU, HAWAII 96813
TELEPHONE: (808) 521-5631 FAX: (808) 523-1402 E-MAIL: pbrhi@aloha.net

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101 AUPUNI STREET, HILO LAGOON CENTER, SUITE 310, HILO, HAWAII 96720
TELEPHONE: (808) 961-3333 FAX: (808) 961-4989

If you have any further comments or questions regarding the project, please do not hesitate to contact me.

Sincerely,

PBR HAWAII

Vincent R. Shigekuni
Associate

cc: Lin Wong, City and County of Honolulu Planning Department
Nancy Heinrich, Office of Environmental Quality Control
Tim Johns, Amfac
Bernard Kea, Community Planning, Inc.
Ted Kawahigashi, Austin Tsutsumi & Associates, Inc.

1032.13\dcis\kl-46w61

Alternative D-A&B - Two Levels Generator Building (No Fill) with 2 Level Addition

	Req'm't		New Alt. Ds	# of Stalls Required
Use	1 stall per 200 SF		5,500	27.5
Fitness Training Room			2,400	12.0
Aerobic Dance Studio			1,900	9.5
Men's/Boy's Locker Room			1,900	9.5
Women's/Girl's Locker Room			600	3.0
Special Needs Locker Room		Subtotal	12,300	61.5
	1 stall per 75 SF		1,385	18.5
Meeting Room 1			600	8.0
Meeting Room 2			400	5.3
Meeting Room 3		Subtotal	2,385	31.8
	1 stall per 400 SF		800	2.0
Lobby/Vending			578	1.4
Lobby Restrooms			338	0.8
Reception/Control Desks			600	1.5
Child Watch Room		Subtotal	2,214	5.5
	1 stall per 400 SF		303	0.8
Office 1			278	0.7
Office 2			365	0.9
Office 3			373	0.9
Work Room			845	2.1
General Office Space		Subtotal	2,163	5.4
		1 stall per 400 SF	2,050	5.1
Heritage Museum		1 stall per 300 SF	2,000	6.7
Restaurant		Subtotal	4,050	11.8
	1 stall per 2000 SF		438	0.2
Storage			380	0.2
Mechanical			140	0.1
Laundry			4,180	2.1
15% Planning Factor		Subtotal	5,188	2.6
		TOTALS	23,287	118

	Alt. D-A	Alt. D-B
	180	163

SPECIAL STALLS

			Alt. D-A	Alt. D-B
Handicap Stalls[1]		5	6	7
Total regular stalls	5 HC stalls for 101 to 150 standard stalls			

		New Alt. Ds	# of Stalls Required	Alt. D-A	Alt. D-B
Loading Requirements[2]			1	1	1
Generator Building	1 stall for 2,000 - 10,000 SF	9,564	1	1	
Generator Addition	1 stall for 2,000 - 10,000 SF	5,883	1	1	2
Heritage Museum & Restaurant	1 stall for 2,000 - 10,000 SF	4,050			
Human Resources	1 stall for 20,000 - 50,000 SF	1,145	1	1	1
Administration Building	1 stall for 20,000 - 50,000 SF	5,590			
	TOTAL	26,012	4	4	4

Notes:
1. Source: *Uniform Federal Accessibility Standards*. FED-STD 795 April 1, 1988
2. Based on current City and County of Honolulu LUO, Section 21-6.100.
Also note that for the Generator, Generator Addition, and Heritage Museum Buildings, net square footage used and for the Human Resources and Administration Building the SF includes all usable square footage.

1959.01\ParkingAnalysis.xls

Alt D-A&B

FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
3375 KOAPAKA STREET, SUITE H425 • HONOLULU, HAWAII 96819-1869
TELEPHONE (808) 831-7761 • FAX (808) 831-7750 • INTERNET: www.honolulufire.org

JEREMY HARRIS
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARK
DEPUTY FIRE CHIEF

NOV 14 2002

November 8, 2002

Mr. Tom Schnell
PBR Hawaii
1001 Bishop Street
Pacific Tower, Suite 650
Honolulu, Hawaii 96813

Dear Mr. Schnell:

Subject: Draft Environmental Assessment
Leeward YMCA
Ewa, Oahu
Tax Map Keys: 9-4-161: 002 and 9-4-161: 004

We received your letter dated October 23, 2002, regarding the Draft Environmental Assessment for the Leeward YMCA in Ewa. The Honolulu Fire Department (HFD) requests that the following be complied with for all new structures and for existing structures that change occupancy use:

1. Provide a private water system where all appurtenances, hydrant spacing, and fire flow requirements meet Board of Water Supply standards.

2. Provide a fire department access road within 150 feet of the first floor of the most remote structure. Such access shall have a minimum vertical clearance of 13 feet 6 inches, be constructed of an all-weather driving surface complying with Department of Transportation Services (DTS) standards, capable of supporting the minimum 60,000-pound weight of our fire apparatus, and with a gradient not to exceed 20%. The unobstructed width of the fire apparatus access road shall meet the requirements of the appropriate county jurisdiction. All dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with an approved turnaround having a radius complying with DTS standards.

3. Submit civil drawings to the HFD for review and approval.

Mr. Tom Schnell
Page 2
November 8, 2002

Should you have any questions, please call Battalion Chief Kenneth Silva of our Fire Prevention Bureau at 831-7778.

Sincerely,

ATTILIO K. LEONARDI
Fire Chief

AKL/SK:bh

cc: Office of Environmental Quality Control
Department of Community Services, CBED Office of Special Projects

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

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Fax: (808) 242-2902
E-Mail: pbrmaui@lava.net

January 8, 2003

Mr. Attilio K. Leonardi, Fire Chief
Fire Department
City and County of Honolulu
3375 Koapaka Street, Suite H425
Honolulu, Hawaii 96819-1869

SUBJECT: **LEEWARD YMCA DRAFT ENVIRONMENTAL ASSESSMENT, TMK 9-4-161:2; TMK 9-4-161:4**

Dear Chief Leonardi:

Thank you for your letter regarding the Leeward YMCA Draft Environmental Assessment (EA) dated November 8, 2002. We offer the following responses to your comments:

1. A private water system will be provided where all appurtenances, hydrant spacing, and fire flow requirements meet Board of Water Supply standards;

2. The first floor of the most remote structure will be within 150 of both parking areas, which will be accessible to fire vehicles and apparatus; and

3. At the appropriate time civil drawings will be submitted for your review.

Your comments will be incorporated into the final EA.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Associate

cc: Glenn Tsugawa/YMCA of Honolulu
Paul Kobata/Dept. of Community Services
Genevieve Salmonson/OEQC

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POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 - AREA CODE (808) 529-3111
http://www.honolulupd.org
www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

LEE D. DONOHUE
CHIEF

GLEN KAJIYAMA
DEPUTY CHIEF

OUR REFERENCE CS-KP

November 12, 2002

Mr. Tom Schnell
PBR Hawaii
Pacific Tower, Suite 650
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Schnell:

Thank you for the opportunity to review and respond to the Leeward YMCA Draft Environmental Assessment.

This proposed project should have negligible impact on the services and facilities of the Honolulu Police Department.

If there are any questions, please call Ms. Carol Sodetani of the Support Services Bureau at 529-3658.

Sincerely,

LEE D. DONOHUE
Chief of Police

By

KARL GODSEY
Assistant Chief of Police
Support Services Bureau

cc: Mr. Paul Kobata
Department of Community Services

OEQC

Serving and Protecting with Aloha

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E-MAIL: [illegible]

January 8, 2003

Lee D. Donohue, Chief of Police
Police Department
City and County of Honolulu
801 South Beretania Street
Honolulu, Hawaii 96813

SUBJECT: LEEWARD YMCA DRAFT ENVIRONMENTAL ASSESSMENT, TMK 9-4-161:2; TMK 9-4-161:4

Dear Chief Donohue:

Thank you for your letter regarding the Leeward YMCA Draft Environmental Assessment (EA) dated November 12, 2002. We note that you state that the proposed project should have negligible impact on the services and facilities of the Honolulu Police Department.

We appreciate your participation in the review of the draft EA.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Associate

cc: Glenn Tsugawa/YMCA of Honolulu
Paul Kobata/Dept. of Community Services
Genevieve Salmonson/OEQC

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FROM :COANDERSON FAX FAX NO. :6714741 Nov. 25 2002 12:13AM P2

WAIPAHU NEIGHBORHOOD BOARD NO. 22

c/o NEIGHBORHOOD COMMISSION • 530 SOUTH KING STREET, ROOM 400 • HONOLULU, HAWAII 96813
PHONE: (808) 527-5749 • FAX: (808) 527-5760 • INTERNET: www.co.honolulu.hi.us

11/22/02

PBR HAWAII
1001 Bishop Street, Suite 650
Honolulu, Hawaii 96813

Office of Environmental Quality
235 S. Beretania Street, Suite 702
Honolulu, Hawaii 96813

Department of Community Services
CBED Office of Special Projects
City and County of Honolulu
711 Kapiolani Blvd, Rm 1422
Honolulu, Hawaii 96813

Gentlemen:

I have completed review of your excellent presentation of the proposed improvements at the Leeward YMCA/former Oahu Sugar site in Waipahu. My review as Neighborhood Board Chair and past President of Hawaii's Plantation Village perhaps gives me greater insight and interest in this plan.

I invite your attention to page 6, par 203, section four, which reads "The site plan also includes an area for a future heritage museum building as mentioned in the Waipahu 2000 Update and the Waipahu Town Plan, although this building is not proposed to be built at this time."

I ask that you please identify the specific site by TMK and map coordinates of the Heritage Museum location on your plan, doing so will assist Hawaii's Plantation Village management in their efforts to move forward with their plan to build. Presently the site is non-specific, just somewhere.

Your help in this regard will be appreciated.

Very Truly Yours,

C.O. Anderson

C. O. "Andy" Anderson, Chair

Cc: Neighborhood Commission; Hawaii's Plantation Village; Waipahu Community Association; Leeward YMCA; file.

PBR HAWAII

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January 8, 2002

Mr. C.O. "Andy" Anderson, Chair
Waipahu Neighborhood Board No. 22
c/o Neighborhood Commission
530 South King Street, Room 400
Honolulu, Hawaii 96813

SUBJECT: LEEWARD YMCA DRAFT ENVIRONMENTAL ASSESSMENT, TMK 9-4-161:2; TMK 9-4-161:4

Dear Mr. Anderson:

Thank you for your letter regarding the Leeward YMCA Draft Environmental Assessment (EA) dated November 22, 2002.

Please note that the site plan contained in the draft EA (Figure 3B) reserves a location east of the existing parking lot and fronting Waipahu Street for potential use as a Heritage Museum. The final EA will be revised to indicate that this location is on a portion of the parcel identified by TMK 9-4-161: 4.

The YMCA had intended to move the former Lab building to this location for use as the Heritage Museum to be leased by Hawaii Plantation Villages. However, before it could be moved, the Lab building was struck by fire. Before the remains of the burned Lab building were removed, the YMCA asked Hawaii Plantation Villages' management to tour the destruction. They agreed that the burned Lab building could not be salvaged and the remains subsequently have been removed. However, the YMCA is still allotting space for the Heritage Museum as discussed in the above paragraph.

We appreciate your participation in the review of the draft EA.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Associate

cc: Glenn Tsugawa/YMCA of Honolulu
Paul Kobata/Dept. of Community Services
Genevieve Salmonson/OEQC

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U.S. Department of Housing and Urban Development
Hawaii State Office
500 Ala Moana Boulevard, Suite 3A
Honolulu, Hawaii 96813
http://www.hud.gov

November 7, 2002

Mr. Tom Schnell
PBR Hawaii
Pacific Tower, Suite 650
1001 Bishop Street
Honolulu, Hawai'i 96813

Dear Mr. Schnell:

Subject: Leeward YMCA Draft Environmental Assessment

We have received and reviewed the Draft Environmental Assessment (EA) for the Leeward YMCA. We have the following comments and concerns regarding the EA:

1. As identified in the introduction, the EA must satisfy both federal and state environmental regulations. The document correctly identifies Chapter 343 of the Hawaii Revised Statutes as the State regulation but does not identify the appropriate federal regulation. In several places the document states that it is being prepared as a requirement of the United States Department of Housing and Urban Development (HUD). The HUD regulations that govern the preparation of environmental documents can be found at 24 CFR 58, however, the document does not cite the HUD regulations.

2. In its current format, the draft EA does not meet the requirements found at 24 CFR 58. As an example, Section 4.0 on page 17 of the document refers to form HUD-4128. This form is used with 24 CFR 50 but not with 24 CFR 58. Instead, the Statutory Worksheet, identified in the same section, is the appropriate document used with Part 58 regulations and should be completed in this instance.

3. Section 1.5 identifies the City and County of Honolulu Department of Community Services as the "Accepting Agency" but does not identify the approving agency. However, the cover letter identifies the City and County of Honolulu Department of Community Services as both the "Approving Agency" and the "Accepting Authority". The complete information on accepting and approving agencies should be contained in the body of the document.

4. One of the most critical defects of the draft EA is the omission of documentation that supports statements made on the environmental conditions at the site of the Leeward YMCA. This defect is found through out Section 4 "Description of the Affected Environment, Potential Impacts of the Proposed Action, and Mitigative Measures". For example, Section 4.1.1 on Coastal Barrier Resources/coastal zones states that the improvements are consistent with the Hawai'i Coastal Zone Management program but does not indicate how or by what authority the consistency has been established.

5. Section 4.1.3 on Historic Preservation/Historic Properties makes reference to two archaeological studies done in 1995 and 1996 that found the property drastically altered and the possibility of finding prehistoric sites remote. The EA then concludes that no archaeological or prehistoric sites will be disturbed by this project. However, the EA does not attach these reports to verify the information found in the 1995 and 1996 report nor does it contain a letter from the State Historic Preservation Officer that arrives at the same conclusion. In addition, there is no mention that consultations with Native Hawaiians concerning the cultural use or resources of the proposed site were conducted. This consultation is required by federal law and should be documented in the EA by letters from the proponents inviting such consultations with responses from the invited groups.

6. Sections 4.1.8 and 4.1.9. Section 4.1.8 on Toxic Chemicals and Radioactive Materials. Reference is made to a Phase II (ASTM) report prepared in connection with the former O'ahu Sugar Company mill site. However, the date of the report is not included, there is no corroborating information from the State of Hawaii Department of Health nor is the report attached to the EA.

7. Section 4.1.9 on Endangered Species simply states that the site of the Leeward YMCA was a former mill site and it is not likely that any endangered species now exist on the property. However, no survey of the site was done to substantiate this assumption. The premise that no endangered species currently exist on the property must be validated and documented.

8. Section 4.1.4 concerns Noise and Noise Abatement. A 1996 acoustic study on traffic noise was used as the basis for conclusions in the EA. However, the conclusions cannot be substantiated because the study was not attached to the EA. This section also states that the Leeward YMCA is within several miles of any civil airport and/or military airfields. The EA then presumes that noise from these facilities will not be a problem because of the distance involved. We suggest that a map indicating the location of the Leeward YMCA and its proximity to the nearest civil and military airfields be included in the EA to strengthen the conclusions.

Finally, thank you for the opportunity to review the draft EA for the Leeward YMCA. If you have any questions regarding our comments, please contact Lynn J. Lee, Senior Community Planning and Development Representative at 522-8180, extension 276.

Sincerely,

Mark A. Chandler, Director
Office of Community Planning
and Development

cc:
Mr. Paul Kobata
Department of Community Services
CBED Office of Special Projects
City and County of Honolulu
711 Kapi'olani Blvd., Room 1422
Honolulu, Hawai'i 96813

Ms. Jean Tanji
Federal Grants Coordinator
Department of Budget and Fiscal Services
City and County of Honolulu
530 South King Street, Room #208
Honolulu, Hawai'i 96813

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

PBR HAWAII
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January 8, 2003

Mr. Mark A. Chandler, Director
Office of Community Planning and Development
U.S. Department of Housing and Urban Development
Hawaii State Office
500 Ala Moana Boulevard, Suite 3A
Honolulu, Hawaii 96813

SUBJECT: LEEWARD YMCA DRAFT ENVIRONMENTAL ASSESSMENT, TMK 9-4-161:2; TMK 9-4-161:4

Dear Mr. Chandler:

Thank you for your letter regarding the Leeward YMCA Draft Environmental Assessment (EA) dated November 8, 2002. We offer the following responses to your comments:

1. The final EA will be revised to cite 24 CFR 58, the HUD regulations that govern the preparation of environmental documents.

2. The final EA will be revised to meet the requirements of 24 CFR 58, and will include a completed Statutory Worksheet.

3. In the draft EA the terms "accepting agency" and "approving agency" were used interchangeably and a distinction was not made between these two terms. In the final EA the term "accepting agency" will be replaced with "approving agency" to maintain consistency throughout the document.

4. The final EA will a contain documentation that supports statements made on the environmental conditions at the site of the Leeward YMCA.

5. Section 4.1.3 of the draft EA only makes reference to one archaeological study, which, although not stated in Section 4.1.3, was completed in 1996. This archaeological study was prepared as part of the *Amfac Commercial and Park, Waipahu Central Oahu TMK 9-4-02: 04, Final Environmental Impact Statement* (PBR Hawaii 1997). This will be clarified in the final EA. The final EA will also include the archaeological report as an appendix along with a letter from the State Historic Preservation Division stating "we believe it is unlikely that historic sites will be found and believe that this project will have 'no effect' on historic sites."

   In addition, the final EA will include consultation with Native Hawaiians concerning cultural use or resources of the Leeward YMCA site.

6. The final EA will include the Phase II (ASTM) report mentioned in section 4.1.8 as an appendix. The section on Toxic Chemicals and Radioactive Materials will be revised to include the date of the report. In addition, the State of Hawaii Department of Health Office of Hazard Evaluation and Emergency Response has be consulted and this consultation will be included in the final EA.

7. In compliance with the HUD Statutory Worksheet, the U.S Fish and Wildlife Service has been consulted in regard to the impact the proposed Leeward YMCA may have on endangered species of plants or animals or critical habitat. This consultation will be included in the final EA.

8. The final EA will include the 1996 acoustic study conducted for the site. A map indicating the location of the Leeward YMCA and its proximity to the nearest civil and military airfields will also be included.

Thank you for your review of the draft EA. As noted above the final EA will incorporate your concerns.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Associate

cc: Glenn Tsugawa/YMCA of Honolulu
Paul Kobata/Dept. of Community Services
Genevieve Salmonson/OEQC

Appendix A

Community Needs Assessment

Fish

YMCA of Honolulu: Community Needs Assessment – Waipahu/Waianae

November 2001

Prepared by:
Phil Balducci & Associates, Inc.
101 South Bay Blvd., Suite B-2
Anna Maria Island, FL34216

"A YMCA would be great. Our children need someplace to go. We all want it."

– A Waianae resident

"Waipahu is exploding with new people and stores. A YMCA would anchor the community. I hope they build a big one."

– A Waipahu resident

Table of Contents

Objectives

The primary purpose of this study is to determine, in an unbiased, statistically projectable manner:

- What area residents want and need in terms of sports, recreation and health-related programs and services.
- How likely area residents are to join one or both of the proposed new YMCAs, to be located in Waianae and Waipahu.
- What impact cost plays in terms of likely YMCA membership at both sites.
- What impact including an outdoor swimming pool will have on likely YMCA membership at both sites.

Methodology

The results presented in this report are based upon 800 complete interviews with adult head of households who reside within a predetermined study area. This area includes Pearl City, Waipahu, Kapolei, Ewa, Makakilo City, Nanakuli, Maili, Waianae, Makaha and all points in between these communities. The sample for this study was designed in such a manner that every telephone household within each of these areas had an equal probability of being contacted and interviewed. Multilingual interviews from a central telephone facility in Honolulu were utilized for all the telephone calls. Interviewing was completed during October and November of 2001.

For purposes of discussion, the sample area has been collapsed into the following designations: Pearl City, Ewa/Kapolei (which includes Makakilo City) Waianae, and Other Leeward (which consists of Makaha, Maili and Nanakuli, and all points in between, except for Waianae) and Waipahu.

This is the first phase of a multi-part study examining the optimal growth strategy for the YMCA of Honolulu to better meet the needs and wants of Island residents.

This study was conducted in cooperation with the YMCA of the USA, and followed a pattern being utilized by numerous YMCAs across the continental United States. As such, when applicable, results of this study are compared with national norms established during the past 18 months.

Data Presentation

The tables within this report show responses based on the actual number of respondents.

In some cases, percentages may add to slightly more or less than 100 percent due to rounding. Percentages may also add to slightly more than 100 percent due to acceptance of more than one answer from a respondent to a particular question.

Reliability of Survey Percentages

Results of any sample are subject to sampling variation. The magnitude of this variation is measurable and is affected by the number of interviews contained in the sample and the level of the percentages expressing the results.

The table below shows the possible sample variation that applies to percentage results reported from typical random sample survey results. The chances are 95 out of 100 that survey results do not vary, plus or minus, by more than the indicated number of percentage points from the result that would be obtained if interviews had been conducted with all persons in the universe represented by the sample.

Applicable Sample Size	Approximate Sampling Tolerances to Percentages at or Near These Levels		
	10% or 90%	30% or 70%	50%
800 Interviews	2%	3%	3%
600 Interviews	3%	3%	4%
400 Interviews	4%	5%	5%
200 Interviews	6%	7%	7%
100 Interviews	6%	9%	10%
50 Interviews	8%	13%	14%

Sampling Tolerances When Comparing Two Samples

Tolerances are also involved in the comparison of results from different parts of any one sample and in the comparison of results between two different samples. A sample difference, in other words, must be of at least a certain size to be considered statistically significant. The table below is a guide to the sampling tolerances applicable to such comparisons, based on 95 chances in 100 that the difference is statistically significant.

Sample Sizes Compared	Differences Required for Significance at or Near These Percentage Levels		
	10% or 90%	30% or 70%	50%
600 and 600	3%	4%	4%
400 and 400	4%	6%	6%
400 and 250	5%	8%	8%
300 and 300	6%	7%	7%
200 and 100	7%	11%	12%
100 and 100	8%	13%	14%

Formulas for Sampling Tolerances

The following are the formulas for calculating sampling tolerances from a single sample for various confidence levels at any given response rate.

<u>Confidence Levels</u>

90%: Tolerance = $\pm 1.645 \sqrt{PQ/N}$

95%: Tolerance = $\pm 1.960 \sqrt{PQ/N}$

99%: Tolerance = $\pm 2.575 \sqrt{PQ/N}$

P = Proportion of people who answer a given question one way (e.g., yes vs. no).

Q = 1 - P

N = Sample size.

Example: 95% confidence level, P = 30%, Q = 70%, N = 500

Tolerance	=	±	1.960 $\sqrt{(0.30)(0.70)/500}$
	=	±	1.960 $\sqrt{0.21/500}$
	=	±	1.960 $\sqrt{0.00042}$
	=	±	1.960 $\sqrt{0.02049}$
	=	+	0.04
	=	+	4% at 95% confidence level

Example: 99% confidence level, P = 10%, Q = 90%, N = 500

Tolerance	=	±	2.575 $\sqrt{(0.10)(0.90)/500}$
	=	±	2.575 $\sqrt{0.09/500}$
	=	±	2.575 $\sqrt{0.000182}$
	=	±	2.575 $\sqrt{0.01341}$
	=	±	0.034
	=	±	3% at 99% confidence level

Executive Summary

- This research demonstrates that there is a very strong level of interest among area residents in having full Family Center YMCAs in both Walanae and Waipahu.
  - What Walanae may lack in population base, it compensates for in greater than may be expected likelihood of joining a YMCA.
  - In contrast, the sheer number of those area residents who would be more likely to use a YMCA in Waipahu makes this facility appear as if it has the potential for a very large paying membership.
- Residents of the study area appear:
  - Very price elastic. That is, as the monthly costs of membership drop, the percentage likely to join rises dramatically.
  - Very interested in having the new YMCAs include outdoor swimming pools. This amenity is likely to significantly increase the number of members at both locations.

Membership Projections Based Upon Conservative Assumptions

If both YMCA facilities are developed:

Waianae:

- Costs of $60 (individual) and $75 (family) without a pool = 864 member units.
- Costs of $60/$75 with a pool = 1,392 member units.
- Costs of $40/$60 with a pool = 2,272 member units.

Waipahu:

- Costs of $60/$75 without a pool = 2,509 member units.
- Costs of $60/$75 with a pool = 3,390 member units.
- Cost of $40/$60 with a pool = 5,755 member units. ✓

If only Waipahu is developed:

- Cost of $40/$60 with a pool = 6,213 member units. ✓

If only Walanae is developed:

- Cost of $40/$60 with a pool = 3,286 member units.

Membership Calculations

Total Area Calculation--
Pearl City, Ewa, Ewa Beach, Walanae, Other Walanae Cost and Waipahu

There are 48,667 households in the study area.

- Of these, 8,028 belong to a health or fitness club.

Therefore, 40,639 area households are available for YMCA membership.

- Of these, 8,941 prefer going to a YMCA in Walanae, and 31,698 prefer going to a YMCA in Waipahu.

Walanae Membership Projections

Of the 8,941 households:

- 26%, or 2,325 prefer an individual membership.
- 74%, or 6,616 prefer a family membership.

Individual members:

At a cost of $60 per month for an individual membership (no pool), 4% of the individuals claim to be "very likely" to join.

- .04 x 2,325 = 93

At a cost of $60 per month for an individual membership with an outdoor pool, 11% are "very likely" to join.

- .11 x 2,325 = 256

At a cost of $40 per month for an individual membership, 36% are "very likely" to join.

- .36 x 2,325 = 837

Family members:

At a cost of $75 per month for an individual membership (no pool), 19% of the individuals claim to be "very likely" to join.

- .19 x 6,616 = 1,257

At a cost of $75 per month for an individual membership with an outdoor pool, 29% are "very likely" to join.

- .29 x 6,616 = 1,919

At a cost of $60 per month for an individual membership, 41% are "very likely" to join.

- .41 x 6,616 = 2,713

Total members for Walanae before adjustments:

- Minimum member units, monthly fees of $60/$75, without pool = 1,350.
- Mid-range member units, monthly fees of $60/$75 with outdoor pool = 2,175.
- Maximum member units, monthly fees of $40/$60, with outdoor pool = 3,550.

Waipahu Membership Projections

Of the 31,698 households:

- 33%, or 10,460 prefer an individual membership.
- 67%, or 21,238 prefer a family membership.

Individual members:

At a cost of $60 per month for an individual membership (no pool), 5% of the individuals claim to be "very likely" to join.

- .05 x 10,460 = 523 member units

At a cost of $60 per month for an individual membership with an outdoor pool, 8% are "very likely" to join.

- .08 x 10,460 = 837 member units

At a cost of $40 per month for an individual membership, 21% are "very likely" to join.

- .21 x 10,460 = 2,197 member units

Family members:

At a cost of $75 per month for an individual membership (no pool), 16% of the individuals claim to be "very likely" to join.

- .16 x 21,238 = 3,398 member units

At a cost of $75 per month for an individual membership with an outdoor pool, 21% are "very likely" to join.

- .21 x 21,238 = 4,460 member units

At a cost of $60 per month for an individual membership, 32% are "very likely" to join.

- .32 x 21,238 = 6,796

Total members for Waipahu before adjustment:

- Minimum member units, monthly fees of $60/$75, with no pool = 3,921.
- Mid-range member units, monthly fees of $60/$75 with outdoor pool = 5,297.
- Maximum member units, monthly fees of $40/$60, with pool = 8,993.

Summary Membership Estimates

Conservative Assumptions

- Very good marketing causes 80% of area residents to become aware of the new YMCAs in Walanae and Waipahu.
- 80% of those who claim to be "very likely" to join, actually join.
- None of those claiming to be "somewhat likely" to join actually join in the short run. These individuals do, however, represent "market potential" which, over time, may be persuaded to join the YMCA.
- Total number of households are per the 1990 census, and projections do not take population growth into account.

If both the Walanae and Waipahu YMCAs open:

Walanae YMCA

- At costs of $60 (individual) and $75 (family), without an outdoor pool: 1,350 x .80 x .80 = 864 member units
- At costs of $60 and $75, with an outdoor pool: 2,175 x .80 x .80 = 1,392 member units
- At costs of $40 and $60, with an outdoor pool: 3,550 x .80 x .80 = 2,272 member units

Waipahu YMCA

- At costs of $60 (individual) and $75 (family), without an outdoor pool: 3,921 x .80 x .80 = 2,509 member units
- At costs of $60 and $75, with an outdoor pool: 5,297 x .80 x .80 = 3,390 member units
- At costs of $40 and $60, with an outdoor pool: 8,993 x .80 x .80 = 5,755 member units

If only the Waipahu YMCA is opened, a percentage (8%) of those most interested in a Walanae YMCA claim to be "very likely" to join in Waipahu.

- At $40 and $60, with an outdoor pool: 5,755 + (715 x .80 x .80) = 6,213 member units

If only the Walanae YMCA is opened, a percentage (5%) of those most interested in a Walanae YMCA claim to be "very likely" to join in Walanae.

- At $40 and $60, with an outdoor pool: 2,272 + (1,585 x .80 x .80) = 3,286 member units

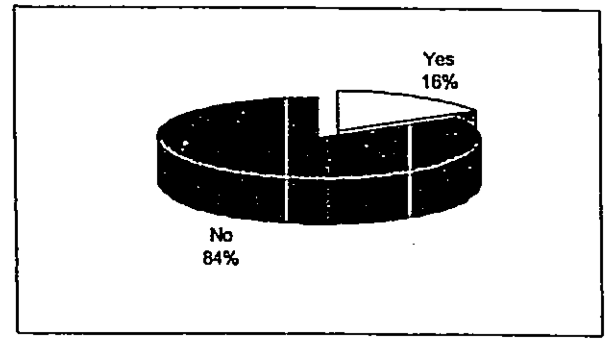
Detailed Survey Findings

I. Current Membership – The Health and Fitness Environment

The first questions asked in this survey dealt with whether or not area residents currently belong to any type of health or fitness club. In the YMCA membership calculations, residents who belong to a health or fitness club are omitted.

- Of the individuals interviewed, 16 percent belong to some type of health or fitness club.

Currently Belong To a Health or Fitness Club



Base: Total sample (800).
Question: Do you currently belong to a health club or fitness club?

- Level of membership in health/fitness clubs varies across the geographic areas surveyed, ranging from 22% among Pearl City residents, to 6% of the Waianae sample.
- Overall, it appears there is a lower level of health and fitness club membership among Leeward coast residents (i.e., Waianae and other Leeward sample areas) than elsewhere.

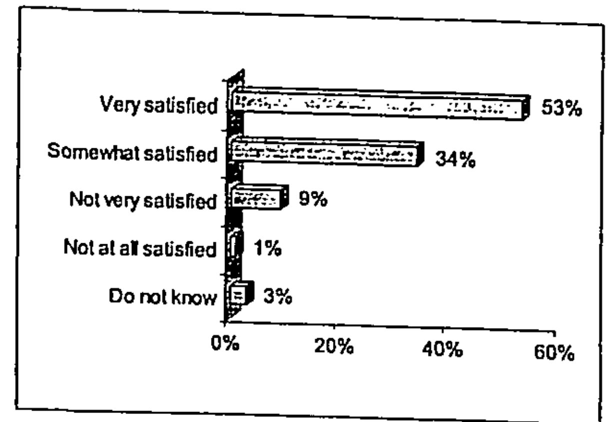
Currently Belong To a Health or Fitness Club

	Total Sample (%)	Pearl City (%)	Ewa/ Kapolei (%)	Waianae (%)	Other Leeward (%)	Waipahu (%)
Yes	16	22	19	6	7	16
No	84	78	81	94	93	84

Base: Total sample (800).
Question: Do you currently belong to a health club or fitness club?

- Of the area residents who belong to a health or fitness club, almost nine out of ten (53% "very satisfied" plus 34% "somewhat satisfied") claim to be satisfied with their membership. This is consistent with findings in similar surveys conducted across the continental United States by PB&A.

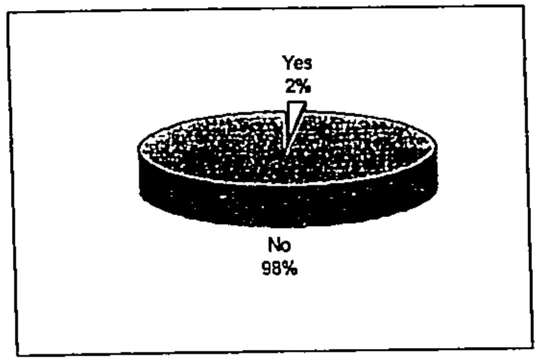
Satisfaction with Health/Fitness Club



Base: Respondents who belong to a health or fitness club (130).
Question: Do you currently belong to a health club or fitness club?

- When asked directly, 2% of respondents claim that they, or a member of their immediate family, are fitness members of the YMCA. Thus, it appears there should be very little membership loss at existing YMCAs from members who reside within the sample area. However, it is important to remember that Mililani is not included in this study.
- Of the 16 respondents claiming to be current fitness members of the YMCA, 8 reside in Pearl City, 6 in Waipahu and 2 in Ewa/Kapolei.

Current Fitness Members of YMCA



Base: Total sample (800).

Question: Are you, or is anyone in your immediate family, currently a fitness member of the YMCA?

To Which YMCA Do You Belong?

	Total Sample 16 (#)	Pearl City 8 (#)	Ewa/ Kapolei 2 (#)	Waipahu 6 (#)
Kahili	1	--	--	1
Mililani	8	6	--	2
Nuuanu	1	--	--	1
Central	4	2	2	--
Other	2	--	--	2

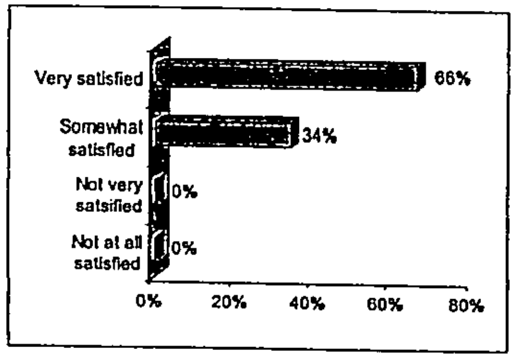
Base: Respondents who are current fitness members of the YMCA (16).

Question: To which YMCA do you belong?

CAUTION: Very small base size.

- All of the respondents surveyed who claim to be current fitness members of the YMCA are either very or somewhat satisfied with their membership (66% "very satisfied" plus 34% "somewhat satisfied").
- Although some caution should be exercised in this interpretation due to the very small number of YMCA members in this study, it appears that YMCA of Honolulu members are at least as satisfied with their memberships as are their colleagues who belong to YMCAs on the mainland. Over the past 18 months, the average satisfaction level computed by PB&A for YMCAs is 92% "very satisfied" plus "somewhat satisfied".

Satisfaction with Current YMCA Membership



Base: Respondents who are current fitness members of the YMCA (16).

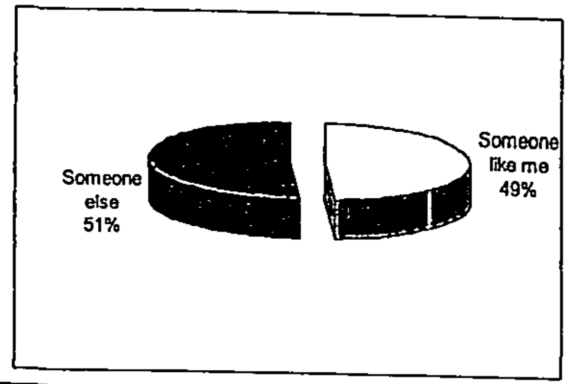
Question: Overall, are you [read scale] with your current YMCA membership?

II. Is the YMCA for Someone Like You?

Study participants who are not YMCA members were asked directly whether, based upon what they know or have heard, if they perceive membership in the YMCA to be for someone like themselves, or for someone else.

- Not including current members, one-half of those surveyed claim that membership in the YMCA is for someone like themselves.

YMCA Membership Is For Someone Like Me



Base: Non YMCA members (784).

Question: Based on what you know or have heard, is membership in the YMCA for someone like you, or someone else?

- Residents of Ewa/Kapolei and Waianae/Leeward coast are more likely to feel YMCA membership is for someone like themselves than are residents of Pearl City or Waipahu.

YMCA Membership Is For Someone Like Me

	Total Sample (%)	Pearl City (%)	Ewa/ Kapolei (%)	Waianae (%)	Other Leeward (%)	Waipahu (%)
Someone like me	49	43	56	50	57	45
Someone else	51	57	44	50	43	55

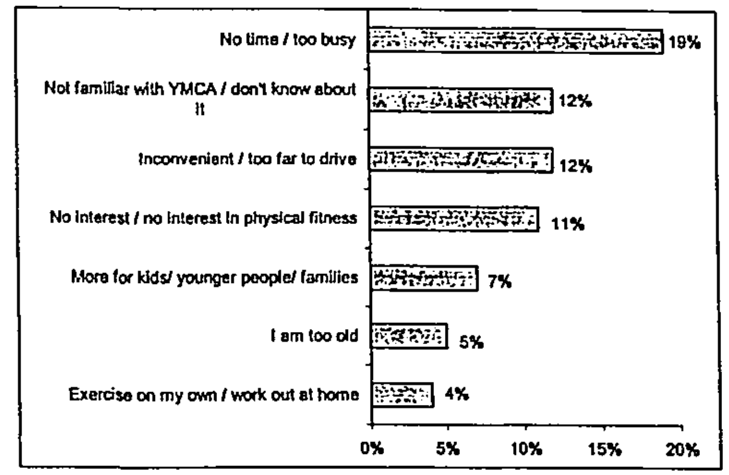
Base: Non YMCA members (784).

Question: Based on what you know or have heard, is membership in the YMCA for someone like you, or someone else?

Respondents who do not feel membership in the YMCA is for someone like them were asked the reasons they feel this way. This is asked on an open-ended basis, so that residents are answering in their own words.

- The most common reason given for believing membership in the YMCA is not for someone like themselves is that the respondent is too busy, or has no time.
- One in ten (12%) respondents claim they are not familiar with the YMCA, or don't know enough about it.
- Similarly, one in ten (12%) claim that the YMCA is inconvenient or too far away to be for someone like themselves.

Why Is Membership In the YMCA Not for Someone Like You? (Unaided)



Base: Non YMCA members who feel membership in the YMCA is not for someone like themselves (400).

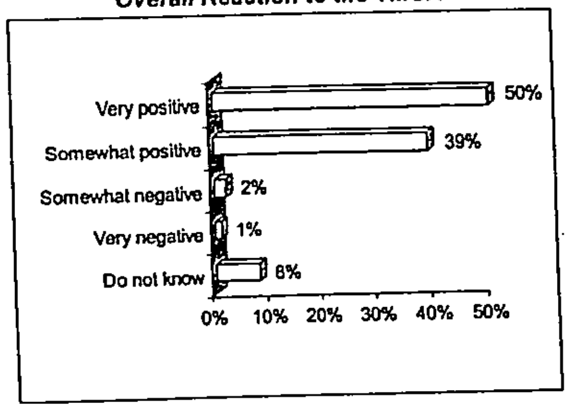
Question: Based on what you know or have heard, is membership in the YMCA for someone like you, or someone else?

NOTE: *Only answers given by 4% or more of the sample are included in this chart.*

III. Overall Reaction to the YMCA

- As has been seen in numerous studies across the continental United States conducted by Phil Balducci & Associates, Inc. (PB&A) on behalf of local YMCAs, the basic reaction of people to the YMCA is overwhelmingly positive.

Overall Reaction to the YMCA



Mean Rating: 3.60

Base: Respondents who are not YMCA members (784).
Question: Based upon what you know or have heard, is your reaction to the YMCA: [read scale]

- Having a positive reaction to the YMCA exists across all five sample areas in this study, but is particularly strong around the Leeward coast (i.e., Walanae and other Leeward).

Overall Reaction to the YMCA
By Geographic Area

	Total Sample (%)	Pearl City (%)	Ewa/ Kapolei (%)	Walanae (%)	Other Leeward (%)	Waipahu (%)
Very positive	50	43	50	65	58	48
Somewhat positive	39	49	37	24	35	39
Somewhat negative	2	–	3	5	1	3
Very negative	1	1	2	–	1	1
Do not know	8	7	8	6	5	9
MEAN RATING	3.60	3.55	3.59	3.72	3.66	3.60

Base: Respondents who are not YMCA members (784).
Question: Based upon what you know or have heard, is your reaction to the YMCA: [read scale]
NOTE: *Mean ratings are calculated on a 4-point scale, where 4 = very positive and 1 = very negative.*

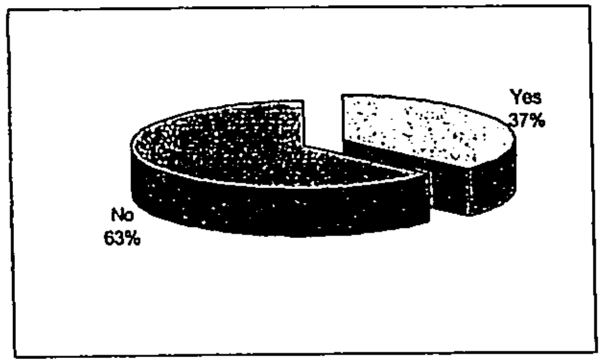
IV. Children In the Home

In this portion of the study, respondents were queried as to the presence of children and teens in their household. Those with children were asked, on an open-ended basis, what type of programs and services there is a desire for, to better meet the needs and wants of these young people.

Children 5 to 12 Years Old

- Of the individuals participating in this survey, 37% claim to have children between the ages of 5 and 12 years old living in their home.

Have Children Between 5 and 12 Years Old at Home



Base: Total sample (800).

Question: Is there anyone in your household between the ages of 5 and 12?

Have Children Between 5 and 12 Years Old at Home

	Total Sample (%)	Pearl City (%)	Ewa/ Kapolei (%)	Waianae (%)	Other Leeward (%)	Waipahu (%)
Yes	37	34	45	38	49	28
No	63	66	55	62	51	72

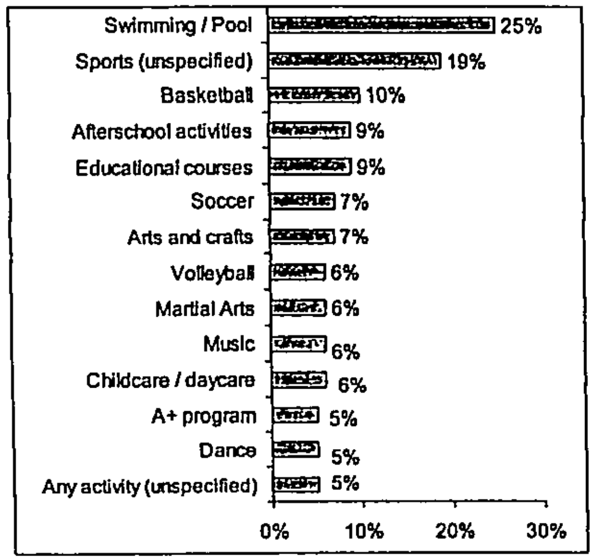
Base: Total sample (800).

Question: Is there anyone in your household between the ages of 5 and 12?

As mentioned, respondents who have children in the home between the ages of 5 and 12 were asked what programs, services or facilities the YMCA should offer that would be of interest to their family.

- A pool and/or swimming lessons were mentioned by one-quarter of the respondents as being something that would be of interest to their family. This program/facility combination is mentioned more often than any other aspect.

What Programs Should the YMCA Offer For Children Between the Ages of 5 and 12? (Unaided)



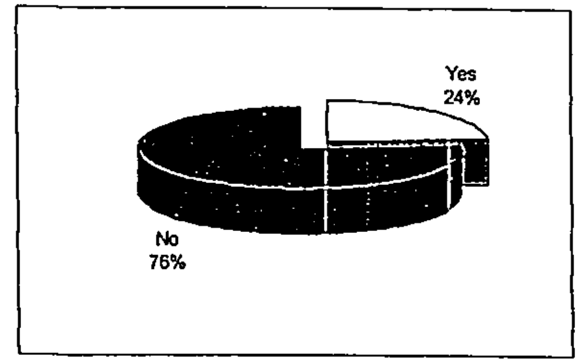
Base: Respondents with children at home between the ages of 5 and 12 (297).

Question: What programs, services or facilities should the YMCA in [town checked in Q10] offer specifically for children between the ages of 5 and 12 that your family would be interested in?

Youth Between 13 and 18 Years Old

- Of the individuals participating in this survey, 24% claim to have children between the ages of 13 and 18 years old living in their home.

Have Children Between 13 and 18 Years Old at Home



Base: Total sample (600).

Question: Is there anyone in your household between the ages of 13 and 18?

- There appears to be a higher percentage of teenagers living in the Leeward coastal areas (i.e., Waianae and other Leeward) than there is elsewhere. This observation should be verified with secondary population statistics.

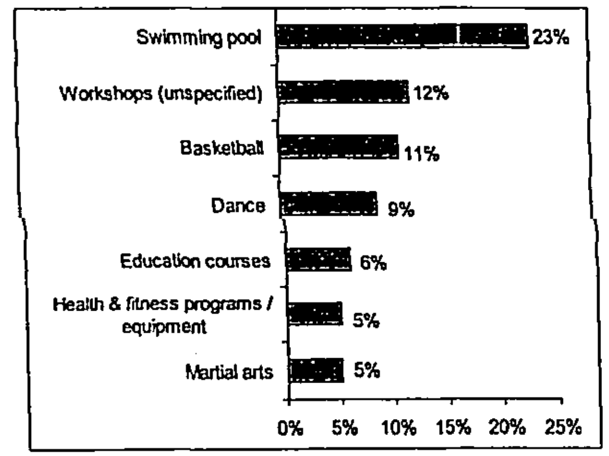
Have Children Between 13 and 18 Years Old at Home

	Total Sample (%)	Pearl City (%)	Ewa/ Kapolei (%)	Waianae (%)	Other Leeward (%)	Waipahu (%)
Yes	24	18	24	29	35	22
No	76	82	76	71	65	78

Base: Total sample (600).
Question: Is there anyone in your household between the ages of 13 and 18?

- As was seen among parents of younger children, those respondents with teens living in their homes are most interested in having a pool built by the YMCA.
- In addition, there appears to be significant interest in workshops, educational courses and social events directed at, and specifically for, teenage youth.

What Programs Should the YMCA Offer For Children Between the Ages of 13 and 18? (Unaided)



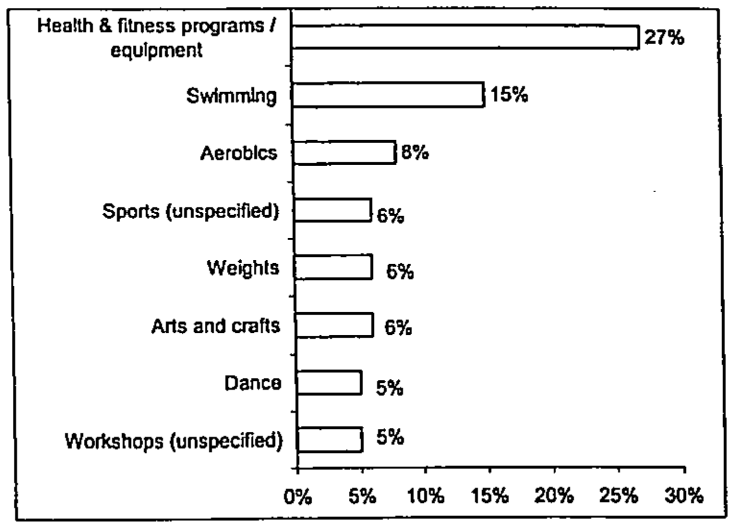
Base: Respondents with children at home between the ages of 13and 18 (189).
Question: What programs, services or facilities should the YMCA in [town checked in Q10] offer specifically for children between the ages of 5 and 12 that your family would be interested in?

V. Community Wants and Needs for Adults

To participate in this survey, respondents were required to be at least 18 years of age. As such, everyone was asked, on an open-ended basis, what type of programs, services and facilities the YMCA should consider offering to meet the needs and wants of adults.

- While a substantial percentage of respondents again suggested that the YMCA should build a pool, the most common request is for health and fitness programs and equipment.

What Programs Should the YMCA Offer For Adults? (Unaided)



Base: Total sample (800).

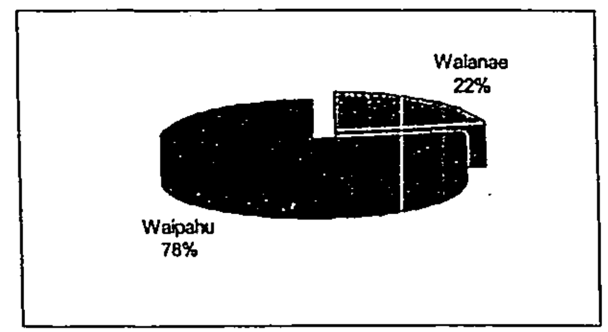
Question: Thinking now about adults, what programs, services or facilities should the YMCA offer that would interest you?

VI. Proposed Locations

Respondents were told that the YMCA of Honolulu is planning to expand their program offerings in both Waipahu and Walanae, and asked, if they were interested in YMCA programs, which location they would be most likely to use.

- Slightly more than three quarters (78%) of the total sample claim they would be most likely to use a facility at Waipahu. However, this percentage may be somewhat misleading because of the manner in which the sampling for this study is defined. That is, a greater number of interviews were conducted in areas in closer proximity to Waipahu than to Walanae.

Which Facility Would You Be More Likely To Use?



Base: Total sample (800).

Question: The YMCA of Honolulu is planning to expand their program offerings in both Waipahu and Walanae. If you were interested in YMCA programs, which would you be most likely to go to?

The table that follows shows which YMCA location is preferable to area residents based upon where they reside.

- Not surprisingly, those individuals who live in Pearl City, Ewa/Kapolei and Waipahu prefer using a YMCA in Waipahu. Those who live along the Leeward coast (Walanae and other Leeward) are more inclined to go to a YMCA in Walanae.

Which Facility Would You Be More Likely To Use?

	Total Sample (%)	Pearl City (%)	Ewa/ Kapolei (%)	Walanae (%)	Other Leeward (%)	Waipahu (%)
Walanae	22	3	6	98	90	1
Waipahu	78	97	94	2	10	99

Base: Total sample (600).

Question: The YMCA of Honolulu is planning to expand their program offerings in both Waipahu and Walanae. If you were interested in YMCA programs, which would you be most likely to go to?

VII. Importance of Specific Facilities and Programs

Next, respondents were presented with twelve potential programs or facilities, which potentially could be offered at Walanae and Waipahu. Here, a 5-point scale, where 5 = definitely will use and 1 = definitely will not use, is utilized.

Results are presented in two ways: first as percentages of "definitely will use" and then, in a separate table, as mean ratings. A mean rating is the average score given by the respondents. In this instance, the closer a mean rating is to 5.00, the more likely area residents are, on average, to claim they will use a specific program/facility.

Readers should keep in mind that residents of Walanae and the other Leeward sample areas are primarily interested in the Walanae location, whereas those who live in Pearl City, Ewa/Kapolei and Waipahu want to use the Waipahu location.

- Of the twelve tested facilities and programs, the four that appear to be of greatest interest (i.e., the highest percentage of "definitely will use") to potential members are:
  - Cardio vascular equipment, such as treadmills, staircilmbers and stationary bicycles.
  - Massage.
  - Outdoor teaching and recreation pool.
  - Computer lab.
  - Free weights.
- The facilities and programs that are likely to be used by the smallest percentage of area residents are:
  - Gymnastics Center.
  - Babysitting services.
- The residents of Walanae and the other Leeward sample area are significantly more interested in nearly every tested factor than are residents of Pearl City, Ewa/Kapolei and Waipahu.

Likelihood of Using Facilities/Services
Percentage Definitely Will Use

	Total Sample (%)	Pearl City (%)	Ewa/ Kapolei (%)	Waianae (%)	Other Leeward (%)	Waipahu (%)
Cardiovascular equipment	49	40	49	59	62	47
Outdoor teaching/ recreation pool	44	31	43	69	65	42
Massage	45	33	48	57	64	42
Free weights	41	27	39	52	63	44
Healthy lifestyle evaluation	35	25	30	47	53	35
Computer lab	42	25	42	60	71	41
Youth exercise equipment	39	23	42	55	62	38
Aerobics room	35	21	35	48	53	37
Nautilus-style weight machine circuit	34	20	32	51	57	34
Full court basketball gym	37	20	33	56	57	41
Gymnastics	24	15	22	38	37	25
Babysitting services	31	20	36	34	48	30

Base: Total sample (600).

Question: I would like to read to you a list of facilities that may or may not be included in the proposed new YMCA. For each, please tell me how likely you or someone in your immediate family would be to use the facility if it became available. On a scale from 1 to 5, where 5 = definitely will use and 1 = definitely will not use, how likely is it that you or someone else in your household will use [Read programs once at a time, beginning with x'd.]?

NOTE: *Mean ratings are calculated on a 5-point scale, where 5 = definitely will use and 1 = definitely will not use.*

Likelihood of Using Facilities/Services
(Mean Ratings)

	Total Sample	Pearl City	Ewa/ Kapolei	Waianae	Other Leeward	Waipahu
Cardiovascular equipment	3.83	3.64	3.93	4.18	4.20	3.66
Outdoor teaching/ recreation pool	3.69	3.37	3.67	4.18	4.28	3.59
Massage	3.61	3.36	3.72	3.86	4.11	3.44
Free weights	3.57	3.31	3.46	3.87	4.19	3.53
Healthy lifestyle evaluation	3.45	3.22	3.25	3.88	3.97	3.48
Computer lab	3.41	2.86	3.35	3.92	4.31	3.40
Youth exercise equipment	3.39	2.94	3.44	3.76	4.07	3.33
Aerobics room	3.38	2.89	3.47	3.85	3.99	3.34
Nautilus-style weight machine circuit	3.38	3.00	3.31	3.89	4.03	3.34
Full court basketball gym	3.19	2.65	3.04	3.68	3.87	3.34
Gymnastics	2.78	2.28	2.83	3.30	3.41	2.77
Babysitting services	2.71	2.22	2.92	3.01	3.25	2.66

Base: Total sample (600).

Question: I would like to read to you a list of facilities that may or may not be included in the proposed new YMCA. For each, please tell me how likely you or someone in your immediate family would be to use the facility if it became available. On a scale from 1 to 5, where 5 = definitely will use and 1 = definitely will not use, how likely is it that you or someone else in your household will use [Read programs once at a time, beginning with x'd.]?

NOTE: *Mean ratings are calculated on a 5-point scale, where 5 = definitely will use and 1 = definitely will not use.*

Respondents were next read a list of 21 programs the YMCA may consider offering. Here, a 5-point scale, where 5 = very interested and 1 = not at all interested, is utilized to rate the programs. Again, the data is presented first as the percentage of respondents "very interested", and then as weighted means.

- Of the 21 tested programs, health screenings, such as blood pressure, bone density and cholesterol checks, appear to be more in demand than any of the others, followed by:
  - Nutrition, diet and weight loss programs.
  - Women's health programs.
  - Health/wellness education programs.
  - Swimming lessons.
- The programs that are the least likely to be used by area residents are:
  - Yoga.
  - Gymnastics.
  - Youth competitive swimming.
  - Day camp.
- However, readers should keep in mind that, even among the relatively "unpopular" gymnastics and yoga, 21% and 18% of the population respectively are "very interested" in these programs.
- As was found in the previous facilities rating, residents of Waianae and the other Leeward coastal communities are more likely to claim interest across the board than are their neighbors in Pearl City, Ewa/Kapolei and Waipahu.

Interest in Specific Programs (Percentage Very Interested)

	Total Sample (%)	Pearl City (%)	Ewa/ Kapolei (%)	Waianae (%)	Other Leeward (%)	Waipahu (%)
Health screenings	51	37	53	69	67	51
Nutrition, diet, weight loss	41	26	40	58	59	42
Women's health programs	39	24	37	57	55	40
Health/wellness education	38	20	35	53	49	41
Swimming lessons	38	28	37	52	61	35
Martial arts	30	16	29	41	48	34
Physical rehabilitation	34	20	35	47	49	35
Native Hawaiian healing	32	24	31	53	55	25
Youth sports	36	29	31	49	54	35
Senior exercise programs	34	24	27	55	51	35
Youth fitness classes	31	23	27	44	49	31
Tai chi	28	16	26	42	45	28
Family nights	30	21	24	48	49	29
Adult sports leagues	25	14	17	48	41	28
Teen clubs and leadership	30	21	23	44	49	31
Parent-child clubs	29	22	22	41	46	29
Studio cycling	22	7	20	38	36	26
Day camp	26	17	21	41	44	27
Youth competitive swimming	25	20	15	44	43	26
Gymnastics	21	9	16	40	35	26
Yoga	18	6	16	35	33	21

Base: Total sample (600).

Question: Now I am going to read you a list of programs that the YMCA may consider offering. On a scale from 1 to 5, where 5 = very interested and 1 = not at all interested, how interested are you or members of your family in each of these programs, if available at the YMCA? [Read programs once at a time, beginning with x'd.]

NOTE: *Percentages in this table are the percentages of respondents claiming to be "very interested" in each program.*

Interest In Specific Programs (Mean Ratings)

	Total Sample	Pearl City	Ewa/ Kapolei	Waianae	Other Leeward	Waipahu
Health screenings	3.88	3.69	3.80	4.30	4.33	3.82
Nutrition, diet, weight loss	3.57	3.14	3.55	4.00	4.11	3.61
Women's health programs	3.53	3.23	3.46	3.99	4.00	3.52
Health/wellness education	3.52	3.12	3.45	3.99	4.06	3.57
Swimming lessons	3.37	2.96	3.50	3.66	4.05	3.24
Martial arts	3.25	2.89	3.23	3.41	3.89	3.27
Physical rehabilitation	3.25	2.92	3.18	3.69	3.76	3.25
Native Hawaiian healing	3.24	3.02	3.19	3.76	4.01	2.99
Youth sports	3.21	2.82	3.21	3.65	3.97	3.10
Senior exercise programs	3.12	2.88	2.90	3.73	3.66	3.10
Youth fitness classes	3.09	2.65	3.14	3.50	3.80	3.03
Tai chi	3.08	2.66	3.06	3.68	3.59	3.08
Family nights	3.06	2.68	2.86	3.58	3.79	3.09
Adult sports leagues	3.03	2.75	2.78	3.56	3.53	3.13
Teen clubs and leadership	2.98	2.55	2.88	3.42	3.73	3.02
Parent-child clubs	2.95	2.50	2.96	3.29	3.62	2.96
Studio cycling	2.90	2.30	2.91	3.39	3.49	3.02
Day camp	2.83	2.35	2.80	3.30	3.58	2.83
Youth competitive swimming	2.82	2.46	2.63	3.39	3.71	2.75
Gymnastics	2.75	2.28	2.77	3.31	3.35	2.74
Yoga	2.63	2.23	2.47	3.14	3.13	2.77

Base: Total sample (800).

Question: Now I am going to read you a list of programs that the YMCA may consider offering. On a scale from 1 to 5, where 5 = very interested and 1 = not at all interested, how interested are you or members of your family in each of these programs, if available at the YMCA? [Read programs once at a time, beginning with x'd.]

NOTE: *Mean ratings are calculated on a 5-point scale, where 5 = very interested and 1 = not at all interested.*

VIII. Price Elasticity

Respondents were asked the following:

> *"Suppose that, when the new YMCA in Waipahu/Waianae opens, it includes a quality fitness center and weight room, aerobics room, basketball gym, teen center, senior center, children's playroom and community meetings rooms. If you were to join the new YMCA, which of these two types of membership would you be most likely to choose?"*

- Among those residents most likely to use a YMCA facility in Waianae, three quarters (74%) are primarily interested in a family membership, rather than an individual membership.
- Among those interested in the Waipahu location, two-thirds (67%) believe they would want a family, rather than an individual membership.

Type of Membership Preferred

	Waianae (%)	Waipahu (%)
Individual	26	33
Family	74	67

Base: Total sample (800).

Question: Suppose that, when the new YMCA in [town check in Q10] opens, it includes a quality fitness center and weight room, aerobics room, basketball gym, teen center, senior center, children's playroom and community meetings rooms. If you were to join the new YCMA, which of these two types of membership would you be most likely to choose?

Individual Membership

Respondents who chose an individual membership were asked about their likelihood of joining a new YMCA at two price points: $60 and $40. At the $60 rate, respondents were questioned about their likelihood of joining first without and then with an outdoor pool.

- At a cost of $60 per month, 4% (Walanae) and 5% (Waipahu) respondents claim to be "very likely" to join the YMCA, if the new YMCAs do not have an outdoor pool.
- There is a significantly greater percentage of residents claiming to be "somewhat likely" to join the Walanae YMCA than there is "somewhat likely" to join the Waipahu YMCA at a cost of $60 for individual memberships.

Likelihood of Joining New YMCA If Individual Membership Costs $60 Per Month – Basic Facility

	Walanae (%)	Waipahu (%)
Very likely	4	5
Somewhat likely	48	24
Not very likely	18	24
Not at all likely	25	45
Do not know	4	1

Base: Respondents who chose individual membership (252).

Question: How likely is it that you will join this new YMCA if an individual membership costs $60 per month?

- It appears that, at a cost of $60, those respondents interested in an individual membership that reside in Waipahu are more likely to join the YMCA than are residents of any other area.

Likelihood of Joining New YMCA If Individual Membership Costs $60 Per Month

	Total Sample (%)	Pearl City (%)	Ewa/ Kapolei (%)	Walanae (%)	Other Leeward (%)	Waipahu (%)
Very likely	5	2	--	6	4	12
Somewhat likely	29	26	26	55	54	20
Not very likely	23	35	9	21	19	19
Not at all likely	42	37	65	12	19	47
Do not know	2	--	--	6	4	3

Base: Respondents who chose individual membership (252).

Question: How likely is it that you will join this new YMCA if an individual membership costs $60 per month?

When, in addition to the facilities already mentioned, for $60 per month, the YMCA includes an outdoor pool with lap lanes and a recreational swimming area, demand for individual membership increases.

- With the inclusion of an outdoor pool, 11% of those interested in an individual membership in Walanae, and 8% of those interested in Waipahu become "very likely" to join the YMCA. An additional 44% and 27% claim to be "somewhat likely" to join the Walanae and Waipahu YMCAs respectively, with an individual membership.

Likelihood of Joining New YMCA If Individual Membership Costs $60 Per Month And Includes an Outdoor Pool

	Walanae (%)	Waipahu (%)
Very likely	11	8
Somewhat likely	44	27
Not very likely	15	23
Not at all likely	22	41
Do not know	7	1

Base: Respondents who chose individual membership (252).

Question: Suppose if, in addition to the facilities and services already mentioned, this YMCA includes an outdoor pool with both lap lanes and a recreational swimming area? How likely would you be to join the YMCA if it costs $60 per month?

- When the cost of an individual membership is reduced to $40 per month, the percentage of residents claiming to be "very likely" to join at both locations increases significantly, to 36% "very likely" in Walanae and 21% "very likely" in Waipahu.

Likelihood of Joining New YMCA If Individual Membership Costs $40 Per Month

	Walanae (%)	Waipahu (%)
Very likely	36	21
Somewhat likely	27	26
Not very likely	13	17
Not at all likely	20	34
Do not know	3	1

Base: Respondents who chose individual membership (252).

Question: How likely is it that you will join this YMCA if an individual membership costs $40 per month?

Family Membership

Respondents who chose family membership were asked about their likelihood of joining a new YMCA at two price points: $75 and $60. The initial questioning at $75 omits the outdoor pool.

- At a cost of $75, 19% of those interested in a family membership at Walanae claim to be "very likely" to join, and 16% of those interested in Waipahu state they are "very likely" to join.
- In addition, a large percentage of area residents (46% in Walanae and 33% in Waipahu) claim to be "somewhat likely" to join a new YMCA if a family membership costs $75 per month.

Likelihood of Joining New YMCA If Family Membership Costs $75 Per Month – Basic Amenities

	Walanae (%)	Waipahu (%)
Very likely	19	16
Somewhat likely	46	33
Not very likely	17	29
Not at all likely	16	21
Do not know	2	1

Base: Respondents who chose family membership (548).

Question: How likely is it that you will join this new YMCA if a family membership costs $75 per month?

Likelihood of Joining New YMCA If Family Membership Costs $75 Per Month – Basic Amenities

	Total Sample (%)	Pearl City (%)	Ewa/ Kapolei (%)	Walanae (%)	Other Leeward (%)	Waipahu (%)
Very likely	16	12	14	22	17	20
Somewhat likely	36	30	31	48	48	37
Not very likely	26	37	30	19	18	21
Not at all likely	20	19	23	10	15	22
Do not know	1	2	1	--	2	1

Base: Respondents who chose family membership (548).

Question: How likely is it that you will join this new YMCA if a family membership costs $75 per month?

When an outdoor pool with both lap lanes and a recreational swimming area is included, demand for family membership increases as follows:

- At a cost of $75 per month for a family membership, 29% of those interested in the Walanae YMCA for their family claim to be "very likely" to join, and 21% of those interested in the Waipahu YMCA are "very likely" to join.
- In addition, 44% and 32% of those interested in a family membership respectively for the Walanae and Waipahu YMCA are "somewhat likely" to join at a cost of $75 per month if the outdoor pool is included.

Likelihood of Joining New YMCA
If Family Membership Costs $75 Per Month
And Includes an Outdoor Pool

	Walanae (%)	Waipahu (%)
Very likely	29	21
Somewhat likely	44	32
Not very likely	16	25
Not at all likely	11	20
Do not know	1	1

Base: Respondents who chose family membership (548).

Question: Suppose if, in addition to the facilities and services already mentioned, this YMCA includes an outdoor pool with both lap lanes and a recreational swimming area? How likely would you be to join the YMCA if it costs $75 per month?

- When the price of a family membership is set at $60 per month, 41% of those interested in a family membership claim to be "very likely" to join at Walanae and 32% at Waipahu.
- In addition, 38% and 31% of those interested in a family membership respectively for the Walanae and Waipahu YMCA are "somewhat likely" to join at a cost of $60 per month.

Likelihood of Joining New YMCA
If Family Membership Costs $60 Per Month
And Includes an Outdoor Pool

	Walanae (%)	Waipahu (%)
Very likely	41	32
Somewhat likely	38	31
Not very likely	9	18
Not at all likely	10	17
Do not know	2	2

Base: Respondents who chose family membership (548).

Question: Suppose if, in addition to the facilities and services already mentioned, this YMCA includes an outdoor pool with both lap lanes and a recreational swimming area? How likely would you be to join the YMCA if it costs $60 per month?

Respondents were next asked how likely they would be to join "the other new YMCA" if the programs and services of interest were only available at the preferred location. That is, those participants expressing a preference for a YMCA in Walanae were asked about the likelihood of joining in Waipahu, and those primarily interested in a Waipahu YMCA were queried about joining a YMCA in Walanae. The goal here is to determine what would happen if only one of the new YMCAs opened, or if full facilities were available at one location or the other, but not both.

- If the YMCA of Honolulu chose to only build one YMCA, and located it in Waipahu, 8% of those interested in the Walanae YMCA claim they would be "very likely" to join the Waipahu YMCA. Another 26% would be "somewhat likely" to join in Waipahu.
- Conversely, if only the Walanae YMCA is constructed, 5% of those interested in the Waipahu YMCA claim they would be "very likely" to join a Walanae YMCA. Nine percent (9%) more would be "somewhat likely" to join.

Would You Join the Other YMCA?

	Walanae (%)	Waipahu (%)
Yes, definitely	8	5
Yes, probably	26	9
No, probably not	31	28
No, definitely not	33	57
Do not know	1	--

Base: Total sample (800).

Question: You mentioned earlier that you are more likely to use a YMCA in [TOWN CHECKED IN Q10] than [OTHER TOWN IN Q10]. What if the facilities and programs you wanted were only available in the YMCA in [OTHER TOWN IN Q10]? Would you join the YMCA in [OTHER TOWN IN Q10]?

IX. Profile of the Sample

The charts that follow present a demographic profile of the sample.

Demographic Profile of the Sample

	Total Sample (%)	YMCA Preferred: Walanae (%)	YMCA Preferred: Waipahu (%)
AGE			
18 – 24	15	22	13
25 – 34	20	16	22
35 – 44	26	25	27
45 – 54	18	18	18
55 – 64	10	10	10
65 – 69	4	3	4
Over 70	6	7	6
HOUSEHOLD INCOME			
Under $25,000	20	36	15
$25 – 49,999	35	32	35
$50 – 74,999	27	20	29
$75 – 99,999	13	7	14
$100 – 199,999	5	4	6
$200 or more	1	1	1
ETHNIC BACKGROUND			
Caucasian	17	20	16
Chinese	3	--	3
Filipino	26	12	30
Hawaiian	25	51	18
Japanese	16	2	20
African American	2	2	2
Multi-racial	4	3	4
Hispanic	2	3	2
Samoan	2	3	2
Other/refused	4	2	4

Demographic Profile of the Sample

	Total Sample (%)	YMCA Preferred Waianae (%)	YMCA Preferred Waipahu (%)
EDUCATION			
Less than high school	5	9	4
High school graduate	35	47	32
Business/trade school	7	4	8
Some College	26	25	26
College graduate	26	13	30
MARITAL STATUS			
Single	28	35	26
Married	59	51	61
Divorced/widowed/ separated	13	13	13
HOUSEHOLD SIZE			
One	7	8	6
Two	20	15	22
Three	16	14	17
Four	22	22	23
Five	14	17	13
Six	10	10	9
Seven or more	11	14	9
YEARS IN HAWAII			
Less than 1	2	1	3
1 – 4	7	3	9
5 – 9	5	3	5
10 – 19	12	10	12
20 or more	73	82	71

Base: Total sample (800).

Appendix B

HUD Statutory Checklist

A	**HUD STATUTORY CHECKLIST** Name of Project/Activity Leeward YMCA Expansion Project No. ______ Description of Project/Activities: The project involves the expansion of the Leeward YMCA facility at its current location to improve and expand services. The Leeward YMCA is located on a portion of the site of the old Oahu Sugar Company mill complex in Waipahu and the proposed expansion includes renovation and expansion of a building that was previously used as part of the mill. This renovated building will include space for fitness activities. A new wing will include administration offices, childcare facilities, and locker rooms. Other improvements include an outdoor swimming pool, redesigned parking areas, and new landscaping. With the improvements, membership at the Leeward YMCA is expected to increase by approximately 3,500 to 6,800 new members, depending on whether additional YMCA facilities are built in the region. It is expected that the Leeward YMCA, along with the adjoining Filipino Community Center, will provide a vital social center for Waipahu, similar to how the old mill comprised the social heart of Waipahu during the plantation era.
B	EVALUATE EACH STATUTE, EXECUTIVE ORDER AND HUD REGULATION/NOTICE ON PAGES 2 & 3 FOR THEIR APPLICABILITY TO THE PROPOSED ACTION(S). CHECK AND COMPLETE THE APPROPRIATE STATEMENT AS NECESSARY. ENTER DETERMINATION IN COLUMN 2 OR 3 BELOW; COMPLETE BLOCK "C" OR "D"; COMPLETE BLOCK "E" AFTER COMPLIANCE IS ACHIEVED WITH EACH AUTHORITY LISTED IN COLUMN (1).

(1) Statutes, Executive Orders and HUD Regulations/Notices	(2) Not Applicable As .....Certified on Pages 2 & 3	(3) Compliance Required. Make Reference to and Attach Source Documentation and Analysis to Show Compliance with Applicable Authorities per 58.5.
Historic Properties		Action is subject to compliance with Section 106 of the National Preservation Act of 1966. Compliance achieved on February 27, 2004, documentation attached.
Floodplain Management	X	The project site is located in areas in which flood hazards are undetermined. Identified by the FIRM map (15003C0240E) Zone D.
Wetlands Protection	X	The project is not located within or adjacent to a wetland identified by or delineated on USDI Fish & Wildlife Service Pearl Harbor, Hawaii USGS Quadrangle Map.
Coastal Zones	X	Based on a review using a general consistency certification that was approved by the State Department of Business, Economic Development and Tourism, the proposed action meets the criteria of the general consistency certification and is consistent with the Hawaii Coastal Zone Management Program.
Endangered Species	X	As documented in the *Amfac Commercial and Park Final Environmental Impact Statement* (1997) (which covers the subject site), due to the previous industrial uses and the highly modified nature of the site, the existing vegetation is representative of introduced species. The project will not affect any endangered species of plants or animals, nor any critical habitat.
Farmlands Protection	X	According to the Agricultural Lands of Importance to the State of Hawaii (ALISH) system, the site is located within "Existing Urban Development" and does not include lands classified as being "Prime", "Unique" or "Other Important" agricultural land. According to the State Land Study Bureau Detailed Land Classification system, the subject property is designated "Urban."
Air Quality	X	Per the EPA website, the State of Hawaii has does not have any "non-attainment" sites. Thus the project is located within an "attainment area." In addition, the project is not located near a power plant or sugar mill and is not adjacent to a traffic thoroughfare that generates CO concentration in excess of the 8 hour standard of 10 mg/m^3 at the project site (Ogden Environmental and Energy Services Co. 1996).
Water Quality	X	According to the HUD-EPA (Region IX) Sole Source Aquifer Memorandum of Understanding of 1990, the project need not be referred to EPA for evaluation because the project involves the construction of public facilities which will be served by an existing publicly owned and operated sewerage system (Section II.B.1.).
Noise	X	The project is not subject to current or projected noise levels that exceed 65 LDN as determined by an acoustic study (Y. Ebisu & Associates 1996) prepared for the *Amfac Commercial and Park Final Environmental Impact Statement* (1997) (which covers the subject site).
Thermal/Explosives	X	The project will expose neither people nor buildings to explosive or flammable fuels or chemical containers.

Airport Clear Zones	X	The project is not located in or near a Clear Zone at a civil or military airfield nor in or near an Accident Potential Zone at a military airfield. The project site is located approximately five miles from Hickam Air Force Base and approximately six miles from Honolulu International Airport (HIA).
Solid Waste Disposal	X	Project/Activity does not involve the disposal of hazardous materials nor siting of sanitary landfills or closing of open dumps.
Toxic Chemicals and Radioactive Wastes	X	The project is not affected by toxic chemicals or radioactive material based on a Phase I Environmental Site Assessment (ASTM) report (Clayton Group Services, February 28, 2000) (prepared for the project site) and a subsequent Subsurface Investigation and Ash Sampling report (Clayton Group Services, February 4, 2000).
Coastal Barrier Resources Wild and Scenic Rivers	Federal legislation and implementing regulations concerning these resources do not apply to the State of Hawaii, Guam, MMI, TTPI or American Samoa, as amended.	

C

_____ Project/activity is exempt from an environmental review in accordance with 24 CFR Part 58.34(a)(1-12). Applicable subsection is 58.34(a)_12_. List applicable subsection for each activity in Block A.

_____ None of the Statutes, Executive Orders or HUD regulations or Notices are applicable to the proposed project/activity, therefore, it is converted to an exempt status in accordance with 24 CFR Part 58.34(12)(B).

Exempt activities or categorically excluded activities converted to exempt status do not require the recipient to: publish a public notice; submit a Request for Release of Funds and certification to HUD and no further approval from HUD will be needed by the recipient for drawdown of Title I funds__ to carry out exempt activities. (24 CFR Part 58.34(b))

D

_X_ Project/activity is categorically excluded but requires compliance with one or more of the authorities listed in Block B.

Categorically excluded projects/activities that require compliance with one or more of the authorities requires the recipient to document its compliance with each authority. A copy of the assessment ____is/____is not attached. The recipient is required to: 1) publish a public notice of Intent to Request for Release of Funds; 2) Submit Request for Release of Funds and certification to HUD before drawdown of funds to implement the proposed project/activity. See 24 CFR Part 58.35(b) and 58.70.

E

HO-SC86
1/3

Tom Schnell AICP, Associate
(Name and Title)

2-25-04
(Signature and Date)

HISTORIC PROPERTIES: The National Historic Preservation Act of 1966 (P.L. 89-666) (16 U.S.C. 470); Preservation of Historic and Archaeological Data Act of 1974 (P.L. 93-291) (16 U.S.C. 469): Executive Order 11593. Implementing Regulations: Protection and Enhancement of the Cultural Environment, 36 CFR Part 800 or 801 F.R. 1/30/79.

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

_X_ Action is subject to compliance with Section 106 of the National Preservation Act of 1966. Compliance achieved on February 27, 2004, documentation attached.

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

_X_ The project/activity is located in areas in which flood hazards are undetermined. Identified by the FIRM or FIA Flood Hazard Boundary map (FIRM Map # 15003C0240E) Zone D. Because the project is not in a floodplain is it not subject to compliance with E.O. 11988.

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

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

____ Flood insurance required. Policy issued to:

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

_X_ The proposed action is not within a wetland area nor will it have an adverse impact on an adjacent wetland area. This determination is made by: _X_ Field observation; ____ consultation with the U.S. Corps of Engineers; _X_ Other (Review of USDI FWS Pearl Harbor, Hawaii USGS Quadrangle Map).

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

____ Flood insurance required. Policy issued to:

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

____ Not applicable to _______________________. (TT only)

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

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

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

_X_ The proposed action will not affect any endangered species of plants or animals, nor any critical habitat. This determination was made based on: _X_ consultation with U.S. Fish and Wildlife Service (FWS); ____ consultation with local authority ___________ (Dept./Agency); _X_ Field Observation. In addition, as documented in the *Amfac Commercial and Park Final Environmental Impact Statement* (1997) (which covers the subject site), due to the previous industrial uses and the highly modified nature of the site, the existing vegetation is representative of introduced species.

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

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

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

According to the Agricultural Lands of Importance to the State of Hawaii (ALISH) system, the site is located within "Existing Urban Development" and does not include lands classified as being "Prime", "Unique" or "Other Important" agricultural land. According to the State Land Study Bureau Detailed Land Classification system, the subject property is designated "Urban."

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

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

_X_ Project/activity is located within an attainment area in accordance with the State Implementation Plan; is not located near a power plant or sugar mill; and is not adjacent to a traffic thoroughfare that generates CO concentration in excess of the 8 hour standard of 10 mg/m^3 at project site.
Per the EPA website, the State of Hawaii has does not have any "non-attainment" sites. Thus the project is located within an "attainment area." In addition, the project is not located near a power plant or sugar mill and is not adjacent to a traffic

thoroughfare that generates CO concentration in excess of the 8 hour standard of 10 mg/m^3 at the project site (Ogden Environmental and Energy Services Co. 1996). An Air Quality Impact Analysis (Ogden Environmental and Energy Services Co. 1996) was conducted for the project site as part of the *Amfac Commercial and Park Final Environmental Impact Statement* (PBR Hawaii 1997) (which includes the project site). According to the analysis, maximum 8-hour CO concentrations were not predicted to exceed 10 mg/m^3 at the project site at any time.

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

<u>WATER QUALITY</u>: Federal Water Pollution Control Act (P.L. 95-500) as amended (33 U.S.C. 1251-1376), the Safe Drinking Water Act of 1974 (P.L. 93-523) as amended (43 U.S.C. 300f-300g-10); particularly section 1424(e) (42 U.S.C. 300h-303(e)).

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

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

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

_X_ Project/activity is not subject to current or projected noise levels that exceed 65 LDN as determined by: ____ A site inspection; ____ An evaluation using HUD Noise Assessment Guidelines; or _X_ other acoustical data <u>(An acoustic study (Y. Ebisu & Associates 1996) prepared for the *Amfac Commercial and Park Final Environmental Impact Statement* (1997) (which covers the subject site)</u>.

____ Project/activity requires mitigative action to comply with 24 CFR Part 518 Noise Abatement and Control. Report prepared by ____________________, consultant, outlines mitigative measures for compliance with HUD standards. Copy attached.

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

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

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

<u>CLEAR ZONES AT AIRPORTS</u>: 24 CFR Part 51 Subpart D - Siting of HUD Assisted Projects in Runway Clear Zones at Civil Airports and Clear zones and Accident Potential Zones at Military Airfields.

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

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

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

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

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

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

_X_ Project/activity is not affected by toxic chemicals or radioactive material based on: ____ site inspection; ____ Information check with local Health Department; _X_ other source: a Phase I Environmental Site Assessment (ASTM) report (Clayton Group Services, February 28, 2000) (prepared for the project site) and a subsequent Subsurface Investigation and Ash Sampling report (Clayton Group Services, February 4, 2000).

____ Project/activity's site was suspected of containing toxic chemicals or radioactive materials. HUD and local responsible agency contacted. ____ Evaluation of hazard was made in accordance with Notice 79-33 and found acceptable. Documentation attached: ____ Yes _ No.

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

Other policies, standards or guidelines used in preparing the environmental analysis.
<u>See next page.</u>

Certification of Environmental Review Requirements

State of Hawaii

Review each of the rules or standards listed below and check and/or complete the statement that applies. The completion of the form and signature at the bottom will provide evidence that the proposed action is consistent with Hawaii's environmental regulations and standards.

1. Chapter 343, HRS, Environmental Impact Statements

2. Act 282, Private Waste Water Treatment Plants, Session Laws of Hawaii, 1985

3. Title 11, Administrative Rules, State of Hawaii, Department of Health

   a. Chapter 42, Vehicular Noise Control for Oahu
   b. Chapter 43, Community Noise Control for Oahu
   c. Chapter 54, Water Quality Standards
   d. Chapter 55, Water Pollution Control
   e. Chapter 59, Ambient Air Quality Standards
   f. Chapter 60, Air Pollution Control
   g. Chapter 200, Environmental Impact Statement Rules

_X_ It has been determined that the proposed action requires compliance with one or more of the above regulations which include Chapter 200, Environmental Impact Statement Rules. Appropriate permits for clearance on the above regulations were obtained on _______________ (date).

____ The proposed action is consistent with the regulations listed above and no permits are required.

Certified by: Tom Schnell, AICP, Associate
Name/Title

February 20, 2004
Date

HO-SC86
c/c

Appendix C

Archaeological Inventory Survey Report

**ARCHAEOLOGICAL INVENTORY SURVEY
AT WAIPAHU, WAIKELE, O'AHU
(9-4-2: por.4)**

prepared by:

Paul L. Cleghorn, Ph.D.

Pacific Legacy, Inc.
332 Uluniu Street
Kailua, Hawai'i 96734

prepared for:

AMFAC/JMB HAWAII INC.
700 Bishop Street
Honolulu, Hawai'i 96813

96-P116

April 1996

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LIST OF FIGURES

1.0 INTRODUCTION

Pacific Legacy, Inc., under contract to AMFAC/JMB Hawaii, Inc., conducted an archaeological inventory survey in Waipahu, O'ahu. The project area consists of ca. 23 acres surrounding and including the Oahu Sugar Mill (TMK 9-4-2:por. 4) (Figure 1). The town of Waipahu is located in the traditional land division, (*ahupua'a*), of Waikele in the 'Ewa District.

The archaeological investigations entailed of two lines of inquiry: (1) archival research and (2) surface survey. The purpose of these investigations is to determine if any potentially significant archaeological resources are present on the project property.

The State Historic Preservation Division (SHPD) requires an archaeological inventory survey as part of the development permitting process. An archaeological inventory survey is the necessary first step in managing archaeological resources that may be present in a project area. The purpose of an archaeological inventory survey prior to development activities is to determine if potentially significant archaeological resources are present on a specific parcel of land. If potentially significant resources are present, then a set of procedures must be implemented to manage these resources and to mitigate any adverse effects of proposed development. These procedures are generally developed in a Historic Preservation Plan (HPP) after completing the archaeological inventory survey.

The archival research included a brief review of relevant archaeological research previously conducted in the project vicinity and historic records and maps. Data from the archival research was used to predict what types of archaeological sites, if any, could occur in the project area.

The surface survey was conducted by the author on 6 March 1996. The entire parcel was traversed on foot and examined for the presence of surface archaeological sites. The archaeological survey was limited to identifying traditional Hawaiian archaeological resources. Historic buildings and structures were outside the parameters of the current project.

1.1 Environmental Setting

The project area in Waipahu Town is located at the approximately 40 foot contour just inland (*mauka*) of Pearl Harbor's West Loch. Pearl Harbor is essentially a series of drowned river valleys created through a complex geologic history of changing sea level and island subsidence (Macdonald and Abbott 1970:356-358). The land area surrounding Waipahu slopes gently into the Pearl Harbor region, with steeper localized relief provided by the gulches of Waikele, Kipapa, and Panakauahi.

The soils in the area are Waipahu silty clay with 6-12 percent slopes (WzC) (Foote et al. 1972:134-135; map 53). This soil series consists of well drained soils on marine terraces that were developed in old alluvium derived from basic igneous rock. On the Waipahu silty clay, runoff is medium and the erosion hazard is moderate (Foote et al. 1972:134-135). Rainfall in Waipahu averages ca. 30 inches per year with most of the precipitation occurring between October and March (Armstrong 1983:62). The mean maximum temperature for the general area is between 80 and 88 degrees Fahrenheit and the mean minimum temperature is between 60 and 70 degrees Fahrenheit (Armstrong 1983:64). Vegetation in the project area is recently introduced exotic tree, bush, and grass species.

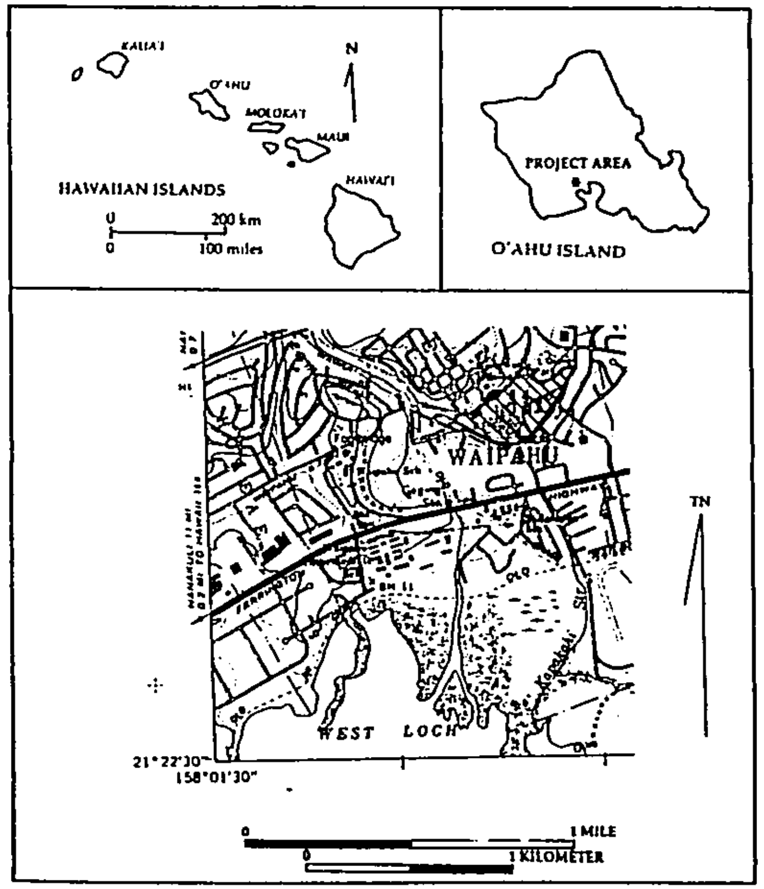

FIGURE 1. LOCATION OF PROJECT AREA.

2.0 ARCHIVAL RESEARCH RESULTS

2.1 Historical Summary

The area now known as Waipahu was originally called Waikele, which is the name for the entire *ahupua'a* (Sterling and Summers 1978:25). Literally, Waipahu means "bursting water" or "water burst forth from underground" (Pukui et al. 1974:227), the name of a spring located here (Sterling and Summers 1978:25). Waipahu Spring is an important traditional spot, the site where the shark goddess Kaahupahau bathed (Sterling and Summers 1978:25). McAllister noted that a pump had been erected atop this spring (presumably by the sugar company) when he visited the site in the early 1930s (McAllister 1933:106).

A "supernatural" stone, *pohaku-pili*, that once belonged to the traditional gods Kane and Kanaloa was placed by these deities at the boundary between the *ahupua'a* of Waikele and Hō'ae'ae on the edge of a cliff (Sterling and Summers 1978:29).

In Waipahu there is a locale named Ka-puka-na-wai-o-Kahuku, or "outlet of water from Kahuku." This is where a tapa anvil that had been lost in Kahuku was found (Sterling and Summers 1978:25-26).

In 1897 the Oahu Sugar Company was established and the Waipahu Depot Road was built between the sugar mill and the railroad depot on the line that ran close to Pearl Harbor (Spencer Mason Architects 1990:3). The growth and development of Waipahu Town centered around the sugar mill. A plantation store, hospital and employee housing were built in close proximity. The reader is referred to Nedbalek's (1984) study for additional information regarding Waipahu's history.

2.2 Previous Archaeology

The first archaeological investigations in Waipahu were conducted by J. Gilbert McAllister (1933) who recorded two archaeological sites as part of his island-wide survey. These two sites were Mokoula Heiau (Site 127) and Hapupu Heiau, both of which were already destroyed when McAllister noted them (cf. Sterling and Summers 1978:25).

Cox and Stasack (1970:97), as part of their state-wide petroglyph study noted the presence of approximately 12 petroglyphs on boulders located on the north side of Waikele Stream, on the west edge of Waipahu town. Both triangular bodied human figure and dog elements were recorded.

In 1990, William Folk conducted a reconnaissance survey for the proposed widening of Waipahu Street, a portion of which borders the current project area. Folk recorded three historic-period dressed stone walls along Waipahu Street and dressed curbstones along Waipahu Street and Makaaloha Street (Folk 1990.9). Folk recommended that these stone features be systematically recorded and if possible preserved in place (Folk 1990:12). Folk also suggested that the entire length of Waipahu Street was "archaeologically sensitive" because: (1) Waipahu is the site of the traditional Hawaiian village of Waikele and (2) buried archaeological deposits are often found in such areas despite modern land use (Folk 1990:10).

Folk supported his first point (that Waikele was a traditional village) by citing Sterling and Summers (1978:24-30). None of the passages on these pages state that Waikele was a traditional village. The citations simply state that the area was termed Waikele. We have no traditional information that there was a "village" situated in Waipahu.

Folk supported his second point with findings of Clark and Toenjes (1987) who found buried archaeological deposits under "paved highways...residential streets...[and] landscaped residential yards" (Clark and Toenjes 1987, as cited in Folk 1990:10). Clark and Toenjes' work was in the Spreckelsville area on Maui which is an active sand dune area, and where one might predict the burial of archaeological materials. This active sand dune area is geomorphically quite different from Waipahu.

In 1990, the firm of Spencer Mason Architects conducted a study of potentially historic properties along Waipahu Street for a proposed street widening project. The conclusions of this study, including discussions regarding a potential historic district. Are begin reevaluated and updated by Spencer Mason Architects.

In 1993 and 1994, Robert Spear conducted two reconnaissance surveys for the Waikele Industrial Subdivision located immediately north of the project area (Spear 1993; 1994). The area has been extensively disturbed and no archaeological sites were found.

3.0 ARCHAEOLOGICAL SURVEY RESULTS

Over 60 percent of the project area is covered by the sugar mill and associated machine buildings, and paved and graded roadways (Figures 2, 3, 4, 5, 6, and 7). The remaining ca. 40 percent of the project area is where the supervisors' residences were located. This residential area is referred to as Skill Village (Spencer Mason 1990:10, Map 4) (Figures 2, 8).

No traditional archaeological sites were observed on the surface in the project area. This is undoubtedly due to the highly developed industrial nature of the site that has persisted for about the last 100 years.

The possibility that there are subsurface deposits in the vicinity has been raised in a previous study (Folk 1990). An open excavation trench was observed in the area located to the northeast of the project area (Figure 9). This trench revealed that ca. 40 cm of fill has been deposited over the area. Much of this fill contains coral gravel which was observed scattered over most of the unpaved surface in the vicinity of the mill. The excavation trench also showed deeper disturbances (a pipe and wooden post) extending to almost a meter below surface. These data suggest that there may be a low likelihood that subsurface archaeological deposits exist in the project area. However, there is the possibility that buried historic period deposits (e.g., trash dumps, etc.) may be present in the project area.

The former housing area now supports only one residence, at 960 Makaaloha Street (Figure 8). All other dwellings have been torn down or removed. This area also has a low probability of containing subsurface archaeological deposits because of the years of intensive use, including numerous buried utility lines.

Dressed basalt wall segments are present along Waipahu Street. These wall segments range in height from ca. 0.2 to 3.0 m (Figures 10 and 11). The basalt boulders have been flaked and dressed to form rectangular blocks. It appears these walls were constructed without mortar.

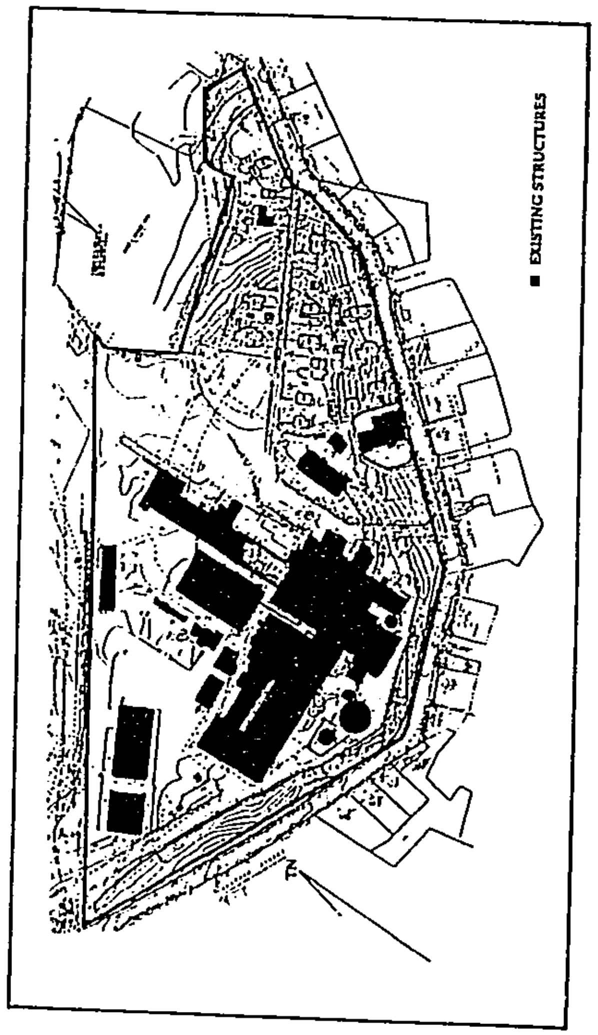

FIGURE 2. DETAILED MAP OF PROJECT AREA.

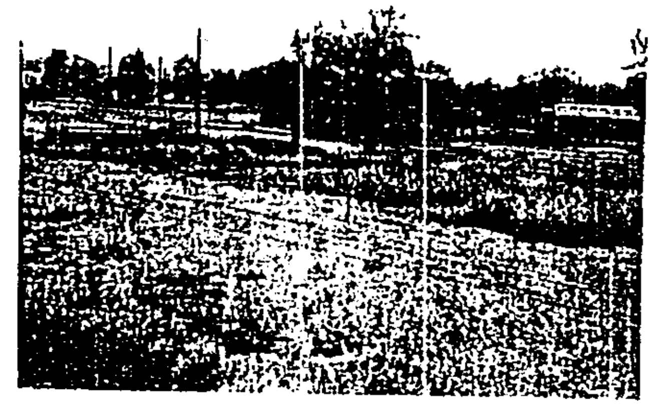

FIGURE 3. PHOTOGRAPH OF MILL AREA (view to northeast).

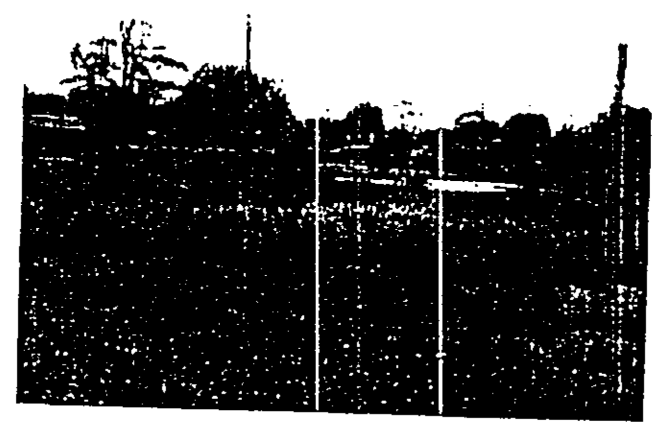

FIGURE 4. PHOTOGRAPH OF MILL AREA (view to east).

FIGURE 5. PHOTOGRAPH OF MILL AREA (view to southeast).

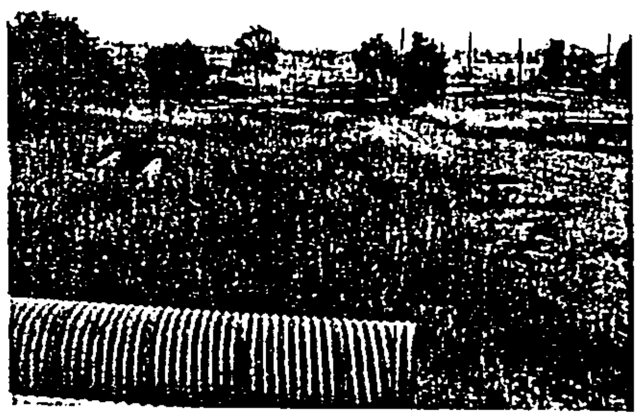

FIGURE 6. PHOTOGRAPH OF MILL AREA (view to south).

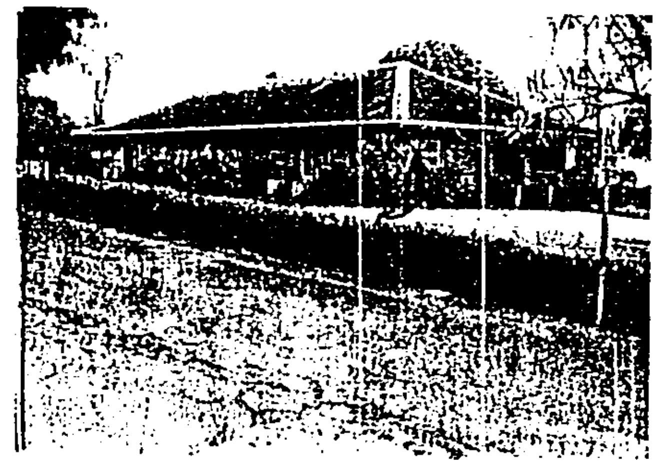

FIGURE 7. PHOTOGRAPH OF ADMINISTRATION BUILDING (view to north).

FIGURE 8. PHOTOGRAPH OF HOUSE AT 960 MAKAALOHA STREET (view to west).

4.0 DISCUSSION

No traditional archaeological sites were found in the project area and it appears unlikely that there will be potentially significant subsurface archaeological deposits of prehistoric age in the project area.

Consideration of the presence of significant historic period-era buildings and structures is outside of the scope of work for this project. These issues, including a potential historic district at the project area, are addressed by the Spencer Mason Architects 1990 study and its pending update.

The walls of dressed basalt boulders along Waipahu Street are likewise outside the scope of this project. These also should be studied and documented.

5.0 REFERENCES CITED

Armstrong, R. Warwick
1983 *Atlas of Hawaii* (Second Edition). University of Hawaii Press, Honolulu.

Clark, Stephan D. and James H. Toenjes
1987 Archaeological Monitoring of Sewer Line Construction from Spreckelsville to Ku'au, Maui, State of Hawai'i. On file, State Historic Preservation Division, Honolulu.

Cox, Halley J. and Edward Stasack
1970 *Hawaiian petroglyphs*. Bishop Museum Press, Honolulu.

Folk, William H.
1990 Archaeological Reconnaissance for the Proposed Waipahu Street Widening Project, Waipahu, Waikele, O'ahu. On file, State Historic Preservation Division, Honolulu.

Foote, D. E., E. L. Hill, S. Nakamura, and F. Stephens
1972 *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*. U.S. Government Printing Office, Washington, D.C.

McAllister, J. Gilbert
1933 *Archaeology of Oahu*. Bishop Museum Bulletin 104. Bishop Museum Press, Honolulu.

Macdonald, Gordon A. and Agatin T. Abbott
1970 *Volcanoes in the Sea*. University of Hawaii Press, Honolulu.

Nedbalek, Lani
1984 *Waipahu: A Brief History*. Wonder View Press, Mililani.

Pukui, Mary K., Samuel H. Elbert, and Esther T. Mookini
1974 *Place Names of Hawaii* (Second Edition). University of Hawaii Press, Honolulu.

Spear, Robert D.
1993 A Reconnaissance Survey Letter Report of the Waikele Industrial Subdivision Waipahu, O'ahu, Hawai'i. On file, State Historic Preservation Division, Honolulu.

1994 An Addendum to the Reconnaissance Survey Letter Report of the Waikele Industrial Subdivision Waipahu, O'ahu, Hawai'i. On file, State Historic Preservation Division, Honolulu.

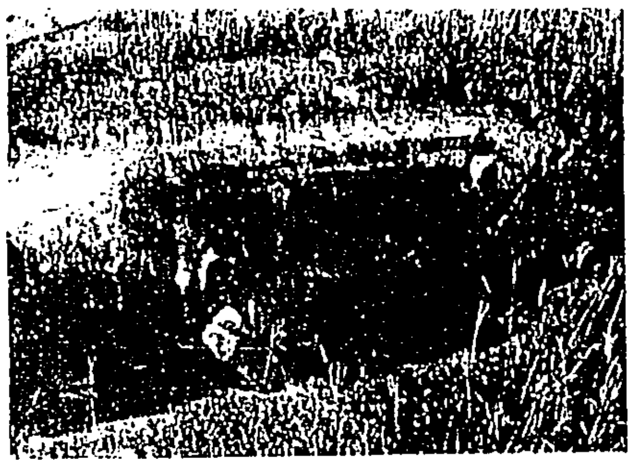

FIGURE 9. PHOTOGRAPH OF OPEN EXCAVATION TRENCH LOCATED TO THE NORTHEAST OF THE PROJECT AREA (view to northwest).

FIGURE 10. PHOTOGRAPH OF LOW WALL SEGMENT ALONG WAIPAHU STREET (view to west).

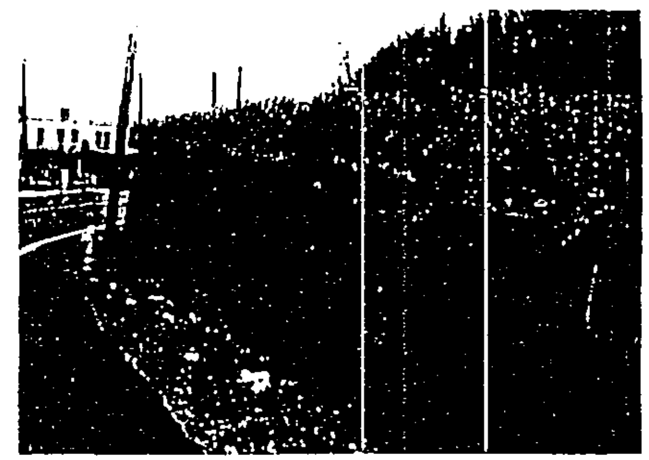

FIGURE 11. PHOTOGRAPH OF HIGH WALL SEGMENT ALONG WAIPAHU STREET (view to west).

Spencer Mason Architects
1990 Waipahu Street Widening Project: Potentially Historic Properties (DRAFT). On file, State Historic Preservation Division, Honolulu.

Sterling and Summers
1978 *Sites of Oahu*. Bishop Museum, Honolulu.

Appendix D

Historic Preservation - Section 106 Compliance

MEMORANDUM OF AGREEMENT
BETWEEN THE YOUNG MEN'S CHRISITIAN ASSOCIATION OF HONOLULU
AND THE STATE OF HAWAII STATE HISTORIC PRESERVATION OFFICER
REGARDING
THE ADAPTIVE REUSE OF THE GENERATOR BUILDING
AT THE FORMER OAHU SUGAR COMPANY MILL SITE, WAIPAHU, HAWAII
SUBMITTED TO THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
PURSUANT TO 36 CFR 800.6(a)

WHEREAS, the Young Men's Christian Association of Honolulu (YMCA) is the landowner of that certain parcel identified by tax map key number 9-4-161:4 (Site);

WHEREAS, the Site is subject to that certain Unilateral Agreement and Declaration for Conditional Zoning for Ordinance 98-61, dated October 29, 1998 (Unilateral Agreement);

WHEREAS, the Site is subject to that certain Mill Town Center Commercial and Park Project, Urban Design Plan, dated July 3, 2000 (UDP);

WHEREAS, the UDP requires that the Smokestack, Laboratory Building, and Generator Building, collectively referred to as the Mill Structures, be retained for adaptive reuse, to the extent practicable and/or permitted by law;

WHEREAS, the Mill Structures are eligible for inclusion in the National Register of Historic Places;

WHEREAS, the YMCA has restored the Smokestack;

WHEREAS, the Laboratory Building was destroyed by fire in July 2002;

WHEREAS, the YMCA will be receiving partial funding for its planned adaptive reuse of the Generator Building from a U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant;

WHEREAS, the State Historic Preservation Division, the City and County of Honolulu Department of Community Services, and the YMCA agree that the YMCA's planned adaptive reuse of the Generator Building will have an adverse effect upon the structure and the YMCA has consulted with the Hawaii State Historic Preservation Officer (SHPO) pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act; and

WHEREAS, the YMCA has also consulted with the State Historic Preservation Officer and the Historic Hawaii Foundation regarding the effects of the undertaking on the Generator Building; and

WHEREAS, in accordance with 36 CFR Section 800.6(a)(1), the City and County of Honolulu Department of Community Services has notified the Advisory Council on Historic Preservation (Council) of the adverse effect of the renovation on the Generator Building with specified documentation and the Council has chosen not to participate in the consultation pursuant to 36 CFR Section 800.6(a)(1)(iii); and

NOW, THEREFORE, the Hawaii SHPO, the City and County of Honolulu Department of Community Services, and the YMCA agree that the YMCA will implement the renovation on the Generator Building in accordance with the following stipulations to take into account the effect of the undertaking on historic properties.

STIPULATIONS

I. Prior to initiation of the renovation of the Generator Building, YMCA shall submit photographic documentation of the existing structure using HABS/HAER Standards.

II. Except for the removal of the southeast portion of the east facing wall and the south facing wall of the Generator Building, renovations to the building shall incorporate the architectural characteristics of the structure as practicable or permitted by law.

III. An on-site historical exhibit shall be incorporated into the interior of the YMCA facilities. An interpretive plan will be developed to define the historical themes and topics to be portrayed by the exhibit and to establish proposed time frames to revisit or update the exhibit. To the extent practicable or permitted by law, this display shall feature:

- Historical photographs of the mill site and Generator Building
- Photographs of the current condition of the Generator Building
- Photographs of the Generator Building after renovation
- Artifacts from the Generator Building and the mill including the key box currently on the south facing interior wall of the Generator Building and the clock on the north facing exterior wall of the Generator Building. Artifacts may also be preserved in their original locations and when possible, made useable.
- Interpretive text accompanying the photographs and artifacts to provide historical context.

IV. The Hawaii SHPO and the Historic Hawaii Foundation shall review and comment on project plans and the interpretive plan. If comments on the plans are not received from the Hawaii SHPO and the Historic Hawaii Foundation within 30 days after SHPO and the Historic Hawaii Foundation receive the plans, it shall be concluded that the Hawaii SHPO and the Historic Hawaii Foundation do not have any comments on, or objections to, the plans.

V. Any future alterations to the Generator Building shall require review and possible revision to this MOA.

VI. DURATION. This agreement will be null and void if its terms are not carried out within five (5) years from the date of its execution. Prior to such time, the YMCA may consult with the other signatories to reconsider the terms of the agreement and amend in accordance with Stipulation IX below.

VII. MONITORING AND REPORTING. Each year following the execution of this agreement until stipulations are complete or until it expires or is terminated, YMCA shall provide all parties to this agreement a summary report detailing work undertaken pursuant to its terms. Such report shall include any scheduling changes proposed, any problems encountered, and any disputes and objections received in YMCA's efforts to carry out the terms of this agreement. Failure to provide such summary report may be considered noncompliance with the terms of this MOA pursuant to Stipulation IX below.

VIII. DISPUTE RESOLUTION. Should any party to this agreement object at any time to any actions proposed or the manner in which the terms of this MOA are implemented, the YMCA shall consult with the objecting party to resolve the objection. If the YMCA determines, within 30 days, that such objection(s) cannot be resolved, the YMCA will:

A. Forward all documentation relevant to the dispute to the Council in accordance with 36 CFR Section 800.2(b)(2). Upon receipt of adequate documentation, the Council shall review and advise the YMCA on the resolution of the objection within 30 days. Any comment provided by the Council, and all comments from the parties to the MOA, will be taken into account by the YMCA in reaching a final decision regarding the dispute.

B. If the Council does not provide comments regarding the dispute within 30 days after the receipt of adequate documentation, the YMCA may render a decision regarding the dispute. In reaching its decision, the YMCA will take into account all comments regarding the dispute from the parties to the MOA.

C. The YMCA's responsibility to carry out all other actions subject to the terms of this MOA that are not the subject of the dispute remain unchanged. The YMCA will notify all parties of its decision in writing before implementing that portion of the undertaking subject to dispute under this stipulation. The YMCA's decision will be final.

IX. AMENDMENTS AND NONCOMPLIANCE. If any signatory to this MOA, including any invited signatory, determines that its terms will not or cannot be carried out or that an amendment to its terms must be made, that party shall immediately consult with the other parties to develop an amendment to this MOA pursuant to 36 CFR 800.6(c)(7) and 800.6 (c)(8). The amendment will be effective on the date a copy signed by all of the original signatories is filed with the Council. If the signatories cannot agree to appropriate terms to amend the MOA, any signatory may terminate the agreement in accordance with Stipulation X below.

X. TERMINATION. If an MOA is not amended following the consultation set out in Stipulation IX, it may be terminated by any signatory or invited signatory. Within 30 days following termination, the YMCA shall notify the signatories if it will initiate consultation to execute an MOA with the signatories under 36 CFR 800.6(c)(1) or request the comments of the Council under 36 CFR 800.7(c)(1) and proceed accordingly.

Execution of this Memorandum of Agreement by the City and County of Honolulu, Department of Community Services, the Hawaii SHPO, the YMCA of Honolulu, and the and the Historic Hawaii Foundation, the submission of documentation and filing of this Memorandum of Agreement with the Council pursuant to 36 CFR Section 800.6(b)(1)(iv) prior to the YMCA's approval of this undertaking, and implementation of its terms evidence that the YMCA has taken into account the effects of this undertaking on historic properties and afforded the Council an opportunity to comment.

SIGNATORIES:

Approved: CITY AND COUNTY OF HONOLULU
DEPARTMENT OF COMMUNITY SERVICES

By: ______________________ 2-17-04
Michael T. Amii, Director, Date

Approved As To Form and Legality: CITY AND COUNTY OF HONOLULU
CORPORATION COUNSEL DEPARTMENT

By: GARY K. NAKATA 8 2004
Deputy Corporation Counsel Date

Approved: HAWAII STATE HISTORIC PRESERVATION OFFICE

By: ______________________ ______________
Peter T. Young, Hawaii State Historic Preservation Officer Date

Approved: YOUNG MEN'S CHRISTIAN ASSOCIATION OF HONOLULU

By: ______________________________ ______________
Don Anderson, President & CEO Date

Concur: HISTORIC HAWAII FOUNDATION

By: ______________________________ 2-13-04
David Scott, Director Date

DEPARTMENT OF COMMUNITY SERVICES
CITY AND COUNTY OF HONOLULU
715 SOUTH KING STREET, SUITE 311 • HONOLULU, HAWAII 96813
TELEPHONE: (808) 527-5311 • FAX: (808) 527-5498 • INTERNET: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

MICHAEL T. AMII
DIRECTOR

JOHN R. SABAS
DEPUTY DIRECTOR

December 10, 2003

Ms. Lee Keatinge
Western Office of Project Review
Advisory Council on Historic Preservation
12136 West Bayaud Avenue, Suite 330
Lakewood, Colorado 80228

Subject: Memorandum of Agreement Regarding the Adaptive Reuse of the former Oahu Sugar Company Generator Building by the Young Men's Christian Association (YMCA) of Honolulu

Dear Ms. Keatinge:

Enclosed please find information regarding the Section 106 review and preparation of a Memorandum of Agreement for the adaptive reuse of the former Oahu Sugar Company Generator Building in Waipahu, Hawaii, by the Young Men's Christian Association (YMCA) of Honolulu.

The YMCA of Honolulu will be receiving partial funding for the project from a HUD Community Development Block Grant administered by the City and County of Honolulu Department of Community Services. The project involves expansion of the existing Leeward YMCA facilities. The Leeward YMCA site was formerly part of the Oahu Sugar Company Mill complex. The site also includes the former Oahu Sugar Company Administration Building and the Human Resources Building, both of which already have been renovated for use by the YMCA. The Leeward YMCA is one of the YMCA of Honolulu's nine branches on Oahu.

As part of the Leeward YMCA expansion at the former Oahu Sugar Company complex, the YMCA will renovate the Generator Building to provide space for fitness activities. A new wing will also be added to the building to provide a central check-in area, administration offices, child-care facilities, and locker rooms. To connect the new wing to the existing building, a portion of the southeast corner of the Generator Building will be removed.

Ms. Lee Keatinge
December 10, 2003
Page Two

The building is not listed on the National or State Registers of Historic Places; however, it meets the eligibility criteria to be included on these Registers. It is the intention of the YMCA of Honolulu to retain as much of the historical integrity of the Generator Building as possible. Recent photographs of the Generator Building and a site plan of the proposed renovations are attached for your review.

The Hawaii State Historic Preservation Office, City and County of Honolulu, and the YMCA of Honolulu has agreed that the renovation of the Generator Building will have an adverse affect upon the structure and in consultation with the designated Hawaii State Historic Preservation Officer (SHPO) pursuant to 36 CFR Part 800 regulations implementing Section 106 of the National Historic Preservation Act. Other consulted parties include the Office of Hawaiian Affairs and the Historic Hawaii Foundation.

In consultations with these organizations, a Memorandum of Agreement (MOA) has been drafted stipulating provisions designed to minimize and mitigate the adverse effect of the renovation of the Generator Building. This MOA is attached for your review.

The City and County of Honolulu has reviewed the criteria regarding the Advisory Council on Historic Preservation involvement contained in Appendix A of 36 CFR Part 800 and respectfully submits that none of the four criteria apply to the renovation of the Generator Building.

In accordance with 36 CFR Part 800.6(a)(1) the City and County of Honolulu hereby notifies the Advisory Council on Historic Preservation of the above action and provides the documentation specified in Section 800.11(e).

We look forward to your cooperation in the completion of the Section 106 review for this project. If you have any questions or need additional information please contact Tom Schnell, the project-planning consultant, at (808) 521-5631 or tschnell@pbrhawaii.com. We look forward to receiving your response.

Sincerely,

MICHAEL T. AMII
Director

MTA:ds

Enclosure

RECEIVED

'04 JAN 8 AM 10 39

DEPT. OF COMMUNITY SERVICES

Preserving America's Heritage

January 2, 2004

Michael T. Amii, Director
City and County of Honolulu
715 South King Street, Suite 311
Honolulu, HI 96813

RE: *Adaptive Reuse of the Former Oahu Sugar Company Generator Building.*

Dear Mr. Amii:

We received your notification and supporting documentation regarding the adverse effects of the referenced project, a property eligible for inclusion in the National Register of Historic Places. Based upon the information you provided, we do not believe that our participation in consultation to resolve adverse effects is needed. However, should circumstances change, please notify us so we can re-evaluate if our participation is required. Pursuant to 36 CFR 800.6(b)(iv), you will need to file the Memorandum of Agreement, and related documentation at the conclusion of the consultation process. The filing of this Agreement with the ACHP is necessary to complete the requirements of Section 106 of the National Historic Preservation Act.

Thank you for providing us with your notification of adverse effect. If you have any questions, please contact Jane Crisler at 303/969-5110 or via eMail at jcrisler@achp.gov.

Sincerely,

Nancy Kochan

Nancy Kochan
Office Administrator/Technician
Western Office of Federal
Agency Programs

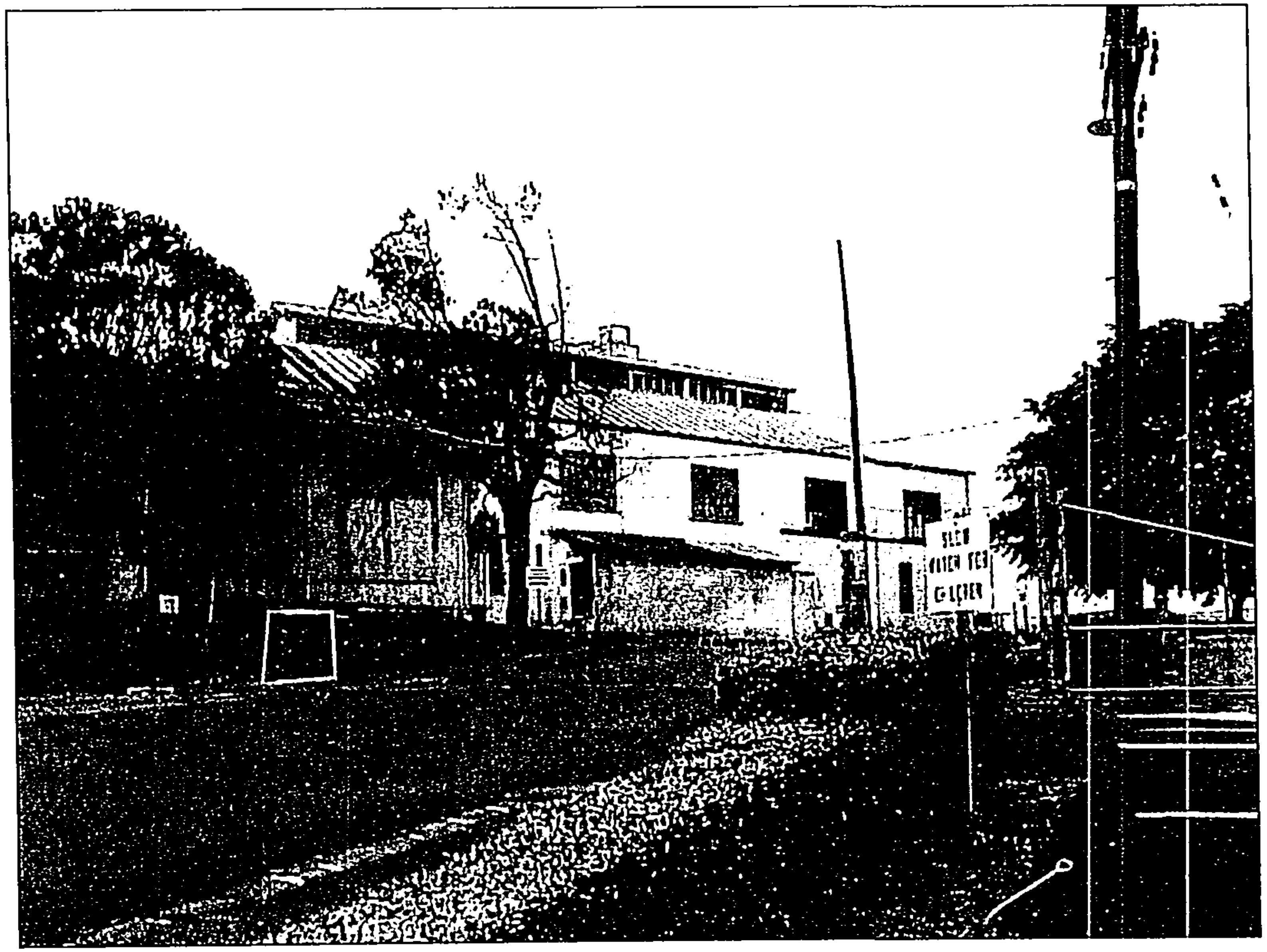

Photo 1
Generator Building
LEEWARD YMCA

PBR HAWAII

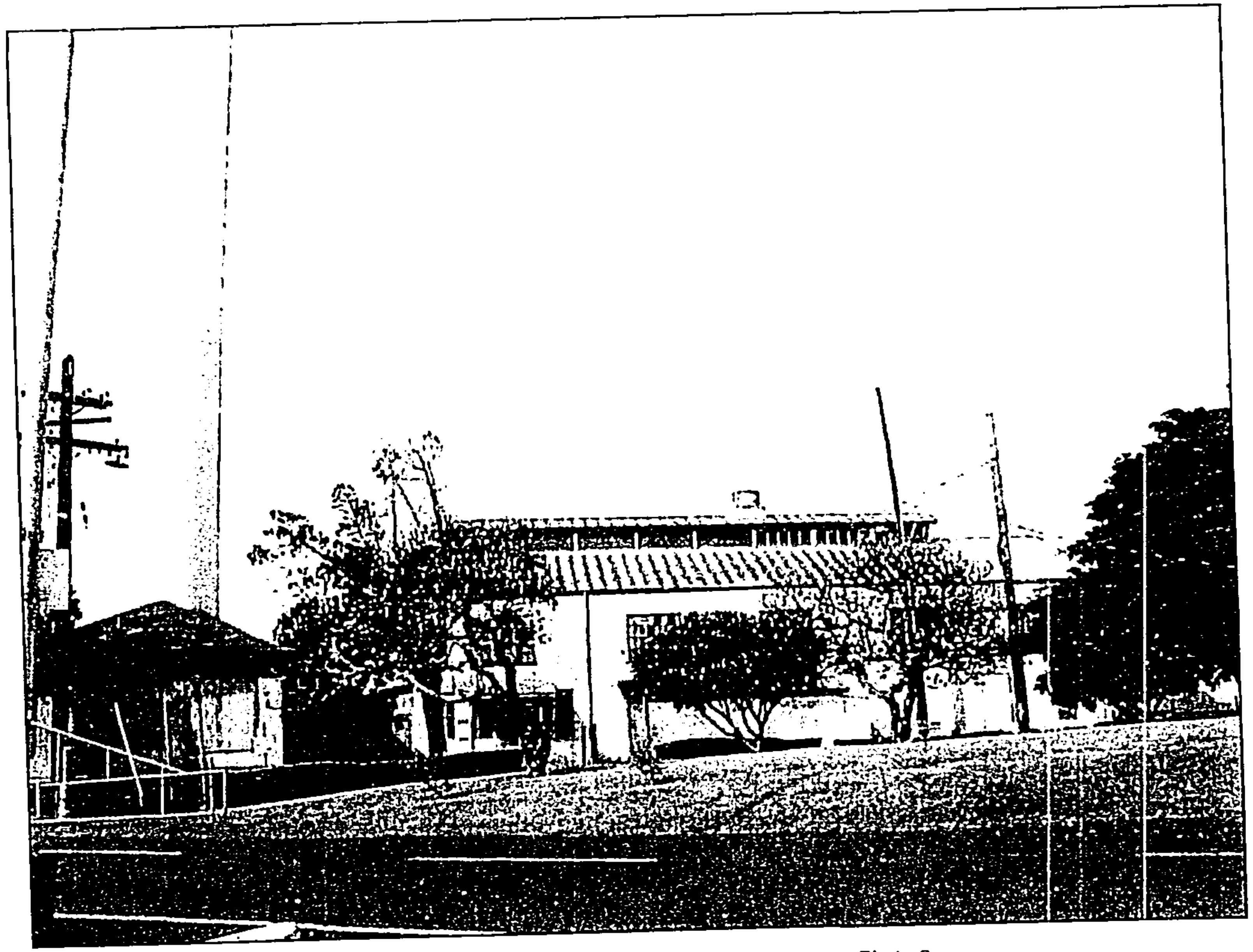

Photo 2
Generator Building

LEEWARD YMCA

PBR HAWAII

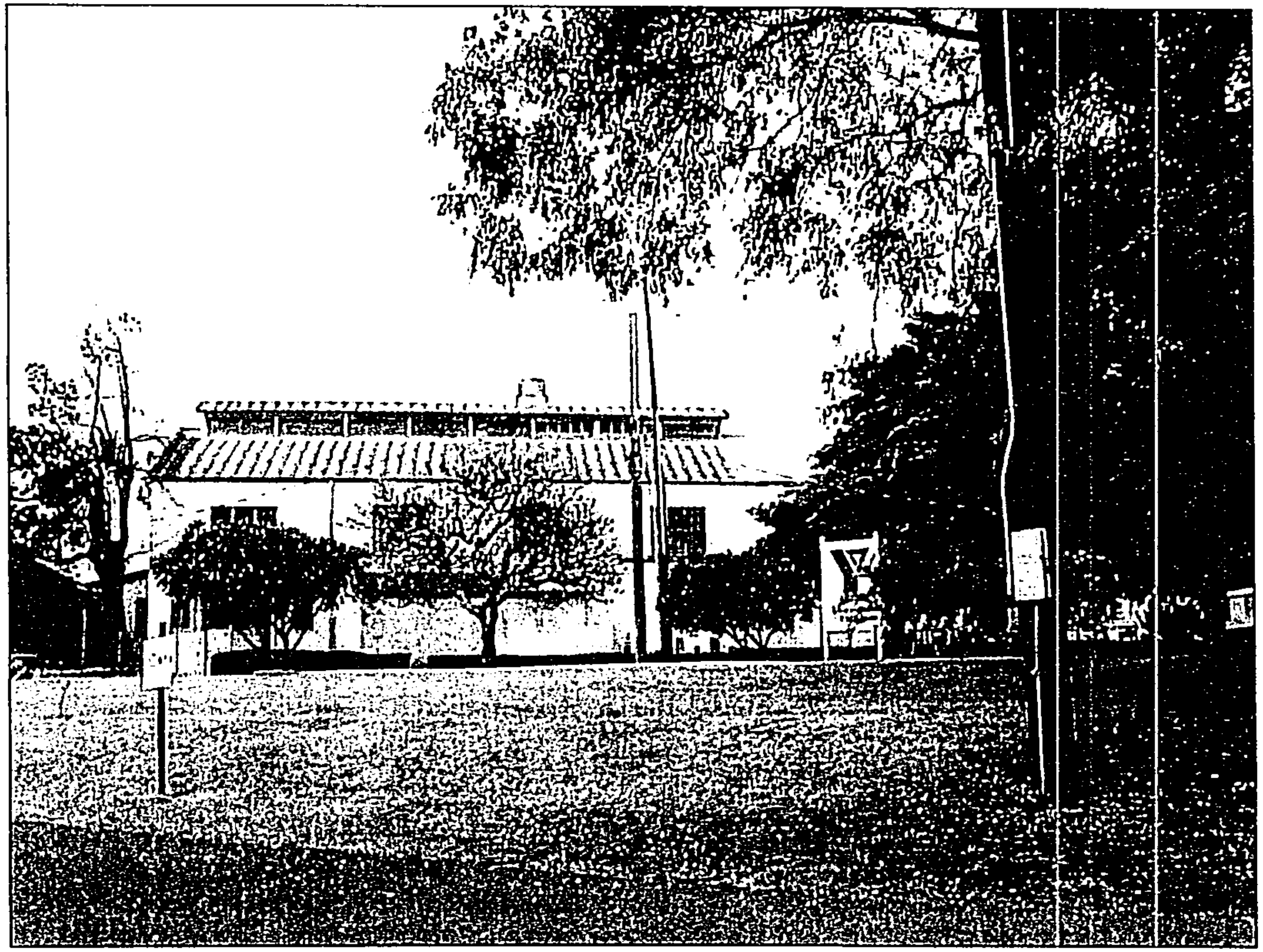

Photo 3
Generator Building

LEEWARD YMCA

PBR HAWAII

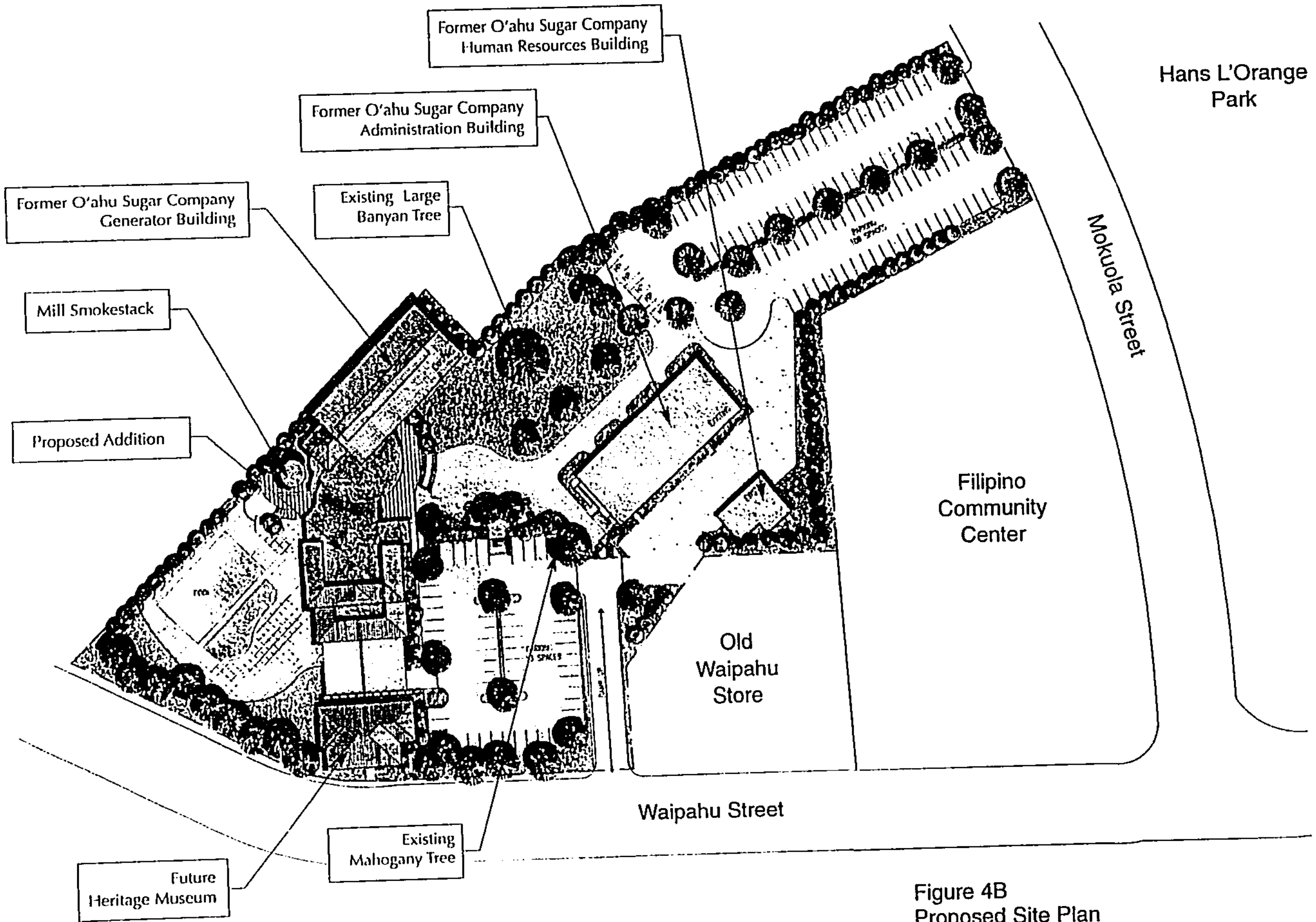

Figure 4B
Proposed Site Plan
LEEWARD YMCA

Source: CDS International

PBR
HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

WM. FRANK BRANDT, FASLA
CHAIRMAN

THOMAS S. WITTEN, ASLA
PRESIDENT

STAN DUNCAN, ASLA
EXECUTIVE VICE-PRESIDENT

RUSSELL Y.J. CHUNG, ASLA
EXECUTIVE VICE-PRESIDENT

VINCENT SHIGEKUNI
PRINCIPAL

JAMES LEONARD, AICP
PRINCIPAL
HILO OFFICE

GRANT MURAKAMI, AICP
SENIOR ASSOCIATE

TOM SCHNELL, AICP
ASSOCIATE

RAYMOND T. HIGA, ASLA
ASSOCIATE

KEVIN NISHIKAWA, ASLA
ASSOCIATE

HONOLULU OFFICE
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HILO OFFICE
101 AUPUNI STREET
HILO LAGOON CENTER SUITE 310
HILO, HAWAI'I 96720-4262
TEL: (808) 961-3333
FAX: (808) 961-4989
E-MAIL: pbrhilo@lava.net

WAILUKU OFFICE
2123 KAOHU STREET
WAILUKU, HAWAI'I 96793-2204
TEL: (808) 242-2878
FAX: (808) 242-2502
E-MAIL: [illegible]

October 29, 2003

Ms. Pua Aiu
Office of Hawaiian Affairs
711 Kapiolani Blvd., Suite 500
Honolulu, Hawaii 96813

SUBJECT: LEEWARD YMCA MEMORANDUM OF AGREEMENT

Dear Ms. Aiu:

The Young Men's Christian Association (YMCA) of Honolulu is proposing to expand its Leeward YMCA facility on the site of the Oahu Sugar Company mill in Waipahu and will be receiving partial funding for the project from a HUD Community Development Block.

The expansion includes the adaptive reuse of the former mill generator building. The building is not listed on the National or State Registers of Historic Places, however, since it is over 50 years old it does meet the eligibility criteria of to be included on these registers. After meeting with a representative from the State Historic Preservation Division, it was determined that the proposed improvements are subject to compliance with Section 106 of the National Preservation Act of 1966.

We are currently in the process of drafting a Memorandum of Agreement (MOA) specifying stipulations to be implemented in the renovation of the Generator Building. We have listed the State Historic Preservation Division and the Historic Hawaii Foundation as signatories to the MOA. After reviewing the plans, it appears that these two organizations are intending to sign the MOA. Other signatories may include the City and County of Honolulu and HUD.

With this letter we are we are inquiring if the Office of Hawaiian Affairs would like to be included as a signatory of the MOA.

The generator building will be renovated to provide space for fitness activities. A new wing will also be added to the building to provide a central check-in area, administration offices, child care facilities, and locker rooms. To connect the new wing to the existing building, a portion of the southeast corner of the building will be removed. It is the intention of the YMCA of Honolulu to retain as much of the historical integrity of the Generator building as possible. A site plan of the proposed renovations is attached for your review. If desired, the project architect also could give a presentation to you.

As part of the comprehensive conversion of the former Oahu Sugar Company site to the Mill Town Commercial and Park project (of which the Leeward YMCA is a part) a draft environmental impact statement (EIS) was prepared in 1996, and a final EIS was prepared in 1997. The Office of Hawaiian Affairs provided comments on the draft EIS (letter dated February 3, 1997) and had no objections to the Mill Town Commercial and Park project.

An archaeological inventory survey of the area was conducted for the EIS. The archaeological survey report concluded that no traditional sites were found in the project area and that it was unlikely that there were potentially significant subsurface archaeological deposits of prehistoric age in the area. In their review of the archaeological report the State Historic Preservation Division stated: "...it is unlikely that historic sites will be found, and we believe that this project will have 'no effect' on historic sites." The complete archaeological inventory survey report is attached for your review.

Thank you for taking time to review the information provided. Please contact me if you have any questions or need additional information to make a determination as to whether the Office of Hawaiian Affairs should be a signatory to the Leeward YMCA Memorandum of Agreement. To coordinate the drafting of the final MOA we would like to receive your reply by November 15, 2003.

Sincerely,
PBR HAWAII

Tom Schnell, AICP
Associate

Attachments

cc Glenn Tsugawa/YMCA of Honolulu—w/o attachments
Tonia Moy/State Historic Preservation Division—w/o attachments
Lynn Lee/U.S. Department of Housing and Urban Development—w/o attachments

O:\Job21\2149.04\OHA MOA letter.doc

Appendix E

Screening Criteria for CDBG Assisted Project to Confirm Its Consistency with HCZM Description of Proposed Action

SCREENING CRITERIA FOR CDBG ASSISTED PROJECT TO CONFIRM ITS CONSISTENCY WITH HCZMP DESCRIPTION OF PROPOSED ACTION:

CRITERIA: This review is based on HUD's request for a general consistency certification pursuant to 15 CFR Part 930.37 that was approved by the State Department of Planning and Economic Development April 8, 1987.

The State's CZM policies are reviewed for their applicability to the action proposed under the general consistency certification as follows:

- If none of the policies apply to the proposed action it is consistent with the Hawaii's Coastal Zone Management Program.
- If one or more of the policies are threatened, the grantee shall make an individual consistency review in accordance with Section 205A-22, Chapter 205A, HRS.

DETERMINATION			CZM POLICIES
Consistent	Ind. Review*		
x		1.	SMA PERMIT The proposed action qualifies as a minor permit and is not subject to an individual CZM consistency review. Copy of permit is: ___ attached, in ERR file. Proposed action is not subject to an individual consistency review. (References 1, 2)
x		2.	LAND USE DISTRICTS Proposed action is located in a developed, altered and urban district. It is not a State Ag, Rural or Conservation Land Use District. (References 1, 3)
x		3.	THREATENED AND ENDANGERED SPECIES AND THEIR HABITAT Proposed action does not occur in or affect areas containing threatened or endangered species and their habitats. (References 4, 5 6)
x		4.	STREAMS Proposed action will not alter the flow or use of streams.
x		5.	HISTORIC/ARCHAEOLOGIC RESOURCES The proposed action is subject to compliance with Section 106 of the National Preservation Act of 1966. Compliance achieved on February 27, 2004, documentation attached. (Reference 8)
x		6.	WETLANDS The proposed action does not impact or affect a wetland. (References 4,7)

REFERENCES

1. County Planning Department
2. Section 205A-22, Chapter 205A, HRS
3. State Land Use Commission
4. State Dept. of Land & Natural Resources
5. U.S. Fish and Wildlife Service
6. The Nature Conservancy of Hawaii
7. U.S. Corps of Engineers
8. State Historic Preservation Officer
9. National Register of Historic Places (Federal Register)

DETERMINATION

Based on the above review, it is determined that:

_X_ The proposed action meets the criteria of the general consistency certification and is consistent with the HZMP.

___ The proposed action requires an individual consistency review that will be prepared and submitted to the State DPED&T for their review and concurrence.

Prepared by: Tom Schnell, AICP. (Name) — Associate (Title) — February 20, 2004 (Date)

* Individual Consistency Review Required by DPED&T

Appendix F

Letter from the U.S. Fish and Wildlife Service

PBR
HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

WM. FRANK BRANDT, FASLA
CHAIRMAN

THOMAS S. WITTEN, ASLA
PRESIDENT

R. STAN DUNCAN, ASLA
EXECUTIVE VICE-PRESIDENT

RUSSELL Y.J. CHUNG, ASLA
EXECUTIVE VICE-PRESIDENT

JAMES LEONARD, AICP
MANAGING DIRECTOR
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WAILUKU, HAWAI'I 96793-2204
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E-MAIL: pbrmaui@lava.net

November 15, 2002

Mr. Paul Henson, Field Supervisor
U.S. Fish and Wildlife Service
Pacific Island Ecoregion
300 Ala Moana Blvd., Room 3-122
Honolulu, Hawaii 96813

Dear Mr. Henson:

Subject: Endangered Species at the Site of the Leeward YMCA

We are writing to consult with the U.S. Fish and Wildlife Service in regard to the expansion of the Leeward YMCA in Waipahu and the effect this project may have on any endangered species of plants or animals or any critical habitat. This consultation is being sought in compliance with the HUD Statutory Worksheet, which must be completed because the Leeward YMCA is seeking a Community Development Block Grant for the project.

Briefly, the project involves the expansion of the Leeward YMCA facility at its current location (94-440 Mokuoka Street, Waipahu)(TMK 9-4-161: 2; 9-4-161: 4) to improve and expand services. The Leeward YMCA is located on an approximately 4.1-acre portion of the site of the old Oahu Sugar Company mill complex in Waipahu and the proposed expansion includes renovation and expansion of a building that was previously used as part of the mill. This renovated building will include space for fitness activities. A new wing will include administration offices, childcare facilities, and locker rooms. Other improvements include an outdoor swimming pool, redesigned parking areas, and new landscaping.

With the closing of the O'ahu Sugar Company in 1995, then landowner Amfac Property Development Corporation, began seeking new uses for the mill site. At that time the Amfac Commercial and Park project was proposed, along with the use of a portion of the mill site for the Leeward YMCA. In 1997 a final environmental impact statement (EIS) (*Amfac Commercial and Park, Waipahu Central Oahu TMK 9-4-02: 04, Final Environmental Impact Statement* (PBR Hawaii 1997)) was prepared for the site, which covers the Leeward YMCA site.

The final EIS concludes that the former O'ahu Sugar Company mill complex site has been highly modified for industrial use over the past century. As a result, no threatened or endangered plant or animal species are known to exist on the Leeward YMCA. Further, the existing vegetation is representative of introduced species and the site is not known to be a habitat for any threatened or endangered plant or animal species.

In addition, no wetlands, streams, estuaries, or other habitats that could accommodate threatened or endangered plant or animal species are present on the Leeward YMCA property or the surrounding area. The flora consists of exotic weedy species due to previous disturbance (clearing), and industrial and residential use of the land. Birds and animals common to urban areas, such as rats, mice, and domesticated and feral cats, have been sighted or are presumed to exist on the site.

Federal agencies that reviewed the *Amfac Commercial and Park, Waipahu Central Oahu TMK 9-4-02: 04, Draft Environmental Impact Statement* include the USDA Natural Resources Conservation Service, the Army Corps of Engineers, and the United States Department of the Interior. These agencies had no comments on the flora and fauna section of the draft EIS and therefore did not dispute the conclusions of the EIS regarding the lack of threatened or endangered plant or animal species on the site.

With this letter we seek your comments as to whether the proposed Leeward YMCA improvements at the site of the former O'ahu Sugar Company mill complex site may have an impact on any endangered species of plants or animals or any critical habitat. We have enclosed a copy of the *Leeward YMCA Draft Environmental Assessment* for your review.

Please contact me if you need any additional information or have any questions.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Associate

enclosure

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Box 50088
Honolulu, Hawaii 96850

DEC 24 2002

In Reply Refer To:
1-2-2003-TA-046

DEC 23 2002

Tom Schnell
PBR Hawaii
1001 Bishop Street
Pacific Tower, Suite 650
Honolulu, Hawaii 96813

Dear Mr. Schnell:

This responds to your November 15, 2002, letter in which you request the U. S. Fish and Wildlife Service review and comment on the proposed expansion of the Leeward YMCA project in Waipahu, Island of Oahu. The proposed project site is located on an approximately 4.1-acre portion of the site of the old Oahu Sugar Company mill complex. The proposed project includes renovation and expansion of a building that was previously used as part of the mill. This renovated building will include space for fitness activities. A new wing will include administration offices, childcare facilities, and locker rooms. Other improvements include an outdoor swimming pool, redesigned parking areas, and new landscaping.

We reviewed the information provided by you and pertinent information in our files, including maps prepared by the Hawaii Natural Heritage Program. To the best of our knowledge, no Federally listed endangered, threatened, or proposed threatened or endangered species, or proposed or designated critical habitat occur in the proposed project site.

We appreciate your efforts to conserve endangered species. If you have any questions, please contact Lorena Wada, Supervisory Fish and Wildlife Biologist (phone: 808/541-3441; fax: 808/541-3470).

Sincerely,

Gina Shultz

for Paul Henson, Ph.D.
Field Supervisor

Appendix G

Air Quality Impact Analysis

AIR QUALITY IMPACT ANALYSIS
Amfac Commercial and Park Development
Waipahu, Hawaii

Prepared For
Amfac Property Development Corp.
21st Floor
Amfac Tower
700 Bishop Street
Honolulu, Hawaii 96813

Prepared By
Ogden Environmental and Energy Services Co.
680 Iwilei Road, Suite 660
Honolulu, Hawaii 96817

December 1996

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LIST OF FIGURES

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ACRONYMS

$\mu g/m^3$	Micrograms per Cubic Meter
°F	Degrees Fahrenheit
Amfac	Amfac Property Development Corporation
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
DBEDT	Department of Business, Economic Development & Tourism
DOH	Hawaii State Department of Health
EPA	U.S. Environmental Protection Agency
H_2S	Hydrogen Sulfide
HAR	Hawaii Administrative Rules
HC	Hydrocarbons
LOS	Level of Service
mph	Miles per Hour
mps	Meters per Second
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
O_3	Ozone
Pb	Lead
PM	Particulate Matter
PM_{10}	Particulate Matter Less Than 10 Microns in Diameter
ppm	Parts per Million
SAAQS	State Ambient Air Quality Standards
SO_2	Sulfur dioxide
TMK	Tax Map Key

EXECUTIVE SUMMARY

Amfac Property Development Corporation (Amfac) proposes to develop 23.3 acres of land owned by the Oahu Sugar Company, Limited in Waipahu, Oahu. The site is located in the Central Oahu Development Plan area, Tax Map Key (TMK) 9-4-02:04, and is referred to as the Amfac Commercial and Park Development Project, hereinafter referred to as the Project.

This Project is referred to as Phase II and is a part of a larger development. Phase I involves the development of 37 acres of light industrial subdivisions and is anticipated to be completed by the year 2000. This report does not address Phase I; however traffic analysis data from Phase I has been used as a base for the year 2000. Phase II, development of 20.3 acres of land for the commercial and park areas, is anticipated to also be completed in the year 2000 (Austin Tsutsumi & Associates).

This report focuses on worst-case air quality conditions for morning and evening peak hours in the years:

- 1995 (existing conditions)
- 2000 (without Phase II of Project)
- 2000 (with Phases I and II of Project)

Short-term pollutant impacts of the Project are considered to be those associated with construction activities. While localized pollutant increases are expected to occur, they are not considered significant. The amount of fugitive dust generated per month is expected to be less than U.S. Environmental Protection Agency (EPA) estimates for construction operations. As a result, fugitive dust impacts to the air quality during the construction phase of the Project will be localized, temporary, and considered insignificant.

Long-term pollutant impacts of the proposed Project are considered to be those associated with everyday use of the Project. The most significant long-term emission sources are motor vehicles, with the most significant tailpipe emission being Carbon Monoxide (CO).

For the 1-hour air dispersion modeling scenarios, there are no potential violations of the National Ambient Air Quality Standards (NAAQS). However, both evening scenarios without Project (Phase I only) and with Project (Phases I and II) in the year 2000 suggest that an exceedance of the State Ambient Air Quality Standards (SAAQS) will occur. For the 8-hour dispersion modeling scenarios, there are no potential violations of the NAAQS. However, all scenarios, including the base year 1995, suggest that an exceedance of the SAAQS will occur.

Although the modeling results indicate that the Project is expected to slightly exceed the SAAQS for CO in some scenarios, implementation of the mitigation measures recommended in the traffic analysis report and in this report will significantly reduced the CO impact to ambient air quality. These mitigation measures are designed to reduce motor vehicle trip generation that can be incorporated into the overall Project strategy. Implementation of the following measures are suggested:

- implement traffic flow improvement measures, such as proper signalization and road widening for intersections with poor LOS ratings;
- encourage ride-sharing/car pooling or use of public transportation by employees;
- limit the number of passenger parking spaces to promote the use of shuttle services and public transportation;
- discourage idling vehicles at drop-off points;
- implement bicycle lanes for bicycling; or
- encourage walking.

Indirect pollutant impacts beyond those associated with construction and traffic are considered to be insignificant.

SECTION 1
INTRODUCTION

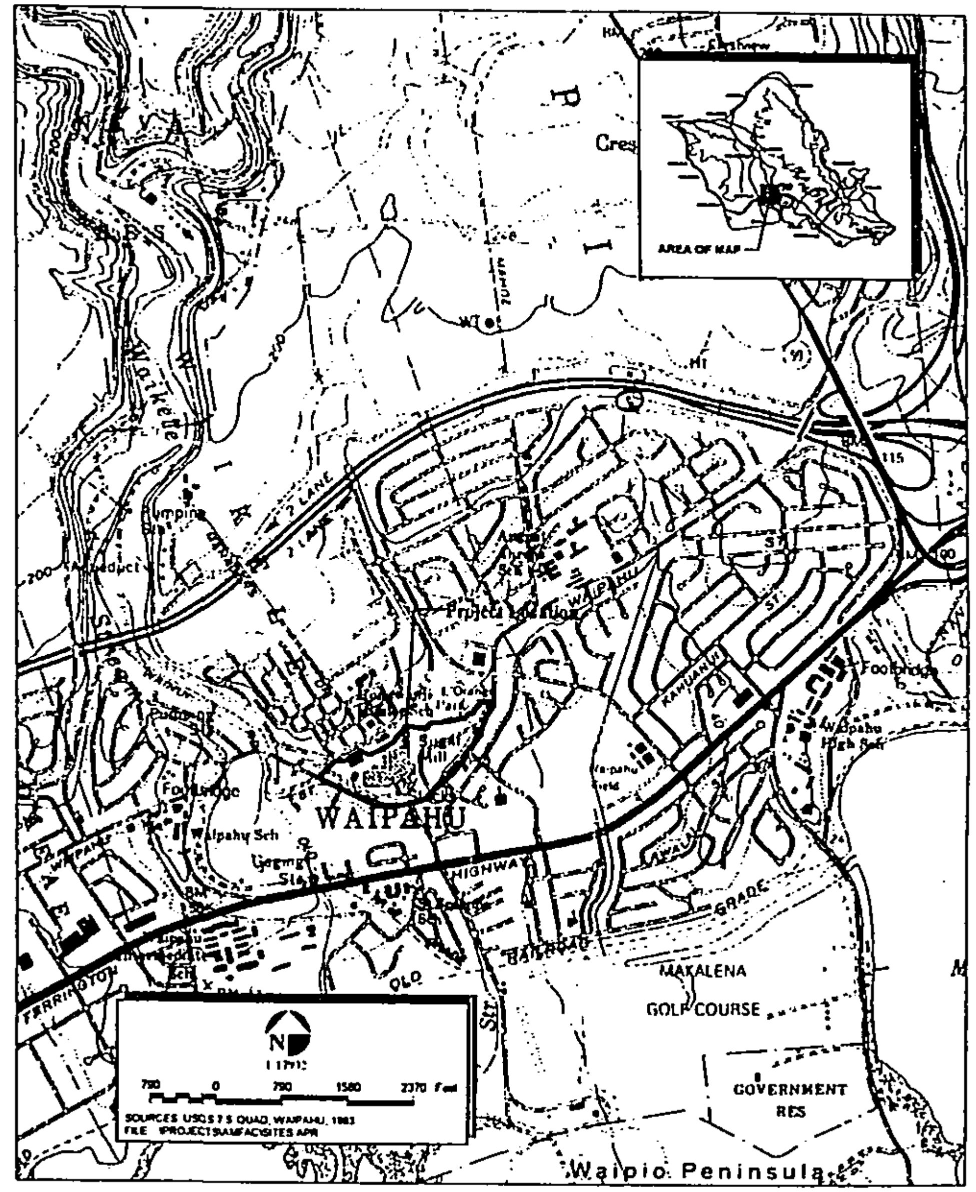
Amfac Property Development Corporation (Amfac) proposes to develop 23.3 acres of land owned by the Oahu Sugar Company, Limited in Waipahu, Oahu. The site is located in the Central Oahu Development Plan area, Tax Map Key (TMK) 9-4-02:04, and is referred to as the Amfac Commercial and Park Development Project, hereinafter referred to as the Project (See Figure 1).

The proposed Project involves the development of lands formerly occupied by the Oahu Sugar Mill into commercial and community facilities (20.3 acres), and a park (3 acres). The development of the commercial area will include a Young Men's Christian Association (YMCA), Heritage Area, and Filipino Community Center. The development of the park area will be to improve and expand the existing Hans L'Orange Park, home of the Hawaii Winter Baseball League's franchise West Oahu Cane Fires team (Amfac Property Development Corporation).

This Project is referred to as Phase II and is a part of a larger development. Phase I involves the development of 37 acres of light industrial subdivisions and is anticipated to be completed by the year 2000. This report does not address Phase I; however traffic analysis data from Phase I has been used as a base for the year 2000. Phase II, development of 20.3 acres of land for the commercial and park areas, is anticipated to also be completed in the year 2000 (Austin Tsutsumi & Associates).

This report focuses on the air quality conditions for worst-case morning and evening peak hours in the years:

- 1995 (existing conditions)
- 2000 (without Phase II of Project)
- 2000 (with Phases I and II of Project)



OGDEN

AMFAC COMMERCIAL AND PARK DEVELOPMENT
PROJECT LOCATION

FIGURE 1

Impacts to the air quality that exceed either the National Ambient Air Quality Standards (NAAQS) or the State Ambient Air Quality Standards (SAAQS) would constitute a significant impact. Impacts to the air quality that do not exceed either the NAAQS or SAAQS would be considered insignificant.

The overall development is an "indirect source" of air pollution as defined in the Federal Clean Air Act (CAA) because its primary association with air pollution is due to its inherent generation of motor vehicle traffic as a result of commercial activities. Thus, the focus of this report is on the development's potential to impact air quality due to increased traffic volume. This report also addresses the short-term impacts due to on-site construction activities, and the indirect impacts off-site due to increased demand for electrical energy. Over 90 percent of the energy generated in the State of Hawaii is by combustion of fossil fuel (Department of Business, Economic Development & Tourism (DBEDT) 1993).

The remaining sections of this report are summarized in the following sections. Section 2 describes the environmental background and regulatory setting. Section 3 discusses the potential environmental impacts of the Project. Section 4 discusses appropriate mitigation measures when deemed necessary. References are presented in Sections 5.

SECTION 2
ENVIRONMENTAL AND REGULATORY BACKGROUND

This section addresses the environmental and regulatory background that is pertinent to the Project. A summary of the existing air quality and physical conditions (i.e., meteorology, climate, and topography) affecting air pollution dispersion at the Project site and surrounding area is presented. Applicable regulations governing the NAAQS and SAAQS are also discussed.

2.1 Climatology and Meteorology

The Island of Oahu is located within the North Pacific trade wind band. The trade winds are controlled by a semipermanent high pressure system that is located north-northeast of the Hawaiian Islands. Wind circulation generated by this high pressure system is clockwise and outward from the center. The prevailing winds arrive from the northeast to east direction. The winds are more persistent in the summer than in the winter, averaging 90 and 50 percent, respectively, and stronger in the afternoon than at night (University of Hawaii 1983).

The National Weather Service monitors meteorological conditions at the Honolulu International Airport, located approximately 5 miles southeast of the Project site. The average temperature during the coolest month of the year is 72.6 degrees Fahrenheit (72.6°F). The average temperature during the warmest month of the year is 81°F. The lowest and highest temperature of record is 53°F and 94°F, respectively. Average annual precipitation is 23 inches (DBEDT 1993). Although Waipahu is located further inland and on slightly higher elevation, the meteorological data at the airport is representative, with only slight variability in forecast. Table 2-1 provides data on climatic normals, means, and extremes at the Honolulu International Airport.

2.2 Topography

The Project will cover 23.3 acres of land in Waipahu, Hawaii. The property is bordered by Waipahu Street to the east, west, and south, and Hans L'Orange Park and the former

Table 2-1

CLIMATIC NORMALS, MEANS, AND EXTREMES FOR THE HONOLULU INTERNATIONAL AIRPORT

Subject	Honolulu
Normal temperatures (°F):	
Daily maximum	84.2
Daily minimum	69.7
Monthly:	
Coolest month	72.6
Warmest month	81.0
Annual	77.0
Extreme temperatures (°F):	
Record highest	94
Record lowest	53
Precipitation (inches):	
Normal (annual average)	23.47
Maximum monthly	20.79
Minimum monthly	trace
Relative humidity (percent):	
8 am	72
2 pm	56
Wind speed (miles per hour):	
Mean	11.4
Fastest observed, 1 minute	46
Mean number of days:	
Clear	89.3
Partly cloudy	179.9
Cloudy	96.0
Precipitation 0.01 inch or more	99.0
Percent of possible sunshine	69

Source: Department of Business, Economic Development, & Tourism, 1993.

Oahu Sugar Company staging and storage area to the north. Topographic maps indicate that the land for the Project is generally flat. Ground elevation rises from approximately 30 feet above mean sea level (MSL) on the southern boundary to about 65 feet above MSL on the northern boundary. Soils are classified as Waipahu silty clay with 0 to 12 percent slopes (U.S. Department of Agriculture, Soil Conservation Service). Figure 1 provides a topographic view of the Project site.

2.3 Regulatory Setting

The Federal CAA (amended November 15, 1990) set forth NAAQS, with States retaining the option to develop more stringent standards. These standards represent the maximum levels of pollution considered safe, with an adequate margin of safety, to protect the public health and welfare. The six pollutants (criteria pollutants) for which NAAQS have been established are sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), particulate matter less than 10 microns in diameter (PM_{10}), and lead (Pb). SAAQS were established for these same pollutants in Chapter 11-59 of the Hawaii Administrative Rules (HAR), Ambient Air Quality Standards (HAR 1993). In the amendment of Chapter 11-59, the SAAQS for particulate matter (PM) was removed and a new standard for PM_{10} was implemented to match the NAAQS for PM_{10}. The State of Hawaii also adopted a hydrogen sulfide (H_2S) standard as well. Both NAAQS and SAAQS are summarized in Table 2-2.

2.4 Ambient Air Quality Levels

In evaluating the compliance of a new source with applicable standards, ambient background concentrations of the criteria pollutants are added to the maximum predicted concentrations resulting from implementation of the Project, and compared with existing NAAQS and SAAQS. Typically, the maximum background concentrations recorded within the previous three years are used to represent baseline conditions for the air quality analysis. However, ambient CO concentrations have never been monitored by the Department of Health (DOH) - Clean Air Branch at or near the proposed Project site.

Therefore, the maximum annual average ambient CO concentration level (2 parts per million (ppm)) detected within the last three years at the DOH monitoring site in downtown Honolulu has been used as background data. The DOH monitoring site in downtown Honolulu is the closest monitoring station to the Project site (Ibaan, 1996).

While there are no nearby ambient concentration data available for the criteria pollutants, it is safe to assume that the air quality relative to these pollutants is good. This assumption is based on the fact that the State of Hawaii is presently considered by the U.S. Environmental Protection Agency (EPA) to be in attainment for all criteria pollutants (i.e., not violating the NAAQS or SAAQS) as codified in the Code of Federal Regulations (CFR) - Title 40 §81.312 (US Code of Federal Regulations).

Table 2-2

STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS
(micrograms per cubic meter [$\mu g/m^3$])

Air Pollutant	Averaging Period	Air Standards: Hawaii	Air Standards: Federal Primary[a]	Air Standards: Federal Secondary[b]	Hawaii Emergency Episode Levels: Alert	Warning	Emergency
Carbon Monoxide (CO)	1 hour	10,000	40,000	40,000	--	--	--
	8 hour	5	10	10	17,000	34,000	46,000
Nitrogen Dioxide (NO_2)	1 hour	--	--	--	1,130	2,260	3,000
	24 hour	--	--	--	282	565	750
	Annual	70	100	100	--	--	--
Particulate Matter (PM_{10})[c]	24 hour	150	150	150	350	420	500
	Annual	50	50	50	--	--	--
Ozone (O_3)	1 hour	100	235	235	400	800	1,000
Sulfur Dioxide (SO_2)	3 hour	1,300	--	1,300	--	--	--
	24 hour	365	365	--	800	1,600	2,100
	Annual	80	80	--	--	--	--
Lead (Pb)	Calendar Quarter	1.5	1.5	1.5	--	--	--
Hydrogen Sulfide (H_2S)	1 hour	35	--	--	--	--	--

a Designed to prevent adverse effects on public health.
b Designed to prevent adverse effects on public welfare including effects on comfort, visibility, vegetation, animals, aesthetics values, and soiling and deterioration of materials.
c Particulate Matter which is 10 microns or less in diameter.
-- No regulatory standard or episode threshold level.

SECTION 3
POTENTIAL ENVIRONMENTAL IMPACTS

This section describes the potential environmental impacts of the Project. Impacts have been broken down into three groups: short-term, long-term, and indirect. Each of these groups is discussed below.

3.1 Short-Term Pollutant Impacts

Short-term pollutant impacts of the Project are considered to be those associated with construction activities. Emission sources primarily include tailpipe emissions from heavy-duty construction equipment and workers' vehicles, and fugitive dust generated during demolition and construction activities, particularly site clearing and land grading.

During the construction of the Project, various types of equipment (i.e., scrapers, dozers, and water trucks) will be utilized. The operation of the heavy-duty construction equipment will result in the emission of SO_2, oxides of nitrogen (NO_x), hydrocarbons (HC), CO, and PM_{10}. Typically, diesel-powered equipment will emit more NO_x, SO_2, and PM_{10} than gasoline powered equipment. The latter, however, will emit more HC and CO. In addition, exhaust emissions from workers' vehicles will add to the total pollutants emitted. While localized increases of these pollutants are expected to occur, they are not considered significant.

Fugitive dust generation (i.e., PM) from clearing vegetation and other heavy-duty construction operations is estimated at 1.2 tons per acre per month of activity (EPA 1985). According to the Amfac Commercial and Park Development Application for Development Plan Amendment dated October 1996, 23.3 acres of land will be disturbed during the lifetime of the development. Development is anticipated to begin in the last quarter of 1998 and be completed by the end of the year 2000. This conservative timeline indicates that 0.86 acres of land will be disturbed per month, correlating to 1.03 tons per month of fugitive dust generation. Therefore, the amount of fugitive dust generated per month is expected to be less than EPA estimates for construction operations. As a result,

fugitive dust impacts to the air quality during the construction phase of the Project will be localized, temporary, and are considered insignificant.

3.2 Long-Term Pollutant Impacts

Long-term pollutant impacts of the proposed Project are considered to be those associated with everyday use of the development. The most significant long-term emission sources are motor vehicles, with the most significant tailpipe emission being CO.

High short-term concentrations of CO, known as "hot spots", can occur at locations where traffic is congested, such as at intersections and along highways. For this Project, the intersection of Waipahu Street and Paiwa Street was modeled because this intersection operates at a Level of Service (LOS) that is rated as one of the worst intersections in the area (Austin Tsutsumi & Associates). The intersection currently operates at a LOS "E" rating in the morning and "D" rating in the evening, and is expected to operate at a LOS "F" rating during both morning and evening peak traffic hours in the future with and without Phase II of the Project. Consequently, traffic at this intersection was modeled for both morning and evening peak hour traffic volumes. Air quality impacts were predicted using the existing 1995 traffic data, projected 2000 traffic data assuming Phase II of the Project is not built, and projected 2000 traffic data assuming that Phase II of the Project is built. The modeling results provide the worst-case scenario of CO concentration levels to be produced with or without the Project.

The CAL3QHC air quality model developed by the EPA was used to analyze the potential air quality impacts at specific receptors surrounding the intersection of concern. CAL3QHC is presently listed in Supplement B to the EPA Guideline on Air Quality Models (Revised) as the preferred air quality model to use for mobile air pollution emissions (EPA 1987, EPA 1990a).

Vehicle emissions were generated for 1995 and 2000 using MOBILE 5.0 emission factors, assuming the national average vehicle mix (EPA 1993a). The idle emission factors were generated by the MOBILE 4.1 model, as recommended in CAL3QHC documentation, and were adjusted for site-specific conditions (EPA 1993b, EPA 1995).

The DOH has indicated that the average miles traveled per gallon per vehicle in the State of Hawaii is higher than the national average. This higher average is due to a higher number of fuel efficient vehicles (most likely rental cars) in operation. Therefore, using the national vehicle mix emission rates is conservative. Different emission factors were used for the estimated speeds approaching the intersection (i.e., 25 miles per hour (mph)) along both Waipahu Street and Paiwa Street. The MOBILE emission rates were used as input into CAL3QHC.

The CAL3QHC model is designed to calculate CO concentrations at signalized intersections. The model generates an appropriate emission rate for the intersection based on the number of vehicles per hour that pass along the queue.

The maximum one hour average concentration of CO was estimated based on the worst-case meteorological conditions of a wind speed of 1.0 meters per second (mps) and a stability class of D. This stability class is considered appropriate for the study involved. Wind directions for the modeling analysis were selected at one degree increments. Receptors (i.e., locations where the ambient CO concentrations are calculated) were placed outside of the mixing zone, 12 feet from the roadways.

For the one hour dispersion modeling scenarios, there are no potential violations of the NAAQS. However, both evening scenarios without Project (Phase I only) and with Project (Phases I and II) in the year 2000 indicate an exceedance of the SAAQS. The results shown in Table 3-1 list the maximum predicted 1-hour CO concentrations for the wind direction that caused the highest overall concentration.

Based on EPA guidelines, a persistence factor of 0.7 was used to estimate the eight hour average CO concentration from the predicted one hour values (EPA 1985). For the eight hour dispersion modeling scenarios, there are no potential violations of the NAAQS. However, all scenarios, including the base year 1995, indicate an exceedance of the SAAQS. The results shown in Table 3-2 list the maximum predicted eight hour CO concentrations for the wind direction that caused the highest overall concentration.

Table 3-1
MAXIMUM PREDICTED 1-HOUR CO CONCENTRATIONS
(parts per million (ppm))

Year	Ambient	Base Year	Without Project (Phase I only)	With Project (Phases I and II)	Total Concentration	SAAQS	NAAQS
1995 am	2.00	6.9			8.9	9.0	35.0
pm	2.00	6.9			8.9	9.0	35.0
2000 am	2.00		5.1		7.1	9.0	35.0
pm	2.00		8.4		10.4	9.0	35.0
2000 am	2.00			4.8	6.8	9.0	35.0
pm	2.00			8.3	10.3	9.0	35.0

Note: 1-hour CO SAAQS of 9 ppm is equivalent to 10,000 μg/m3.
1-hour CO NAAQS of 35 ppm is equivalent to 40,000 μg/m3.

Table 3-2
MAXIMUM PREDICTED 8-HOUR CO CONCENTRATIONS
(ppm)

Year	Ambient	Base Year	Without Project (Phase I only)	With Project (Phases I and II)	Total Concentration	SAAQS	NAAQS
1995 am	1.40	4.8			6.2	4.5	9.0
pm	1.40	4.8			6.2	4.5	9.0
2000 am	1.40		3.6		5.0	4.5	9.0
pm	1.40		5.9		7.3	4.5	9.0
2000 am	1.40			3.4	5.8	4.5	9.0
pm	1.40			5.8	6.2	4.5	9.0

Note:. 8-hour CO SAAQS of 4.5 ppm is equivalent to 5,000 μg/m3.
8-hour CO NAAQS of 9 ppm is equivalent to 10,000 μg/m3.

The modeling results indicate that the Project is expected to slightly exceed the SAAQS for CO in some scenarios. However, implementation of the mitigation measures recommended in the traffic analysis report and in this report will significantly reduce the ambient air quality impact from CO. One interesting note regarding the difference between existing conditions and future conditions is that the projected improvements in vehicular emissions expected in future years outweighs the increased traffic expected in the year 2000. In other words, predicted CO concentrations are expected to remain relatively the same or decrease.

Other air pollution sources (primarily combustion sources) will also contribute to regional air quality background concentrations. Commercial combustion sources like boilers and water heaters will emit primarily NO_x, although smaller quantities of pollutants such as reactive organic gases, CO, SO_2, and PM are also produced. Such impacts are very Project specific and, therefore, were not quantified for this analysis. However, these impacts are generally not considered significant in attainment areas.

3.3 Indirect Pollutant Impacts

The Project will have additional air quality impacts beyond those associated with construction and traffic. For example, street lights have no direct emissions of air pollutants. However, these lighting fixtures will increase energy demand from power generating facilities. This increased demand, though minimal, will also contribute to the regional air pollution background. However, total air pollution generated will have little impact in the area and will remain below the NAAQS and SAAQS. Therefore, impacts beyond those associated with construction and traffic are considered to be insignificant.

As the population on the Island of Oahu grows, increased demand will dictate that the Hawaiian Electric Company (HECO) be able to provide additional electricity. Though HECO is presently investigating increasing electrical output on the Island of Oahu, currently the majority of the island's electricity is generated by burning fuel oil which emits SO_2, NO_x, PM, and HC. The impact from these emissions will be external to the Project, but because additional electrical demands will be generated by the Project, a portion of these emissions are considered attributable to the Project. This increase in electrical demand as a result of the Project will have little impact in the area and pollutant

concentrations are expected to remain below the NAAQS and SAAQS. Therefore, impacts associated with electrical demand from the Project are considered to be insignificant.

SECTION 4
MITIGATION MEASURES

This section describes various mitigation measures that can be employed to minimize or reduce the potentially adverse air quality impacts from the Project. The mitigation measures vary according to impact type. The following subsections discuss mitigation measures for short-term, long-term, and indirect pollutant impacts.

4.1 SHORT-TERM MEASURES

Fugitive dust and heavy equipment use are the primary short-term emission sources. Fugitive dust emissions can be mitigated by ensuring that appropriate brush clearing and construction operations are practiced. These include:

- minimizing the number of concurrent brush clearing and construction activities; and
- watering, which can minimize fugitive dust emissions by fifty percent.

Onsite personnel should determine the locations and application times for watering, based on construction activities and local meteorological conditions.

Although the exhaust emissions from the construction equipment are not expected to be significant, the following measures can be taken to reduce potential impacts. These measures include:

- utilizing electrical equipment; or
- fuel burning equipment with air pollution control technologies applied (i.e., source catalytic converter and fuel injection timing retard).

4.2 LONG-TERM MEASURES

There are mitigation measures designed to reduce motor vehicle trips that can be incorporated into the overall Project strategy. Implementation of the following measures are suggested:

- implement traffic flow improvement measures, such as proper signalization and road widening for intersections with poor LOS ratings;
- encourage ride-sharing/car pooling or use of public transportation by employees;
- limit the number of passenger parking spaces to promote the use of shuttle services and public transportation;
- discourage idling vehicles at drop-off points;
- implement bicycle lanes for bicycling; or
- encourage walking.

4.3 INDIRECT MEASURES

Although the indirect air pollution sources are not considered to be significant, energy conservation measures can be employed to minimize the emissions from electrical power generation brought about by the Project. Energy conservation measures include:

- passive solar water heating;
- low pollutant emitting systems for water heating; and
- developing integrated energy systems that provided services to more than one unit by a centralized system and building design.

When building design is taken into account, energy conservation measures can be significant in reducing emissions. Examples of these techniques include:

- avoidance of large glass areas;
- efficient use of shading;
- maximizing natural light;
- placement of high usage rooms to avoid summer heat; and
- proper use of attic fans or other ventilation systems.

SECTION 5
REFERENCES

Amfac Property Development Corporation, 1996. *Amfac Commercial and Park Development, Waipahu, Central Oahu, TMK 9-4-02:04 (por) - Application for Development Plan Amendment and EIS Notice of Preparation.* October 1996

Austin, Tsutsumi & Associates, Inc., 1996. *Traffic Impact Analysis Report: Oahu Sugar Company Property, Waipahu, Hawaii.* March 1996

Department of Business, Economic Development & Tourism (DBEDT), 1993. *The State of Hawaii Data Book 1992: A Statistical Abstract*, 1993.

Environmental Protection Agency (EPA), 1985. *Compilation of Air Pollution Emission Factors, AP-42, Fourth Edition*, Department of the Interior, Environmental Protection Agency, Research Triangle Park, NC.

EPA, 1987. *Guideline On Air Quality Models (Revised)*, Department of the Interior, Environmental Protection Agency, Research Triangle Park, NC.

EPA, 1990a. *Supplement B to Guideline on Air Quality Models (Revised)*, Department of the Interior, Environmental Protection Agency, Research Triangle Park, NC. September 1990.

EPA, 1993a. *User's Guide to MOBILE 5.0 (Mobile Source Emission Factor Model)*, Department of the Interior, Environmental Protection Agency, Research Triangle Park, NC. March 1993.

EPA, 1993b. *User's Guide to MOBILE 4.1 (Mobile Source Emission Factor Model)*, Department of the Interior, Environmental Protection Agency, Research Triangle Park, NC. July 1991.

EPA, 1995. *User's Guide to CAL3QHC Version 2.0*, Department of the Interior, Environmental Protection Agency, Research Triangle Park, NC. November 1995.

Federal Clean Air Act Amendments, 1990.

Hawaii Administrative Rules (HAR), *Chapter 11 - 59, Ambient Air Quality Standards*, 1993.

Ibaan, Carl, 1996. Personal conversation with Mr. Carl Ibaan of the DOH.

US Code of Federal Regulations (CFR) - Title 40 §81.312, 1992.

US Geological Survey, 1982. 7.5 Minute Topographic Map: Waipahu Quadrangle.

US Department of Agriculture, Soil Conservation Service in cooperation with The University of Hawaii, Agricultural Experiment Station, 1972. *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.* August 1972.

Appendix H

Acoustic Study

ACOUSTIC STUDY FOR THE AMFAC COMMERCIAL AND PARK PROJECT

WAIPAHU, CENTRAL OAHU

Prepared for:

AMFAC / JMB HAWAII, INC.

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NOVEMBER 1996

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CHAPTER I. SUMMARY

The existing and future traffic noise levels in the vicinity of the proposed AMFAC Commercial and Park Project in Waipahu were evaluated for their potential impacts and their relationship to current FHA/HUD noise standards. The traffic noise level increases along three access roadways to the project site were calculated. These three roadways were: Paiwa Street; Waipahu Street; and the proposed Manager's Drive Extension. By CY 2000, increases in traffic noise of 0.1 to 2.7 Ldn units are predicted to occur as a result of project plus non-project traffic.

Along Paiwa Street, traffic noise levels are expected to increase by 0.1 to 1.9 Ldn, as a result of both project and non-project traffic. Project traffic noise contributions along Paiwa Street should range between 0 and 0.2 Ldn. Along Waipahu Street, traffic noise levels are expected to increase by 0.2 to 2.7 Ldn, with project traffic contributions ranging from 0 to 0.5 Ldn. These levels of traffic noise increases resulting from project generated traffic are not considered to be significant, and are not expected to generate adverse noise impacts.

Unavoidable, but temporary, noise impacts may occur during the construction of the proposed project, particularly during the excavation activities on the project site. Because construction activities are predicted to be audible within the project and at adjoining properties, the quality of the acoustic environment may be degraded to unacceptable levels during periods of construction. Mitigation measures to reduce construction noise to inaudible levels will not be practical in all cases, but the use of quiet equipment and the implementation of the State Department of Health construction noise permit procedures are recommended as mitigation measures.

CHAPTER II. PURPOSE

The primary objective of this study was to describe the existing and future traffic noise environment in the environs of the proposed AMFAC Commercial and Park Project in Waipahu on the island of Oahu. Traffic noise level increases and impacts associated with the proposed development were to be determined within the project site as well as along the public roadways expected to service the project traffic. A specific objective was to determine future traffic noise level increases associated with both project and non-project traffic, and the potential noise impacts associated with these increases. Assessments of possible future impacts from short term construction noise at the project site were also included as noise study objectives. Recommendations for minimizing identified noise impacts were also to be provided as required.

CHAPTER III. NOISE DESCRIPTORS AND THEIR RELATIONSHIP TO LAND USE COMPATIBILITY

The noise descriptor currently used by federal agencies (such as FHA/HUD) to assess environmental noise is the Average Day-Night Sound Level (Ldn). This descriptor incorporates a 24-hour average of instantaneous A-Weighted Sound Levels as read on a standard Sound Level Meter. By definition, the minimum averaging period for the Ldn descriptor is 24 hours. Additionally, sound levels which occur during the nighttime time hours of 10:00 PM to 7:00 AM are increased by 10 decibels (dB) prior to computing the 24-hour average by the Ldn descriptor. A more complete list of noise descriptors is provided in APPENDIX B to this report.

Table 1, derived from Reference 1, presents current federal noise standards and acceptability criteria for residential land uses. Land use compatibility guidelines for various levels of environmental noise as measured by the Ldn descriptor system are shown in Figure 1. As a general rule, noise levels of 55 Ldn or less occur in rural areas, or in areas which are removed from high volume roadways. In urbanized areas, which are shielded from high volume streets, Ldn levels generally range from 55 to 65 Ldn, and are usually controlled by motor vehicle traffic noise. Residences which front major roadways are generally exposed to levels of 65 Ldn, and as high as 75 Ldn when the roadway is a high speed freeway. In the project area, traffic noise levels are typically greater than 65 Ldn along the Rights-of-Way due to the large volume of traffic on the primary access roadways to the project site.

For the purposes of determining noise acceptability for funding assistance from federal agencies (FHA/HUD and VA), an exterior noise level of 65 Ldn or lower is considered acceptable. This standard is applied nationally (Reference 2), including Hawaii. Because of our open-living conditions, the predominant use of naturally ventilated dwellings, and the relatively low exterior-to-interior sound attenuation afforded by these naturally ventilated structures, an exterior noise level of 65 Ldn does not eliminate all risks of noise impacts. Because of these factors, and as recommended in Reference 3, a lower level of 55 Ldn is considered to be the "Unconditionally Acceptable" (or "Near-Zero Risk:) level of exterior noise. However, after considering the cost and feasibility of applying the lower level of 55 Ldn, government agencies such as FHA/HUD and VA have selected 65 Ldn as a more appropriate regulatory standard.

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

On the Island of Oahu, the State Department of Health (DOH) regulates noise from on-site mechanical equipment and construction activities. Unavoidably loud construction activities are regulated through the issuance of permits for allowing excessive noise during limited time periods. State DOH noise regulations are expressed

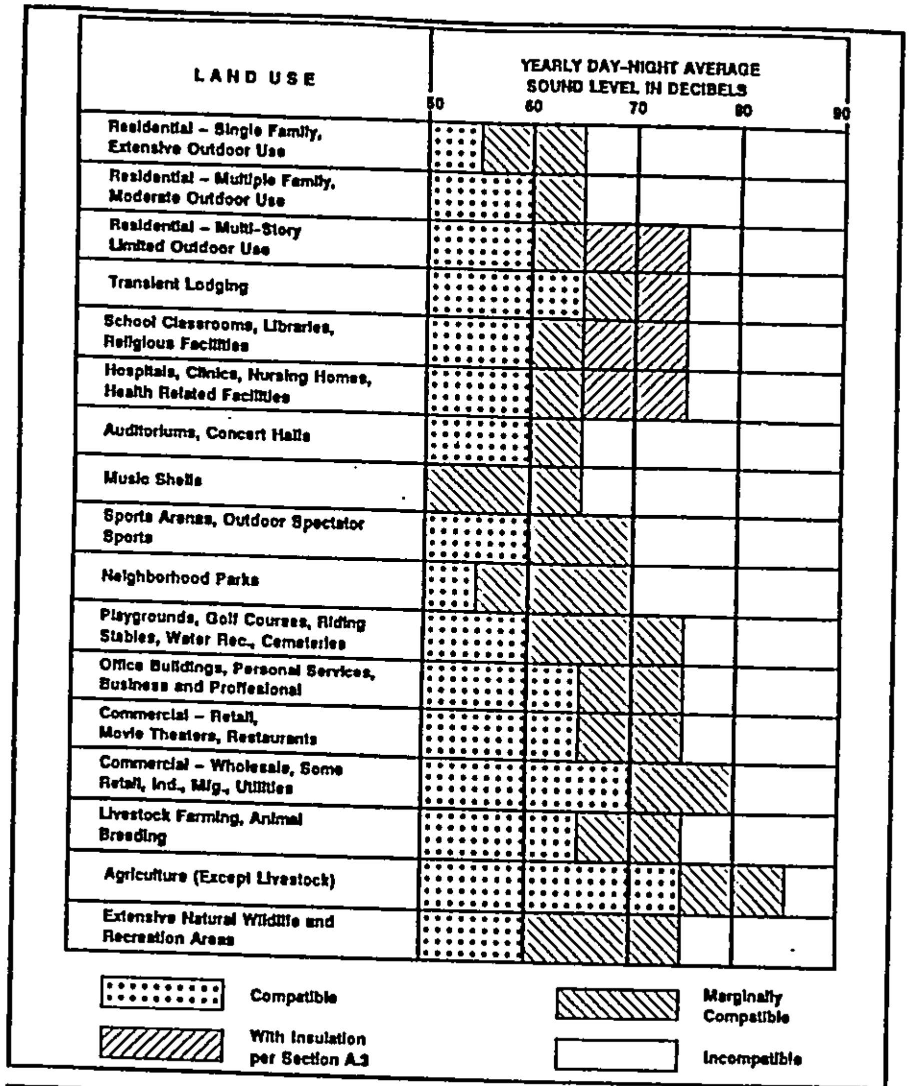
TABLE 1

EXTERIOR NOISE EXPOSURE CLASSIFICATION (RESIDENTIAL LAND USE)

NOISE EXPOSURE CLASS	DAY-NIGHT SOUND LEVEL	EQUIVALENT SOUND LEVEL	FEDERAL (1) STANDARD
Minimal Exposure	Not Exceeding 55 Ldn	Not Exceeding 55 Leq	Unconditionally Acceptable
Moderate Exposure	Above 55 Ldn But Not Above 65 Ldn	Above 55 Leq But Not Above 65 Leq	Acceptable(2)
Significant Exposure	Above 65 Ldn But Not Above 75 Ldn	Above 65 Leq But Not Above 75 Leq	Normally Unacceptable
Severe Exposure	Above 75 Ldn	Above 75 Leq	Unacceptable

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

(2) FHWA uses the Leq instead of the Ldn descriptor. For planning purposes, both are equivalent if: (a) heavy trucks do not exceed 10 percent of total traffic flow in vehicles per 24 hours, and (b) traffic between 10:00 PM and 7:00 AM does not exceed 15 percent of average daily traffic flow in vehicles per 24 hours. The noise mitigation threshold used by FHWA for residences is 67 Leq.



LAND USE COMPATIBILITY
WITH YEARLY DAY–NIGHT AVERAGE SOUND LEVEL
AT A SITE FOR BUILDINGS AS COMMONLY CONSTRUCTED
(Source: American National Standards Institute S12.40–1990)

FIGURE 1

In maximum allowable property line noise limits rather than Ldn (see Reference 4). Although they are not directly comparable to noise criteria expressed in Ldn, State DOH noise limits for residential, commercial, and industrial lands equate to approximately 55, 60, and 76 Ldn, respectively.

It should be noted that the noise compatibility guidelines and relationships to the Ldn noise descriptor may not be applicable to impulsive noise sources such as pile drivers. The use of penalty factors (such as adding 10 dB to measured sound levels or the use of C–Weighting filters) have been proposed. However, the relationships between levels of impulsive noise sources and land use compatibility have not been as firmly established as have the relationships for non–impulsive sources. The State DOH limits for impulsive sounds which exceed 120 impulses in any 20 minute period are 10 dB above the limits for non–impulsive sounds. If impulsive sounds do not exceed 120 impulses in any 20 minute time period, there are no regulatory limits on their sound levels under the State DOH regulations.

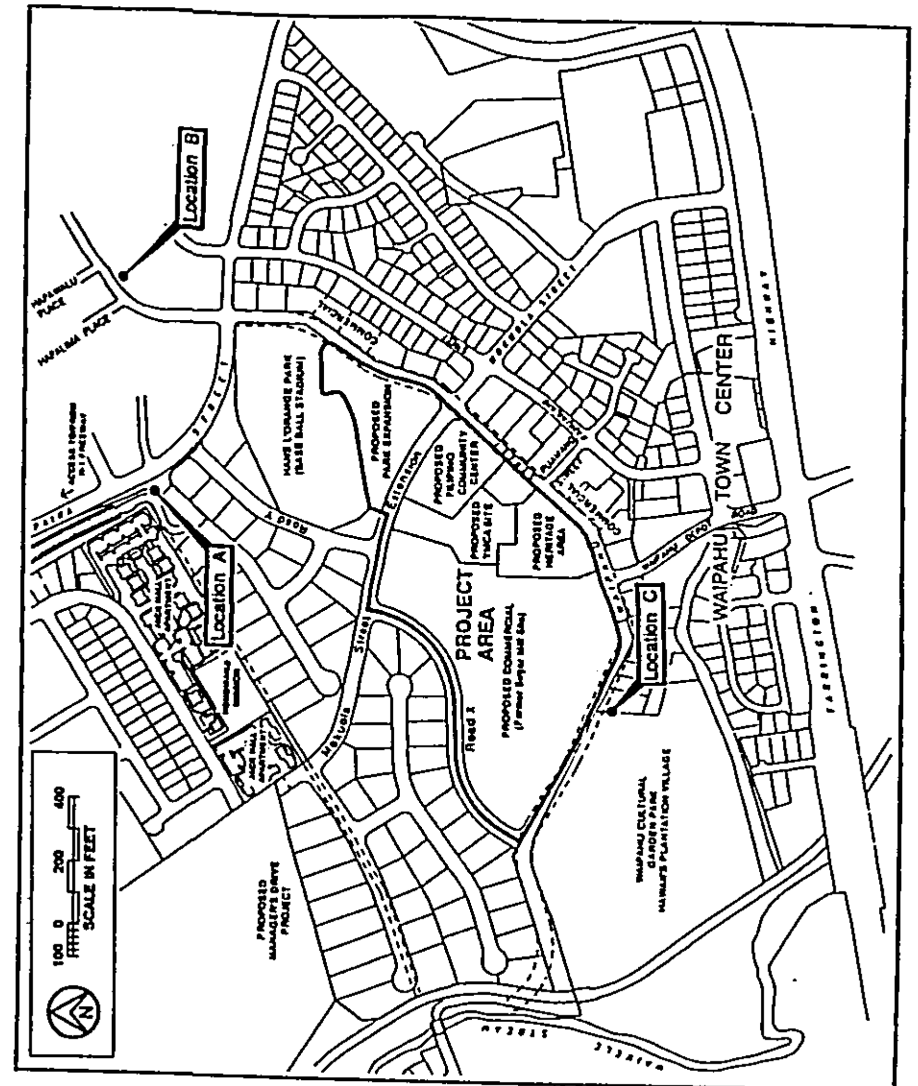
CHAPTER IV. GENERAL STUDY METHODOLOGY

Existing traffic noise levels were measured at three locations in the project environs to provide a basis for developing the project's traffic noise contributions along the roadways which will service the proposed development. The locations of the measurement sites are shown in Figure 2. Noise measurements were performed during the month of November 1996. The results of the traffic noise measurements were compared with calculations of existing traffic noise levels to validate the computer model used.

Traffic noise calculations for the existing conditions as well as noise predictions for the Year 2000 were performed using the Federal Highway Administration (FHWA) Noise Prediction Model (Reference 5). Traffic data entered into the noise prediction model were: hourly traffic volumes, average vehicle speeds, estimates of traffic mix, and hard ground propagation loss factor. The traffic assignments for the project (Reference 6), and Hawaii State Department of Transportation traffic counts on Waipahu Street at Waikele Stream Bridge (Reference 7) were the primary sources of data inputs to the model. For existing and future traffic on all roadways, it was assumed that the average noise levels, or Leq(h), during the AM or PM peak hour were equal to the 24-hour Ldn along the roadway. These assumptions were based on computations of both the hourly Leq and the 24-hour Ldn of traffic noise along Waipahu Street (see Figure 3).

Traffic noise calculations for both the existing and future conditions in the project environs were developed for ground level and elevated receptors without the benefit of shielding effects. Traffic noise levels were calculated for future conditions with and without the proposed commercial and park project. The forecasted changes in traffic noise levels over existing levels were calculated for both future scenarios, and noise impact risks evaluated. The relative contributions of non-project and project traffic to the total noise levels were also calculated, and an evaluation of possible traffic noise impacts was made.

Calculations of average exterior and interior noise levels from construction activities were performed for typical naturally ventilated and air conditioned dwellings. Predicted noise levels were compared with existing background ambient noise levels, and the potential for noise impacts was assessed. Potential noise impacts from construction activities were discussed, and mitigation measures recommended.

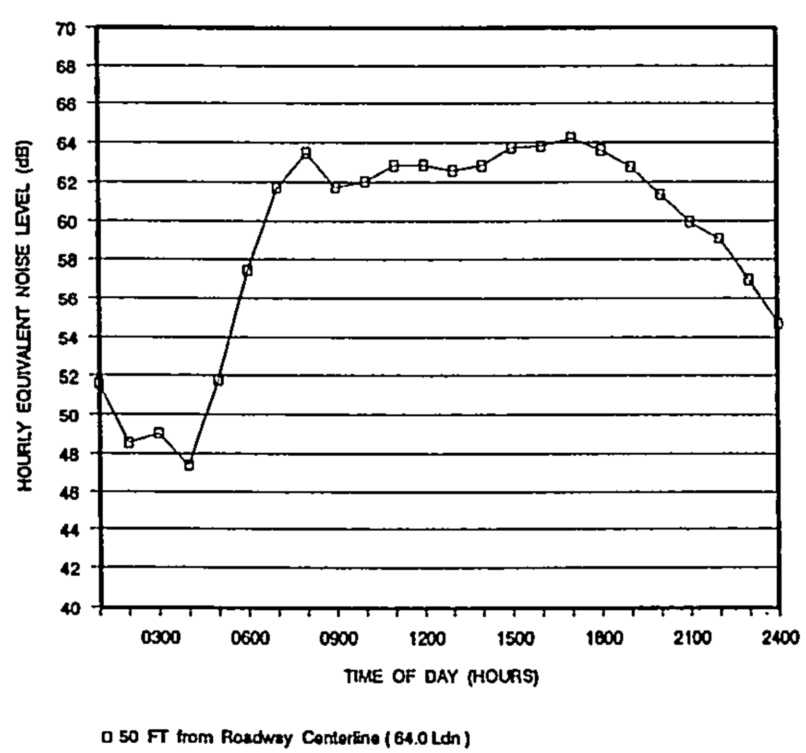


LOCATIONS OF NOISE MEASUREMENT SITES

FIGURE 2

FIGURE 3

HOURLY VARIATIONS OF TRAFFIC NOISE AT 50 FT SETBACK DISTANCE FROM THE CENTERLINE OF WAIPAHU STREET AT WAIKELE STREAM BRIDGE (APRIL 8, 1996)



CHAPTER V. EXISTING NOISE ENVIRONMENT

The results of the November 1996 traffic and background ambient noise measurements are summarized in Table 2, with measurement locations identified in Figure 2. Sites "A" thru "C" were all located at street level. The traffic noise measurement results, and their comparisons with computer model predictions are summarized in Table 2. As shown in Table 2, correlation between measured and predicted traffic noise levels was considered to be good.

The existing traffic noise levels along the primary access roadways to the project site are in the "Significant Exposure, Normally Unacceptable" category at 65 to 70 Ldn.

Results of calculations of existing (CY 1995) traffic noise levels during the PM peak hour period are shown in Table 3. The results of the calculations apply at 50 FT distances from the centerlines of the roadway sections in the project environs. Calculated setback distances from these roadways to the existing 60, 65, and 70 Ldn contours are shown in Table 4. The traffic noise levels shown in the tables only apply when unobstructed line-of-sight conditions exist to the roadways. These conditions would generally occur at short (50 to 100 FT) distances to a roadway, within any flat, open space along the roadway, and at distant, but elevated locations above the roadway. The existing traffic noise levels shown in the tables and figures should be reduced by 3 to 5 dB (or Ldn) if partial shielding (line-of-sight obstruction) exists between the roadway and the receptor location. If the receptor is located behind a major obstruction (large building), the noise levels in the tables and figures should be reduced by 5 to 10 dB.

TABLE 2

TRAFFIC NOISE MEASUREMENT RESULTS

LOCATION	Time of Day (HRS)	Ave. Speed (MPH)	--Hourly Traffic Volume-- AUTO	M.TRUCK	H.TRUCK	Measured Leq (dB)	Predicted Leq (dB)
A. 50 FT from the center-line of Paiwa Street. (11/18/96)	1515 TO 1600	35	1,047	10	6	63.3	64.4
A. 50 FT from the center-line of Paiwa Street. (11/18/96)	1600 TO 1700	35	871	5	4	62.8	63.2
B. 50 FT from the center-line Waipahu Street. (11/20/96)	1600 TO 1700	35	631	9	9	63.8	63.6
C. 25 FT from the center-line of Waipahu Street. (11/18/96)	1600 TO 1700	32	608	9	18	66.4	66.5

TABLE 3

COMPARISONS OF EXISTING (CY 1995) AND FUTURE (CY 2000) TRAFFIC NOISE LEVELS ALONG ROADWAYS SERVICING THE PROJECT (PM PEAK HOUR AND 50 FT FROM ROADWAY CENTERLINE)

LOCATION	SPEED (MPH)	VPH	**** HOURLY LEQ IN dB **** AUTO	MT	HT	ALL VEH
EXISTING (CY 1995) PM PEAK HR. TRAFFIC:						
Paiwa St. North of H-1 Freeway	35	2,038	65.6	57.3	63.1	67.9
Paiwa St. North of Haipo St.	35	1,555	64.4	56.1	61.9	66.7
Paiwa St. from Haipo to Hapapa St.	35	1,283	63.6	55.3	61.1	65.9
Paiwa St. from Hapapa St. to Paiwa Pl.	35	1,263	63.5	55.2	61.0	65.8
Paiwa St. from Paiwa Pl. to Road "Y"	35	1,279	63.5	55.3	61.1	65.9
Paiwa St. from Road "Y" to Waipahu St.	35	1,235	63.4	55.1	60.9	65.7
Waipahu St. North of Paiwa St.	35	705	60.9	54.4	60.3	64.1
Waipahu St. from Paiwa to Mokuloa St.	32	1,465	62.6	56.3	62.5	66.0
Waipahu St. from Mokuloa to Waipahu Depot	32	1,138	61.5	55.2	61.4	64.9
Waipahu St. from Waipahu Depot to Road "X"	32	970	60.8	54.5	60.7	64.2
Waipahu St. North of Road "X"	32	970	60.8	54.5	60.7	64.2
Manager's Drive Extension	N/A	N/A	N/A	N/A	N/A	N/A
FUTURE CONDITIONS (CY 2000) PM PEAK HR. TRAFFIC:						
Paiwa St. North of H-1 Freeway	35	2,898	67.1	58.8	64.6	69.4
Paiwa St. North of Haipo St.	35	2,428	66.3	58.0	63.9	68.7
Paiwa St. from Haipo to Hapapa St.	35	1,778	65.0	56.7	62.5	67.3
Paiwa St. from Hapapa St. to Paiwa Pl.	35	1,808	65.1	56.8	62.6	67.4
Paiwa St. from Paiwa Pl. to Road "Y"	35	1,795	65.0	56.7	62.5	67.4
Paiwa St. from Road "Y" to Waipahu St.	35	1,260	63.5	55.2	61.0	65.8
Waipahu St. North of Paiwa St.	35	1,050	62.6	56.2	62.0	65.8
Waipahu St. from Paiwa to Mokuloa St.	32	1,665	63.2	56.8	63.0	66.6
Waipahu St. from Mokuloa to Waipahu Depot	32	1,185	61.7	55.4	61.5	65.1
Waipahu St. from Waipahu Depot to Road "X"	32	1,228	61.8	55.5	61.7	65.3
Waipahu St. North of Road "X"	32	1,810	63.5	57.2	63.4	67.0
Manager's Drive Extension	35	665	60.7	52.4	58.2	63.0

Notes:

1. The following assumed traffic mix of autos, medium trucks, and heavy vehicles were used for existing and future peak hour conditions along Paiwa Street and Manager's Drive: 98% autos; 1% medium trucks; and 1% heavy trucks and buses.

2. The following assumed traffic mix of autos, medium trucks, and heavy vehicles were used for existing and future peak hour conditions along Waipahu Street: 97% autos; 1.5% medium trucks; and 1.5% heavy trucks and buses.

TABLE 4

EXISTING AND CY 2000 DISTANCES TO 60, 65, AND 70 LDN CONTOURS

STREET SECTION	60 Ldn SETBACK (FT) EXISTING	60 Ldn SETBACK (FT) CY 2000	65 Ldn SETBACK (FT) EXISTING	65 Ldn SETBACK (FT) CY 2000	70 Ldn SETBACK (FT) EXISTING	70 Ldn SETBACK (FT) CY 2000
Paiwa St. North of H-1 Freeway	168	213	78	99	38	46
Paiwa St. North of Haipo St.	141	189	65	88	30	41
Paiwa St. from Haipo to Hapapa St.	124	154	57	71	27	33
Paiwa St. from Hapapa St. to Paiwa Pl.	122	156	57	72	28	34
Paiwa St. from Paiwa Pl. to Road "Y"	123	155	57	72	27	33
Paiwa St. from Road "Y" to Waipahu St.	121	122	58	57	28	28
Waipahu St. North of Paiwa St.	94	122	44	57	20	28
Waipahu St. from Paiwa to Mokuloa St.	126	138	59	64	27	30
Waipahu St. from Mokuloa to Waipahu Depot	107	110	50	51	23	24
Waipahu St. from Waipahu Depot to Road "X"	96	112	45	52	21	24
Waipahu St. North of Road "X"	96	145	45	68	21	31
Manager's Drive Extension	N/A	80	N/A	37	N/A	17

Notes:

(1) All setback distances are from the roadways' centerlines.
(2) See TABLE 3 for traffic volume, speed, and mix assumptions.
(3) Setback distances are for unobstructed line-of-sight conditions.
(4) Soft ground conditions assumed along all roadways.

CHAPTER VI. FUTURE TRAFFIC NOISE ENVIRONMENT

Predictions of future traffic noise levels were made using the traffic volume assignments of Reference 6 for CY 2000 with and without the proposed project. The future projections of project plus non-project traffic noise levels on the roadways which would service the project are shown in Table 3 for the PM peak hour of traffic. As indicated in Table 3, traffic noise levels are predicted to increase by 0.1 to 2.7 dB during the PM peak hour, with the largest increase expected along the section of Waipahu Street northwest of Road "X". These predictions assume that average vehicle speeds and traffic mix will not change from current conditions. The dominant noise sources in the project environs will continue to be traffic noise from all access roadways to the project site and H-1 Freeway to the north. Table 4 summarizes the predicted setback distances to the 60, 65, and 70 Ldn traffic noise contour lines along the roadways servicing the project and attributable to both project plus non-project traffic by CY 2000. The setback distances in Table 4 do not include the beneficial effects of noise shielding from buildings, or the detrimental effects of additive contributions of noise from intersecting streets or reflections from building walls. As indicated in Table 4, setback distances of 37 to 99 FT to the 65 Ldn contour from the centerlines of the roadways are predicted to occur in CY 2000.

Table 5 presents the predicted increases in traffic noise levels associated with non-project and project traffic by CY 2000, and as measured by the Ldn descriptor system. As indicated in Table 5, the larger increases in traffic noise along the primary access roadways to the project are predicted to be associated with non-project traffic rather than project traffic. Minimal increases ranging from 0.0 to 0.5 Ldn in traffic noise levels are expected to result from project traffic along existing roadways. These changes will be difficult to measure and are considered to be insignificant. Along the future section of Manager's Drive Extension, traffic noise increases are expected to be larger due to the relatively low initial traffic volumes along that roadway.

TABLE 5

CALCULATIONS OF PROJECT AND NON-PROJECT NOISE CONTRIBUTIONS (CY 2000)

STREET SECTION	NOISE LEVEL INCREASE (Leq) DUE TO: AMBIENT TRAFFIC	PROJECT TRAFFIC
Paiwa St. North of H-1 Freeway	1.5	0.1
Paiwa St. North of Haipo St.	1.8	0.1
Paiwa St. from Haipo to Hapapa St.	1.2	0.2
Paiwa St. from Hapapa St. to Paiwa Pl.	1.4	0.2
Paiwa St. from Paiwa Pl. to Road "Y"	1.3	0.1
Paiwa St. from Road "Y" to Waipahu St.	0.1	0.0
Waipahu St. North of Paiwa St.	1.2	0.5
Waipahu St. from Paiwa to Mokuloa St.	0.1	0.4
Waipahu St. from Mokuloa to Waipahu Depot	0.1	0.1
Waipahu St. from Waipahu Depot to Road "X"	1.0	0.0
Waipahu St. North of Road "X"	2.6	0.1
Manager's Drive Extension	59.7	3.3

CHAPTER VII. DISCUSSION OF PROJECT RELATED NOISE IMPACTS AND POSSIBLE MITIGATION MEASURES

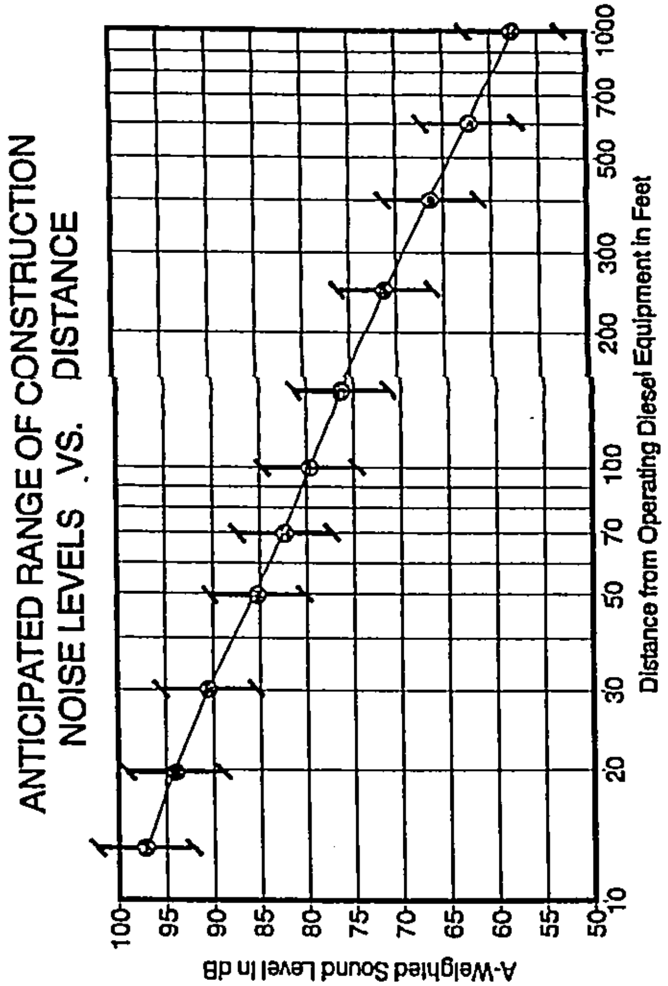
Traffic Noise. Risks of adverse noise impacts from project traffic are expected to be low due to the nature of the project and due to the very small increases in traffic noise expected from project traffic. Moderate increases in traffic noise levels are expected in the project area due to non-project traffic, and minimal increases in traffic noise levels are expected from the proposed Commercial and Park Project. For these reasons, traffic noise mitigation measures should not be required.

On-Site Sources. The retail/commercial areas are expected to be separated from existing residential areas by adequate buffers comprised of parks, existing commercial developments, and future light industrial developments. The separation distances should be adequate to minimize potential noise conflicts between the project's commercial tenants and existing noise sensitive developments.

Audible tire squeal noise from the circulation and parking areas of the project are possible. Tire squeal noise can usually be controlled though the use of a brushed or other coarse finish on the circulation driveways, and this type of treatment is recommended as a mitigation measure.

Mechanical equipment, such as air conditioning chillers or cooling towers, kitchen exhaust fans, and garage ventilation fans are the primary on-site noise sources expected to be located on the project site. This equipment, singly or together, has the potential of exceeding the allowable property line noise limits of the State DOH noise regulations (Reference 4). The State DOH noise limits which apply along the property boundaries of business districts are 60 dB and 50 dB during the daytime and nighttime periods, respectively. Typical noise levels of untreated mechanical equipment are significantly higher (by at least 10 dB) than the allowable DOH noise limits, such that sound attenuation treatment of the mechanical equipment will probably be required for compliance with DOH regulations. Compliance with the DOH noise limits should minimize risks of adverse noise impacts on neighboring properties and within the project area.

General Construction Noise. Audible construction noise will probably be unavoidable during the entire project construction period. The total time period for construction is unknown, but it is anticipated that the actual work will be moving from one location on the project site to another during that period. Actual length of exposure to construction noise at any receptor location will probably be less than the total construction period for the entire project. Typical levels of exterior noise from construction activity (excluding pile driving activity) are shown in Figure 4. The impulsive noise levels of impact pile drivers are approximately 15 dB higher than the levels shown in Figure 4, while the intermittent noise levels of vibratory pile drivers are at the upper end of the noise level ranges depicted in the figure. Typical levels of construction noise in-



CONSTRUCTION NOISE LEVELS VS. DISTANCE

FIGURE 4

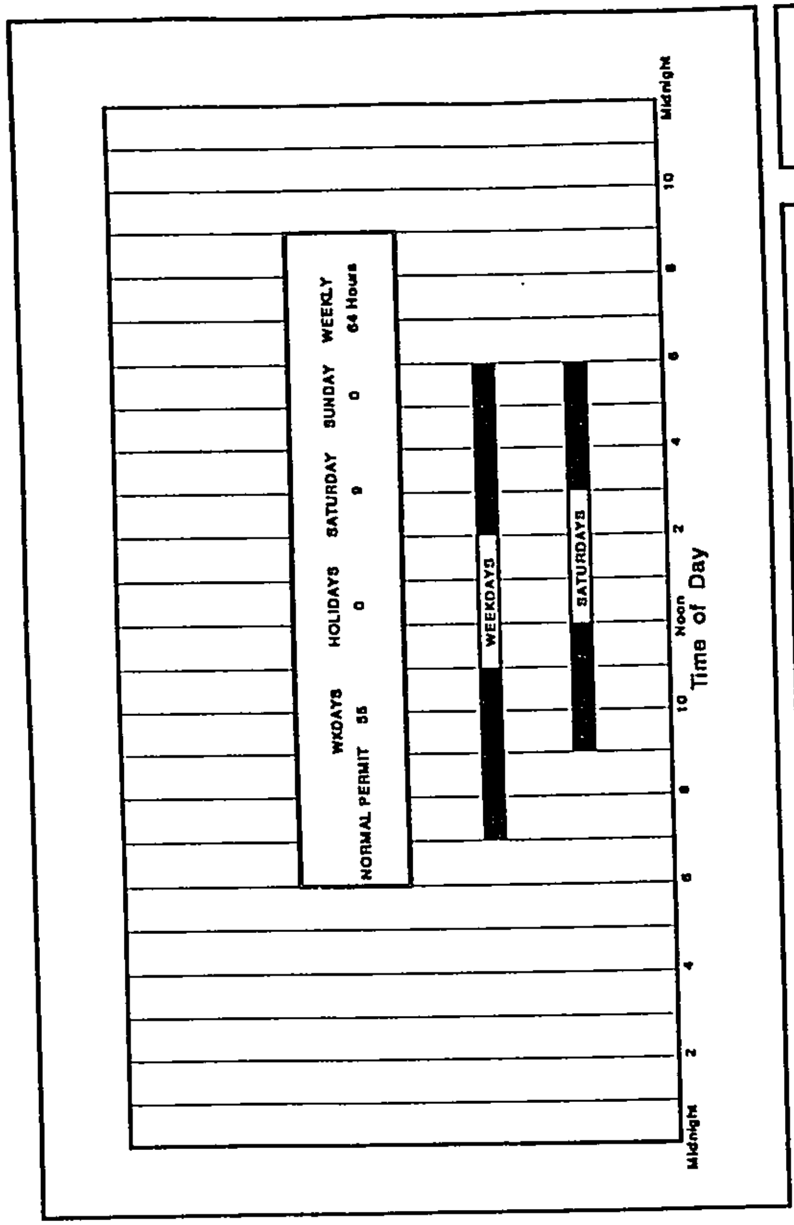
side naturally ventilated and air conditioned structures are approximately 10 and 20 dB less, respectively, than the *levels shown in Figure 4. The existing residential and com*mercial buildings across Waipahu Street are predicted to experience the highest noise levels during construction activities due to their proximity to the project site. Adverse impacts from construction noise are not expected to be in the "public health and welfare" category due to the temporary nature of the work, the business/commercial character of most of the adjacent properties, and due to the administrative controls available for regulation of construction noise. Instead, these impacts will probably be limited to the temporary degradation of the quality of the acoustic environment in the immediate vicinity of the project site.

Mitigation of construction noise to inaudible levels will not be practical in all cases due to the intensity of construction noise sources (80 to 90+ dB at 50 FT distance), and due to the exterior nature of the work (grading and earth moving, trenching, concrete pouring, hammering, etc.). The use of properly muffled construction equipment should be required on the job site, and heavy equipment staging areas should be located away from existing residences.

The incorporation of State Department of Health construction noise limits and curfew times, which are applicable on the island of Oahu (Reference 4), is another noise mitigation measure which is normally applied to construction activities, primarily to minimize construction noise impacts on residences. Table 6 depicts the allowed hours of construction for normal construction noise which exceed the allowable State DOH limits at the project's property line. Noisy construction activities are not allowed on holidays, Sundays, during the early morning, and during the late evening periods under the DOH permit procedures.

TABLE 6

AVAILABLE WORK HOURS UNDER DOH PERMIT PROCEDURES FOR CONSTRUCTION NOISE



APPENDIX A. REFERENCES

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

(2) "Environmental Criteria and Standards, Noise Abatement and Control, 24 CFR, Part 51, Subpart B"; U.S. Department of Housing and Urban Development; April 1, 1995.

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

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

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

(6) "Traffic Impact Analysis Report – Oahu Sugar Company Property, Waipahu, Oahu" dated March 1996 and transmittals from Austin, Tsutsumi & Associates, Inc. dated November 22, 1996.

(7) April 8-9, 1996; 24-Hour Traffic Counts; Station 13-W, Waipahu Street at Waikele Stream Bridge; Hawaii State Department of Transportation.

APPENDIX B

EXCERPTS FROM EPA'S ACOUSTIC TERMINOLOGY GUIDE

__Descriptor Symbol Usage__

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

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

Although not included in the tables, it is also recommended that "Lpn" and "Lepn" be used as symbols for perceived noise levels and effective perceived noise levels, respectively.

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

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

__Descriptor Nomenclature__

With regard to energy averaging over time, the term "average" should be discouraged in favor of the term "equivalent". Hence, Leq, is designated the "equivalent sound level". For Ld, Ln, and Ldn, "equivalent" need not be stated since the concept of day, night, or day-night averaging is by definition understood. Therefore, the designations are "day sound level", "night sound level", and "day-night sound level", respectively.

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

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

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

__Noise Impact__

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

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

APPENDIX B (CONTINUED)

TABLE I

A-WEIGHTED RECOMMENDED DESCRIPTOR LIST

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

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

SOURCE: EPA ACOUSTIC TERMINOLOGY GUIDE, BNA 8-14-78, NOISE REGULATION REPORTER.

APPENDIX B (CONTINUED)

TABLE II

RECOMMENDED DESCRIPTOR LIST

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

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

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

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

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

Appendix I-1

Phase I Environmental Site Assessment Report

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**Phase I Environmental Site Assessment
of the
Former Oahu Sugar Mill
(TMK: [1]9-4-161: Parcel 4)
Located on
Waipahu Street
Waipahu, Oahu, Hawaii
for
YMCA of Honolulu
Honolulu, Oahu, Hawaii**

Clayton Project No. 85-00124.00

February 28, 2000

Y 001368

CONTENTS

Y 001369

CONTENTS

EXECUTIVE SUMMARY

Mr. Glenn Tsugawa of the YMCA of Honolulu retained Clayton Environmental Consultants, a division of Clayton Group Services, Inc. (Clayton), to conduct a Phase I Environmental Site Assessment of the Former Oahu Sugar Mill located on Waipahu Street, Waipahu, Oahu, Hawaii, the subject property. The objective of the assessment was to provide an independent, professional opinion regarding recognized environmental conditions, as defined by the American Society for Testing Materials (ASTM), associated with the subject property.

This assessment was performed in accordance with Clayton's January 25, 2000, proposal number 99-HI-6237, and the terms and conditions set forth therein, and ASTM E1527-97, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. Any exceptions to, additions to, or deletions from the ASTM practice are described in the report. Details of the work performed, sources of information, and findings are presented in the report.

The subject property is an irregular shaped parcel that encompasses 90,594 square feet of land area and is improved with three former Oahu Sugar Company sugar mill structures, including the Smoke Stack, Generator Building, and Laboratory Building, as well as an adjoining asphalt-paved parking lot to the east. These structures are the only remaining improvements from the former sugar mill complex. They are currently vacant and used only as storage space by the YMCA.

This assessment has revealed the following evidence of recognized environmental conditions in connection with the subject property:

- A leaking underground storage tank (LUST) site that included a 10,000-gallon diesel UST is located approximately 600 feet west/northwest of the subject property near a former auto service area. According to Clayton's escort, Mr. John Hiiam, Brewer Environmental Services oversaw the removal of the UST in 1995 and the installation of a "pump and treat" remediation system for the impacted groundwater. Mr. Hiiam also stated that Brewer currently conducts quarterly groundwater monitoring and only very low levels of contamination remain in the groundwater. However, this LUST site has not received a "no further action" status from the Department of Health (DOH).

  Clayton recommends a review of the DOH case file for this LUST site to assess its potential to impact the subject property.

- A registered UST site at the subject property includes one 5,000-gallon diesel UST listed under the name "Waipahu Mill Boiler Area." This UST was formerly located along the fence line just southeast of the Laboratory Building and was removed by Brewer Environmental Services in the mid-1980s. Although no leaks were reported for this site and it is not included on the DOH LUST list, a review of the UST closure report for technical content would be necessary to assess its potential to impact the subject property.

- A large, concrete-lined pit that appeared as a sump, approximately 5-feet by 4-feet wide and 7 feet deep, was observed on the north side of the Laboratory Building near the west end. This sump extended partially underneath the building and contained approximately three feet of liquid that appeared as water. The purpose of this sump was not apparent and no information was available regarding the past use of this sump.

  Clayton recommends that this sump be cleaned out and further assessed for potential contamination in the underlying soil.

- A significant amount of ash was observed inside the base of the Smoke Stack on the subject property. According to Mr. Hiiam, this area was used only to burn bagasse (sugar cane waste). Mr. Hiiam stated that the ash was formerly tested by Edward K. Noda & Associates and was determined to be non-hazardous, but there was no test documentation available. Clayton recommends that the test data be obtained and reviewed for technical content.

- During the onsite inspection, Clayton observed two large floor-mounted electrical switch gear boxes labeled "PCB-Containing" in the northeast portion of the middle level of the Generator Building. Clayton also observed two medium-sized and five small suspect PCB-containing transformers located in an underground access tunnel adjacent to the east side of the Generator Building. In addition, one medium-sized suspect PCB-containing transformer was observed in the storage shed attached to the southwest side of the Laboratory Building. All of the suspect PCB transformers appeared old and abandoned.

  Clayton recommends that all of the switch vault boxes and suspect PCB transformers be removed from the subject property and disposed of properly following state and federal regulatory requirements.

- Suspect PCB-containing electrical capacitors may exist on electrical equipment observed at the subject property, such as abandoned pumps and air compressors. Also, fluorescent light fixtures with potential PCB-containing ballasts were observed throughout the two buildings on the subject property during the site inspection. The capacitors and fluorescent light ballasts must be handled and disposed of according to state and federal regulations prior to any renovation or demolition activities that may disturb these units.

- Three 100-pound cylinders labeled "Chlorine Gas" were stored on a wooden pallet in the field directly south of the Laboratory Building. Clayton recommends that these cylinders be properly removed and disposed of according to applicable state and federal safety regulations.

- A large amount of waste in the form of abandoned equipment, construction material debris, and general refuse (e.g., paper, household trash, etc.) was observed throughout both of the buildings on the subject property. Clayton recommends that these solid waste items be removed in order to further assess the interiors of the buildings.

The following environmental issues were also revealed, although not deemed to be recognized conditions as defined by ASTM:

- Based on the sampling and laboratory analysis of suspect asbestos-containing materials (ACM) at the subject property, materials confirmed as ACM included: floor tiles with mastic and insulation/gasket materials on autoclaves in the Laboratory Building; thermal insulation debris in the Generator Building; and white paint/plaster coating on the Smoke Stack. In addition, Clayton observed presumed ACM (PACM) in the form of cementitious fixtures inside transformer switch gear boxes in the Generator Building. Clayton recommends that these ACM and PACM be removed by proper asbestos abatement methods prior to demolition or renovation projects that may disturb the ACM.

- Paint was observed in poor condition (extensive peeling and delamination) on the three structures at the subject property (Generator Building, Laboratory Building, and Smoke Stack). Due to the age of these structures and the poor condition of the paint, lead-based paint could be an issue at this site. Sampling should be conducted to determine the presence or absence of lead-based paint prior to the disturbance of the painted surfaces.

1.0 INTRODUCTION

Mr. Glenn Tsugawa of YMCA of Honolulu retained Clayton Environmental Consultants, a division of Clayton Group Services, Inc. (Clayton), to conduct a Phase I Environmental Site Assessment of the Former Oahu Sugar Mill located on Waipahu Street, Waipahu, Oahu, Hawaii, hereafter referred to as *the subject property*.

1.1 PURPOSE

The objective of the assessment was to provide an independent, professional opinion regarding recognized environmental conditions, as described in Clayton's proposal and defined by the American Society for Testing Materials (ASTM), associated with the subject property. The term *recognized environmental conditions* is defined as the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.

1.2 METHODOLOGY AND EXCEPTIONS

This assessment was performed in accordance with Clayton's January 25, 2000, proposal number 99-HI-6237, and the terms and conditions set forth therein, and with the scope and limitations of ASTM E-1527-97, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.

The assessment included the following components:

- A walkthrough of the subject property.
- A review of pertinent records for evidence of historical and present use of the subject and adjoining properties.
- Interviews with current owners, occupants, and local government officials.
- Evaluation of information gathered and development of this report.

Although not considered an ASTM component, this assessment included a visual inspection of the subject property to identify suspect asbestos-containing materials (ACM), as well as sampling and analysis of selected suspect ACM.

Mr. Timothy Swartz and Mr. Douglas Oringer, Environmental Consultants from Clayton's Honolulu Regional Office, conducted the site walkthrough portion of the

assessment on Wednesday, February 2, 2000. Clayton was accompanied by Mr. John Hiiam of Amfac/JMB Hawaii Inc. Photographs taken at the time of the assessment are included behind the Photographs Tab.

1.3 LIMITING CONDITIONS OF ASSESSMENT

Information for the assessment was obtained from sources listed in Appendix A. This information, to the extent it was relied on to form our opinion, is assumed to be correct and complete. Clayton is not responsible for the quality or content of information from these sources.

The information and opinions rendered in this report are exclusively for use by the YMCA of Honolulu. Clayton will not distribute or publish this report without their consent except as required by law or court order. The information and opinions expressed in this report are given in response to a limited assignment and should be considered and implemented only in light of that assignment. The services provided by Clayton in completing this project were consistent with normal standards of the profession. No other warranty, expressed or implied, is made.

2.0 SUBJECT PROPERTY DESCRIPTION

2.1 LOCATION AND LEGAL DESCRIPTION

The subject property is located on Waipahu Street, Waipahu, Oahu, Hawaii, in an industrial and residential setting (Figures 1 and 2, Figures Tab). The subject property is described as that land designated as tax map key number (TMK) (1) 9-4-161: Parcel 4, located approximately 3/4-mile northeast of Pearl Harbor's West Loch and approximately 1,300 feet northeast of Waikele Stream. The zoning designation for the subject property is "B-2, community business district."

According to the flood insurance rate map (FEMA/FIRM Map No. 150001-0110 D, Revised Date: September 30, 1995), the subject property lies within Flood Zone X, an area determined to be outside the 500-year flood plain, and Flood Zone D, an area in which flood hazards are undetermined.

No records of environmental liens against the subject property were found in the property records or Vista Database Report reviewed by Clayton.

2.2 CURRENT USE OF SUBJECT PROPERTY

The subject property is an irregular-shaped parcel that encompasses 90,594 square feet of land area and is improved with three former Oahu Sugar Company sugar mill structures, including the Smoke Stack, Generator Building, and Laboratory Building, as well as an adjoining asphalt-paved parking lot to the east. These structures are the only remaining improvements from the former sugar mill complex. They are currently vacant and used only as storage space by the YMCA.

The Smoke Stack is a tall concrete structure (approximately 220 feet high) which was reportedly used to burn sugar cane waste (bagasse) when the sugar mill was in operation. The Generator Building is a three-level building constructed of concrete and hard plaster, with the two lower levels existing below the ground surface. This structure formerly housed steam-driven electrical generators that powered the sugar mill, but the generators have been removed from the building. The Laboratory Building is a single-story wooden structure with a large laboratory area, five offices, and a storage shed attached to the southwest corner of the building. During Clayton's onsite inspection, both the Generator Building and Laboratory Building contained large amounts of abandoned equipment and general debris, which made it difficult to perform a thorough inspection of the building interiors.

2.3 CURRENT USES OF NEARBY/ADJOINING PROPERTIES

The area surrounding the subject property consists of commercial and residential properties. Adjoining properties were observed (from the subject property or from public access areas) for signs of recognized environmental conditions and their potential to pose an environmental concern to the subject property (Figure 2, Figures Tab). The uses and features of adjoining properties are described below.

North: Vacant grassy field with four deep well pumps, and Kupehe Lane.

South: Waipahu Street, commercial businesses, City of Refuge Christian Church, and Waipahu Depot Road.

East: YMCA Leeward Branch, asphalt-paved parking lots, Waipahu Mill Health Clinic, and a commercial office building.

West: Vacant grassy field (former Sugar Mill complex).

None of the current businesses on the adjoining properties appear to have conducted activities of potential environmental risk to the subject property.

2.4 PHYSICAL SETTING

2.4.1 Physiographic Area

According to the U.S. Geological Survey, Waipahu, 7.5-minute topographic quadrangle map, the subject property is relatively flat, at an elevation of approximately 60 feet above mean sea level (msl). The topographic gradient of the region slopes down gradually from Oahu's central plain to the north, to the West Loch of Pearl Harbor to the south.

2.4.2 Soils/Geology

The U.S. Department of Agriculture Soil Conservation Service classifies the soil within the area of the subject property as Waipahu Series silty clay, with 6 to 12 percent slopes (mapping unit *WzC*). This series consists of well-drained soils on marine terraces. These

soils developed from basic igneous rock. They are nearly level to moderately sloping, and are geographically associated with Hanalei, Honuliuli, and Waialua soils.

In a representative profile, the surface layer is dark grayish-brown silty clay approximately 12 inches thick. The subsoil, approximately 58 inches thick, is dark-brown silty clay and is prismatic in structure. It is very sticky and very plastic in the lower part, and the substratum is clayey alluvium. The soil is slightly acid in the surface layer and subsoil. Permeability is moderately slow, runoff is medium, and the erosion hazard is moderate for this soil type.

2.4.3 Groundwater

Clayton reviewed the Aquifer Identification and Classification Technical Report No. 179, published by the Water Resources Research Center at the University of Hawaii, for information on groundwater conditions below the subject property. The report describes the aquifer below the subject property as part of the Waipahu aquifer system of the Pearl Harbor sector.

The aquifer is an unconfined basal aquifer of the flank type, occurring in horizontally extensive lavas. Its status is described as an irreplaceable fresh drinking water aquifer that is currently in use. This aquifer has a high vulnerability to contamination.

3.0 HISTORICAL REVIEW

3.1 AERIAL PHOTOGRAPHS

Clayton reviewed aerial photographs at R.M. Towill Corporation to further assess past land use at and adjacent to the subject property. Aerial photographs from the years 1950 to 1995 were available for review.

Aerial Photography Data Reviewed

Date of Photograph	Flight Number
12-21-50	543-2
10-3-52	916-5
8-5-71	5582-8
8-23-72	5780-5
6-24-81	8088-2
9-21-82	8186-3
8-10-85	8383-9
5-15-91	8750-56
12-23-95	9012-63

All of the aerial photographs appeared similar, showing the current structures on the subject property and all of the west adjacent structures that comprised the entire Oahu Sugar Mill complex. Buildings on the east adjacent area appeared the same as those observed during Clayton's site visit, and various commercial-type buildings appeared to the south across Waipahu Street. Outlying areas north and west of the sugar mill complex underwent various changes over the years, but primarily appeared as vacant land and/or residential properties.

3.2 FIRE INSURANCE MAPS

Fire insurance maps typically depict either the locations of manufacturing and industrial facilities within the city limits or potential fire hazards existing within the individual building structures. In many cases, areas of environmental concern, such as location of USTs can be found by reviewing fire insurance maps. Clayton reviewed Sanborn Fire Insurance Maps of the subject property at Hamilton Library, located at the University of Hawaii, Manoa Campus. Map coverage of the subject site and immediate surrounding area was available for the following years: 1953, 1981, 1987, 1990, and 1991.

In the 1953 Sanborn Map, the subject property appeared as the southeast portion of the Oahu Sugar Mill complex, with a chimney stack located between two adjacent structures forming an L-shape, including one labeled "Lab" and the other labeled "Power Plant." An area labeled "Transfer Stand" was indicated along the east side of the Power Plant. The Power Plant was shown abutting the wall of a large Mill building to the west labeled "Pulp Grinding." Also, two residential dwellings were indicated on the southeast portion of the subject property, near the corner of Waipahu and Makaaloha Streets. Makaaloha Street was shown running through the center of the subject property, from north to south, with a vacant area to the east

Waipahu Street was shown forming the southern property line and a vacant yard appeared as the north adjacent area, while the remaining Sugar Mill complex and its associated structures appeared on the west and northwest adjacent areas. The eastern surrounding area appeared commercially developed with a store and two office structures. A clubhouse structure with tennis courts appeared to the north/northeast beyond the Mill yard. The remaining areas surrounding the subject property appeared as residential neighborhoods with small commercial businesses.

The 1981 and 1987 maps were similar to the 1953 map. However, a small office structure appeared to the north of the Lab structure, between the Power Plant and Makaaloha Street. Also, a boiler system with an associated control room was connected by a duct to the south side of the chimney stack, adjoining the southeast wall of the Pulp Grinding building. In addition, only the smaller of the two residential dwellings appeared on the southeast portion of the subject property, and four "Deep Well Pumps" were shown in the north adjacent Mill yard area, feeding the Power Plant operations. Furthermore, the clubhouse to the northeast was removed and the associated tennis court area was labeled "Parking."

The 1990 and 1991 maps appeared unchanged from the 1981 and 1987 maps except for a Health Center complex that appeared in place of the former store structures to the east of the subject property.

Our review of the Sanborn fire insurance maps indicate several facilities on or adjacent to the subject property that constitute potential recognized environmental concerns, including the Power Plant, boiler systems, laboratory, welding and machine shop operations.

3.3 PRIOR OWNERSHIP

Readily available records at the City and County of Honolulu Real Property Tax Office were reviewed to assess past ownership and use of the subject property. According to the tax records, the subject property (TMK: [1]9-4-161: Parcel 4) is currently owned by the Oahu Sugar Company, Ltd. and was derived from various adjacent parcels.

A summary of the past ownership, as well as past lease and sublease records for the subject property, is presented in the "Tax Assessment Records" table included in Appendix D.

4.0 <u>STANDARD ENVIRONMENTAL RECORD SOURCES, FEDERAL, STATE, AND LOCAL</u>

Available government database information prepared by Vista Information Solutions (Vista) was reviewed to evaluate both the subject property and any listed sites within ASTM-recommended search distances. Federal, state and local databases reviewed are included in Appendix B.

The subject property was identified in the databases reviewed, which indicated two underground storage tanks (UST) sites and two leaking UST (LUST) sites located at the Oahu Sugar Company property (94-833 Makaaloha Street). However, no environmental cleanup liens appear to be on record against the subject property, based on the review of information available from the Vista report. Available information on the UST/LUST sites located on or near the subject property is included as follows:

- The Waipahu Outside Storage facility located at 94-833 Makaaloha Street is an UST site with two 12,500-gallon diesel USTs listed as "out of service." Based on Clayton's interview with Mr. Elmer Nii, former manager at the sugar mill, this UST site was located by the truck dispatch area located approximately 500 feet northwest of the subject property. Mr. Nii stated that these USTs were removed in the mid-1980s. The DOH Facility Identification (ID) number for this site is 9-200945.

- The Waipahu Mill Boiler Area located at 94-833 Makaaloha Street is an UST site with one 5,000-gallon diesel UST listed as "out of service." According to Mr. Nii, this UST was formerly located along the fence line just southeast of the Laboratory Building, and was removed by Brewer Environmental Services in the mid-1980s. The DOH Facility ID number for this site is 9-200942.

Although no leaks were reported for this site and it is not included on the DOH LUST list, a review of the UST closure report for technical content would be necessary to assess its potential to impact the subject property.

- The Waipahu Mechanical Equipment Shop located at 94-833 Makaloha Street is a LUST site, and its status is listed as "Confirmed Release" with a leak date of December 12, 1991. The DOH Facility ID number for this site is 9-200943, and the Leak ID number is 920025.

  During previous environmental work conducted in the vicinity of the subject property, Clayton performed a review of the case file for this LUST site at the DOH, Solid and Hazardous Waste Branch, UST Division. According to the case file, the LUST was a 250-gallon waste oil UST which was located approximately 300 feet west/northwest of the subject property and was removed in February of 1991. Although cleanup of this site is ongoing, Clayton believes that there is a low potential for this LUST site to impact the subject property because of its distance and the small size of the LUST.

- The Oahu Sugar Company, Ltd.–Ewa T facility in Waipahu was listed as an unmapped LUST site with a leak date of June 6, 1996 and a status of "LUST Cleanup Initiated." The DOH Facility ID number for this site is 9-200944, and the Leak ID number is 890014. No additional information was included for this LUST site.

  According to Mr. Hiiam, Clayton's escort, a 10,000-gallon diesel UST was removed from the site after the sugar mill was closed in 1995, and a fuel release was reported at that time. This LUST site is located approximately 600 feet west/northwest of the subject property near a former auto service area, and it most likely is the unmapped LUST site listed in the Vista report. According to Mr. Hiiam, Brewer Environmental Services oversaw the removal of the UST and the installation of a "pump and treat" remediation system for the impacted groundwater. Although this site has not received a "no further action" status from the DOH, Mr. Hiiam stated that Brewer conducts quarterly monitoring and only very low levels of contamination remain in the groundwater.

The Vista database report also identified a total of eight LUST sites, one CERCLIS site, three CORRACTS sites, and one NPL site located within the specified search distances from the subject property. A complete listing of these sites is included in Appendix B. None of these sites present an environmental concern to the subject property because they are either permitted with environmental regulatory agencies, require no further action, or based upon Clayton's review, are too distant or downgradient/crossgradient relative to the subject property.

Four additional sites were listed in the Vista report, but were not indicated on the area maps. Unmappable sites are facility sites that cannot be plotted with confidence, but can be located by zip code or city name. In general, a facility site cannot be geocoded due to inaccurate or missing information in the environmental database records provided by its applicable agency. Cross-referencing addresses and site names, as well as a visual

reconnaissance of surrounding properties, has been completed for the unmappable facility sites in the database report. Based on Clayton's research, the four unmappable sites were not found to be within the ASTM-recommended search distances.

5.0 SITE RECONNAISSANCE AND INTERVIEWS

5.1 GENERAL OBSERVATIONS

At the time of the site walkthrough, the two buildings and the Smoke Stack on the subject property appeared generally dilapidated, with a large amount of abandoned equipment and general debris observed inside the two buildings. A significant amount of ash was observed inside the base of the Smoke Stack which, according to Mr. Hiiam, was used only to burn bagasse (sugar cane waste). Mr. Hiiam stated that the ash was formerly tested by Edward K. Noda & Associates and was determined to be non-hazardous, but there was no test documentation available.

A total of three sumps were observed on the subject property during Clayton's site visit. One large, concrete-lined pit that appeared as a sump, approximately 5-feet by 4-feet wide and 7 feet deep, was observed on the north side of the Laboratory Building near the west end. This sump extended partially underneath the building and contained approximately three feet of liquid that appeared as water. The purpose of this sump was not apparent and no information was available regarding past use of this sump.

Two smaller sumps were observed on the lower levels of the Generator Building at the north and south ends, with a narrow floor drainage trench running between them. Both of these sumps were filled with liquid that appeared as murky water, and the depths of the sumps could not be determined. The apparent purpose of these two sumps was to collect water runoff and condensate from the steam lines formerly used to power the generators.

5.2 INTERVIEWS

Clayton interviewed a former manager of Oahu Sugar Company, Mr. Elmer Nii, for information on past operations at the sugar mill. According to Mr. Nii, all of the former USTs at the sugar mill were removed in the mid-1980s after the UST regulations became law. Mr. Nii said that Bunker C fuel oil was used primarily to power the boiler located just south of the Smoke Stack on the subject property. The fuel oil was stored in an aboveground tank located approximately 300 feet west of the subject property. At times, according to Mr. Nii, sugar cane waste (bagasse) was burned to heat the boiler. The resulting ash was collected at the base of the boiler and transported by conveyor belt to trucks, which transported the ash to a local plant nursery for use as a soil additive.

The 5,000-gallon diesel UST associated with the boiler was located along the fence line just southeast of the Laboratory Building, and was used to power the boiler ignitors. This UST was removed by Brewer Environmental Services in the mid-1980s. The UST closure report for this site was not available for review, by Clayton.

Mr. Nii also stated that he did not know the purpose of the concrete-lined pit located on the north side of the Laboratory Building (near the west end). He said that the pit existed prior to his employment at the sugar mill and was never used since that time. He also said that there were no pipelines leading into the pit and no other openings in the pit.

5.3 HAZARDOUS MATERIAL AND WASTE

The subject property was assessed for signs of the storage, use, or disposal of hazardous materials. The assessment consisted of noting evidence (e.g., drums, unusual vegetation patterns, and staining) indicating that hazardous materials are currently or were previously located on the subject property.

Potentially hazardous materials were observed at the subject property, including:

- Approximately 150, 1-gallon cans of paint and ten 5-gallon buckets of paint were stored in the northeast corner on the upper floor of the Generator Building.
- Three 100-pound cylinders labeled "Chlorine Gas" were stored on a wooden pallet in the field directly south of the Laboratory Building.
- Two large switch gear boxes labeled "PCB-Containing" and seven smaller suspect PCB-containing transformers were observed throughout the Generator Building. One medium-sized suspect PCB-containing transformer was also observed in the storage shed attached to the southwest side of the Laboratory Building. All of the suspect PCB transformers appeared old and abandoned.

Currently, hazardous waste is not generated onsite.

5.4 STORAGE TANKS

5.4.1 Underground Storage Tanks

Clayton did not observe evidence of potential USTs (such as fill ports, vent pipes and dispensing pumps) at the subject property during the onsite inspection. However, Clayton reviewed the list of USTs registered under the State of Hawaii Department of Health, Underground Storage Tank Program, and found evidence of four UST sites at the subject property, two of which were included on the DOH LUST list. Information on these UST/LUST sites is included in Section 4.0 (Standard Environmental Record Sources, Federal, State, and Local).

Lack of visible evidence, owner/operator knowledge, and registration of USTs does not preclude the possibility that additional USTs could be present on the site. USTs could have been used without the knowledge of the current owner/operator and prior to the regulatory agency requirement for registration. Also, visible evidence of USTs may not be present or may have been obscured from view during the onsite inspection.

5.4.2 Aboveground Storage Tanks

The subject property was inspected for evidence of aboveground storage tanks (ASTs). No readily visible evidence of ASTs was observed on the subject property during the site assessment.

5.5 INDICATIONS OF SOLID WASTE DISPOSAL

Currently, nonhazardous solid waste is not generated onsite. However, a large amount of waste in the form of abandoned equipment, construction material debris, and general refuse (e.g., paper, household trash, etc.) was observed throughout both of the buildings on the subject property. These solid waste items should be removed in order to further assess the interiors of the buildings.

Areas that are apparently filled or graded by non-natural causes, or filled by materials of unknown origin, suggesting trash or other solid waste disposal, or mounds or depressions suggesting trash or other solid waste disposal, were not observed.

5.6 INDICATIONS OF POLYCHLORINATED BIPHENYLS (PCB)

The subject property was inspected for the presence of liquid-cooled electrical units (transformers, light ballasts, and capacitors), and major sources of hydraulic fluid (elevators and lifts). Such units are notable because they may be potential PCB sources. PCB-containing units may subject the owner/operator to various regulatory requirements under the Toxic Substances Control Act (TSCA). The release of PCB fluids or their combustion products, in the event of fire, is a potential environmental liability and may require costly remediation.

Electrical Transformers

Clayton observed two large, floor-mounted electrical switch gear boxes labeled "PCB-Containing" in the northeast portion of the middle level of the Generator Building. Clayton also observed two medium-sized and five small suspect PCB-containing transformers located in an underground access tunnel adjacent to the east side of the Generator Building. In addition, one medium-sized suspect PCB-containing transformer was observed in the storage shed attached to the southwest side of the Laboratory Building. All of the suspect PCB transformers appeared old and abandoned.

Three pole-mounted transformers were observed on a utility pole located in the southeast portion of the subject property near Waipahu Street. Information regarding the PCB status of the transformers was requested from Hawaiian Electric Company, Inc. (HECO) by facsimile (fax) transmittal on February 7, 2000. Information such as date of installation and whether the transformer contains PCB oil was requested in the fax.

At the time of this writing, Clayton has not received a response from HECO regarding the pole-mounted transformers at the subject property. Clayton will forward this information to YMCA of Honolulu upon receipt from HECO.

Fluorescent Light Ballasts

Many fluorescent light ballasts manufactured prior to 1980 may contain PCBs. These light ballasts are considered small capacitors under TSCA. According to TSCA regulations (40 CFR 761.60), small capacitors may be disposed of as municipal waste by householders and infrequent disposers unless the disposer was once a manufacturer of *small capacitors. However, the disposal of large quantities* (greater than 25) of small capacitors by commercial and industrial activities poses a greater environmental risk. *USEPA encourages these types of disposers to establish a voluntary collection and* disposal program that would result in small capacitors going to an approved PCB landfill or *incinerator for disposal.*

Numerous fluorescent light fixtures (greater than 25) were observed in the two subject property buildings. Therefore, the ballasts associated with these fixtures should be disposed of as PCB waste.

Electrical Capacitors

Electrical capacitors may exist on abandoned equipment such as air compressors and generator equipment strewn throughout the Generator Building. In addition, a capacitor was observed on an electrical pump located in the storage shed attached to the southwest side of the Laboratory Building. All of the capacitors should be disposed of as PCB waste.

5.7 WELLS

Clayton observed evidence of four abandoned water supply wells located just north of the subject property. According to State of Hawaii Department of Land and Natural Resources Groundwater Index and Summary, a total of 17 water wells are located within ¼ mile.

Clayton did not observe evidence of other wells (supply, monitoring or dry wells) at the subject site.

6.0 NON-ASTM ISSUES

6.1 ASBESTOS-CONTAINING MATERIALS (ACM)

The subject property was inspected for the presence of suspect asbestos-containing materials (ACM). An asbestos assessment survey, including the sampling and laboratory analysis of suspect ACM, was conducted as part of the Phase I assessment. A total of thirteen (13) types of suspect ACM were identified in the three structures on the subject property, and one sample of each type of material was collected for asbestos analysis.

The samples were sent to EMSL Analytical, Inc., a National Voluntary Laboratory Accreditation Program (NVLAP) laboratory located in Milpitas, California. The samples

were analyzed for asbestos content utilizing Polarized Light Microscopy (PLM) analysis. The PLM analytical results are presented in the following table:

PLM Analytical Results

Structure	*Sample* Numbers	Material Type & Location	*% and Type of* Asbestos
Laboratory Building	3806	*Asphalt shingle roofing with* tarpaper/felt underlay, *located on rooftop.*	ND
	3807	*9-inch by 9-inch pink floor* tiles & mastic located in one office.	5% Chrysotile (floor tiles) 3% Chrysotile (mastic)
	3808	2-feet by 2-feet acoustical wall/ceiling tiles located in one office.	ND
	3809	12-inch by 12-inch "woodtone" floor tiles & mastic located in laboratory area and two offices.	ND
	3810	Thermal insulation on three small autoclaves located in laboratory area.	20% Amosite 10% Crocidlt. 10% Chrystl.
	3811	Cloth gasket on door of large autoclave, located in laboratory area.	40% Chrysotile
	3812	Cementitious lining of fume hoods located in laboratory area.	ND
Generator Building	3813	White pipe insulation on abandoned pipe section, located in shed attached to east side of building.	ND
	3815	Hard plaster walls located throughout building.	ND
	3816	Gypsum wall board with joint tape/compound, located in office at south end of building.	ND

Structure	Sample Numbers	Material Type & Location	% and Type of Asbestos
Generator Building (continued)	3817	Gaskets on joints of abandoned steam piping strewn throughout building.	ND
	3818	Thermal insulation debris located primarily in the southwest portion of the middle level.	20% Amosite 15% Crocidlt.
Smoke Stack	3814	White paint/plaster coating on exterior of smoke stack.	10% Chrysotile

ND: None Detected

Based on Clayton's asbestos assessment survey and PLM laboratory results, confirmed ACM at the subject property include the following:

- Approximately 150 square feet of 9-inch by 9-inch floor tiles and the underlying mastic located in one of the offices on the west side of the Laboratory Building. These materials were observed in good condition.
- Thermal insulation on three small autoclaves (approximately one cubic foot each) located in the southeast portion of the Laboratory Building. This material was observed in poor condition.
- Approximately 10 linear feet of cloth gasket on the door of a large autoclave, located in the southwest portion of the Laboratory Building. This material was observed in fair condition.
- Approximately 100 square feet of thermal insulation debris located in the southwest portion of the middle level of the Generator Building. The debris was observed in poor condition. Additional ACM debris may be located underneath abandoned equipment strewn throughout the Generator Building
- Approximately 10,000 square feet of white paint/plaster coating on the exterior of the smoke stack. This material was observed in poor condition.

In addition to the confirmed ACM, Clayton observed cementitious fixtures inside the switch gear boxes of the two large electrical transformers inside the Generator Building. Although these fixtures were not sampled, they are presumed ACM (PACM) and should be handled the same as confirmed ACM.

All of the ACM and PACM should be properly removed and disposed of prior to conducting renovation or demolition activities that may disturb these materials. However, because the asbestos-containing floor tiles with mastic in the Laboratory

Building were observed in good condition, they are considered non-friable (not easily crumbled under hand pressure). Therefore, if the Laboratory Building is completely demolished in the future, these non-friable ACM may remain in place during demolition activities.

6.2 LEAD-BASED PAINT (LBP)

Lead-based paint (LBP) was commonly used for corrosion protection in the 1960s, and in prime, intermediate, and finish coats well into the 1970s. Regulations specifically addressing LBP include 1995 Housing and Urban Development (HUD) guidelines and the Consumer Product Safety Act (1977). These regulations define LBP as containing 0.5% lead by weight (5,000 ppm), and 0.06% lead by weight (600 ppm), respectively, for housing and consumer products. There is no industrial definition. There are specific testing methods for sampling and analyzing lead in paint.

Paint was observed in poor condition (extensive peeling and delamination) on the three structures at the subject property (generator building, laboratory, and smoke stack). Due to the age of these structures and the poor condition of the paint, lead-based paint could be an issue at this site. Sampling should be conducted to determine the presence or absence of lead-based paint prior to the disturbance of the painted surfaces.

If paint samples are confirmed as LBP by laboratory analysis and the structures are to be repainted, renovated, or demolished, the loose LBP should be properly removed and disposed of by a licensed lead abatement contractor. In addition, a qualified industrial hygienist should be employed to oversee the LBP removal. The industrial hygienist will conduct air monitoring for lead exposure during abatement activities, as well as conducting wipe sampling and wastewater/soil sampling with lead analyses following abatement activities.

7.0 FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Clayton has performed a Phase I Environmental Assessment in conformance with the scope and limitations of ASTM Practice E-1527 of the former Oahu Sugar Mill located on Waipahu Street in Waipahu, Oahu, Hawaii, the subject property.

This assessment has revealed the following evidence of recognized environmental conditions in connection with the subject property:

- A leaking underground storage tank (LUST) site that included a 10,000-gallon diesel UST is located approximately 600 feet west/northwest of the subject property near a former auto service area. According to Clayton's escort, Mr. John Hiiam, Brewer Environmental Services oversaw the removal of the UST in 1995 and the installation of a "pump and treat" remediation system for the impacted groundwater. Mr. Hiiam also stated that Brewer currently conducts quarterly groundwater monitoring and only very low levels of contamination remain in the groundwater. However, this LUST site has not received a "no further action" status from the Department of Health (DOH).

Clayton recommends a review of the DOH case file for this site to assess its potential to impact the subject property.

- A registered UST site at the subject property includes one 5,000-gallon diesel UST listed under the name "Waipahu Mill Boiler Area." This UST was formerly located along the fence line just southeast of the Laboratory Building and was removed by Brewer Environmental Services in the mid-1980s. Although no leaks were reported for this site and it is not included on the DOH LUST list, a review of the UST closure report for technical content would be necessary to assess its potential to impact the subject property.

- A large, concrete-lined pit that appeared as a sump, approximately 5-feet by 4-feet wide and 7 feet deep, was observed on the north side of the Laboratory Building near the west end. This sump extended partially underneath the building and contained approximately three feet of liquid that appeared as water. The purpose of this sump was not apparent and no information was available regarding the past use of this sump.

  Clayton recommends that this sump be cleaned out and further assessed for potential contamination in the underlying soil.

- A significant amount of ash was observed inside the base of the Smoke Stack on the subject property. According to Mr. Hiiam, this area was used only to burn bagasse (sugar cane waste). Mr. Hiiam stated that the ash was formerly tested by Edward K. Noda & Associates and was determined to be non-hazardous, but there was no test documentation available. Clayton recommends that the test data be obtained and reviewed for technical content.

- During the onsite inspection, Clayton observed two large floor-mounted electrical switch gear boxes labeled "PCB-Containing" in the northeast portion of the middle level of the Generator Building. Clayton also observed two medium-sized and five small suspect PCB-containing transformers located in an underground access tunnel adjacent to the east side of the Generator Building. In addition, one medium-sized suspect PCB-containing transformer was observed in the storage shed attached to the southwest side of the Laboratory Building. All of the suspect PCB transformers appeared old and abandoned.

  Clayton recommends that all of the switch vault boxes and suspect PCB transformers be removed from the subject property and disposed of properly following state and federal regulatory requirements.

- Suspect PCB-containing electrical capacitors may exist on electrical equipment observed at the subject property, such as abandoned pumps and air compressors. Also, fluorescent light fixtures with potential PCB-containing ballasts were observed

throughout the two buildings on the subject property during the site inspection. The capacitors and fluorescent light ballasts must be handled and disposed of according to state and federal regulations prior to any renovation or demolition activities that may disturb these units.

- Three 100-pound cylinders labeled "Chlorine Gas" were stored on a wooden pallet in the field directly south of the Laboratory Building. Clayton recommends that these cylinders be properly removed and disposed of according to applicable state and federal safety regulations.

- A large amount of waste in the form of abandoned equipment, construction material debris, and general refuse (e.g., paper, household trash, etc.) was observed throughout both of the buildings on the subject property. Clayton recommends that these solid waste items be removed in order to further assess the interiors of the buildings.

The following environmental issues were also revealed, although not deemed to be recognized conditions as defined by ASTM:

- Based on the sampling and laboratory analysis of suspect asbestos-containing materials (ACM) at the subject property, materials confirmed as ACM included: floor tiles with mastic and insulation/gasket materials on autoclaves in the Laboratory Building; thermal insulation debris in the Generator Building; and white paint/plaster coating on the Smoke Stack. In addition, Clayton observed presumed ACM (PACM) in the form of cementitious fixtures inside transformer switch gear boxes in the Generator Building. Clayton recommends that these ACM and PACM be removed by proper asbestos abatement methods prior to demolition or renovation projects that may disturb the ACM.

- Paint was observed in poor condition (extensive peeling and delamination) on the three structures at the subject property (Generator Building, Laboratory Building, and Smoke Stack). Due to the age of these structures and the poor condition of the paint, lead-based paint could be an issue at this site. Sampling should be conducted to determine the presence or absence of lead-based paint prior to the disturbance of the painted surfaces.

Clayton

This report prepared by:

Tim Swartz
Environmental Consultant
Honolulu Regional Office

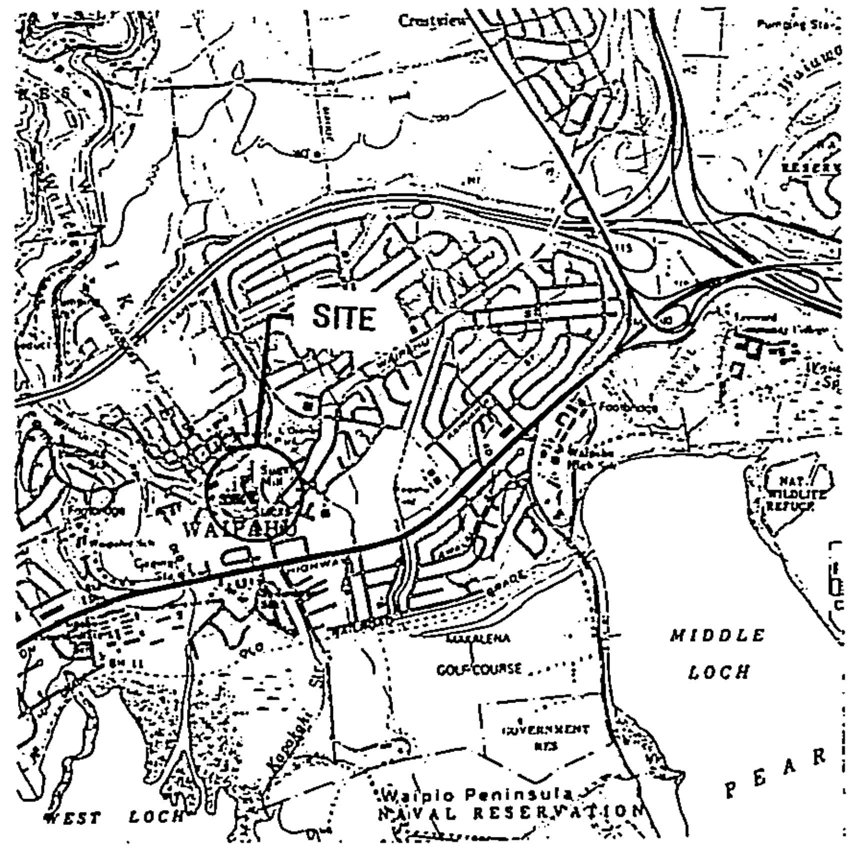
This report reviewed by:

Daniel P. Ford, R.G.
Director
Honolulu Regional Office

February 28,2000

Clayton

FIGURES



N

Scale 1:24 000

1/2 0 1 Mile

1000 0 1000 2000 3000 4000 5000 6000 7000 Feet

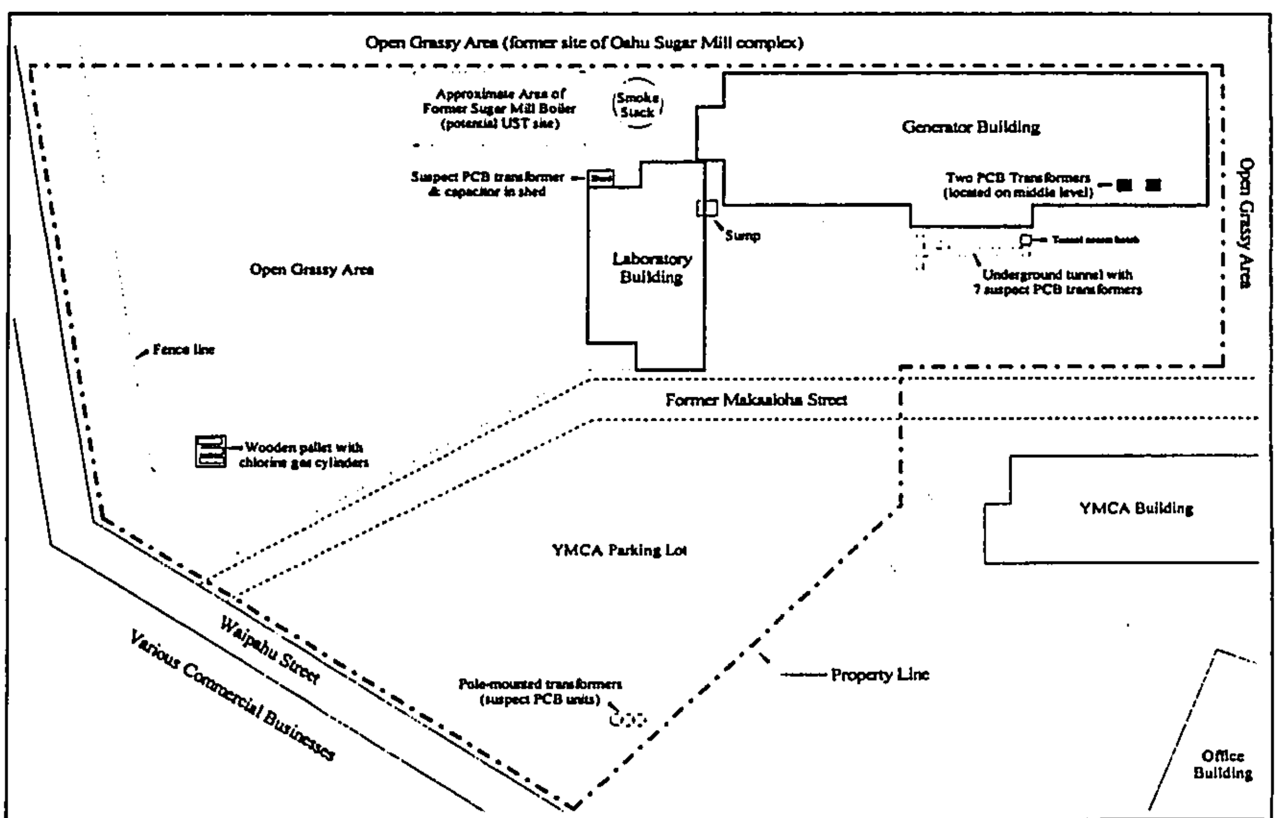
Basemap taken from U.S.G.S. 1983 Waipahu Quadrangle, Hawaii, 7.5 minute series (topographic). Topography from aerial photographs taken in 1953. Field checked in 1968. Revised from photographs taken in 1978. Limited field check in 1982.

Clayton GROUP SERVICES	85-00124.00	VICINITY MAP	FIGURE 1
	2/22/00	Former Oahu Sugar Mill Property (Lot 31) Waipahu Street, Waipahu, Oahu, Hawaii	
	TJS		
	DPF	YMCA of Honolulu	

Clayton

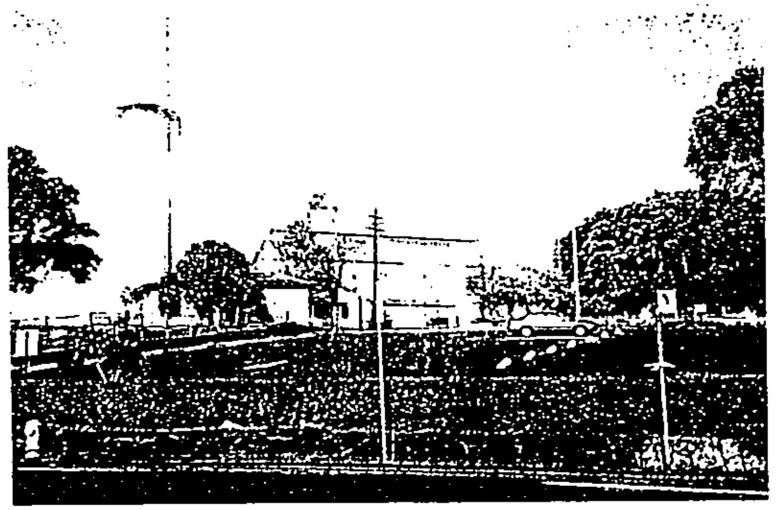
PHOTOGRAPHS

Y 001394

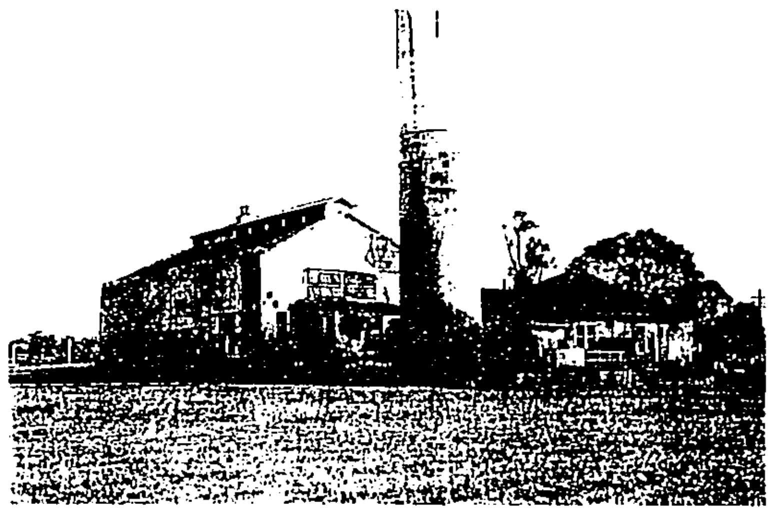


Clayton GROUP SERVICES	85-00124.00	SITE LAYOUT	FIGURE
	2/22/00	Former Oahu Sugar Mill Property (Lot 31) Waipahu Street, Waipahu, Oahu, Hawaii	2
	TJS		
	DPF	YMCA of Honolulu	

Y 001393

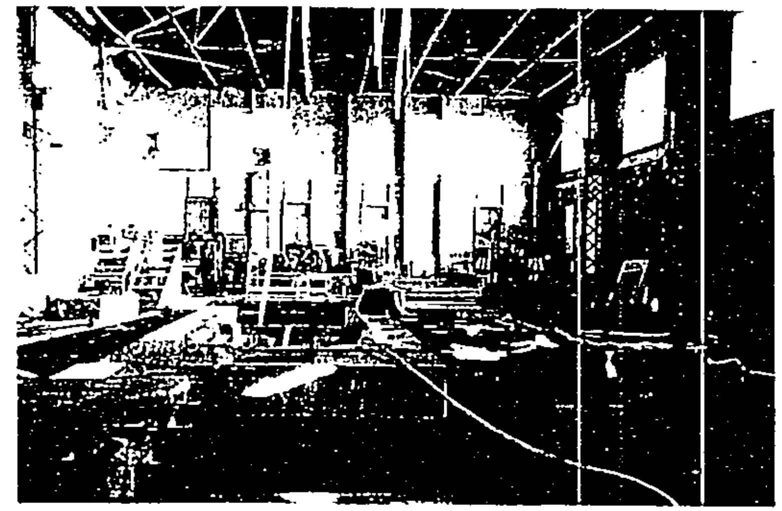


Clayton Project No.	Description	Overview of subject property (front view), looking west	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124 00	Client	YMCA of Honolulu	Feb 2, 2000

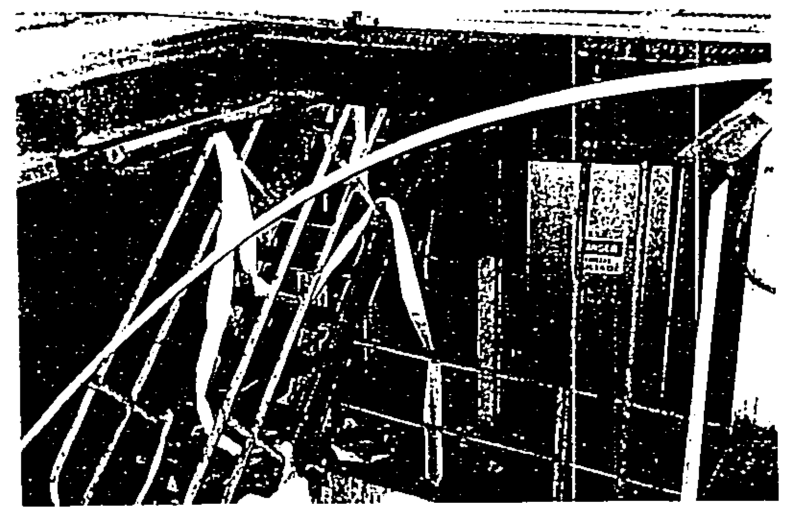


Clayton Project No.	Description	Overview of subject property (rear view), looking northeast	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000

Y 001395



Clayton Project No.	Description	Interior of Generator Building (ground floor), looking north	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000

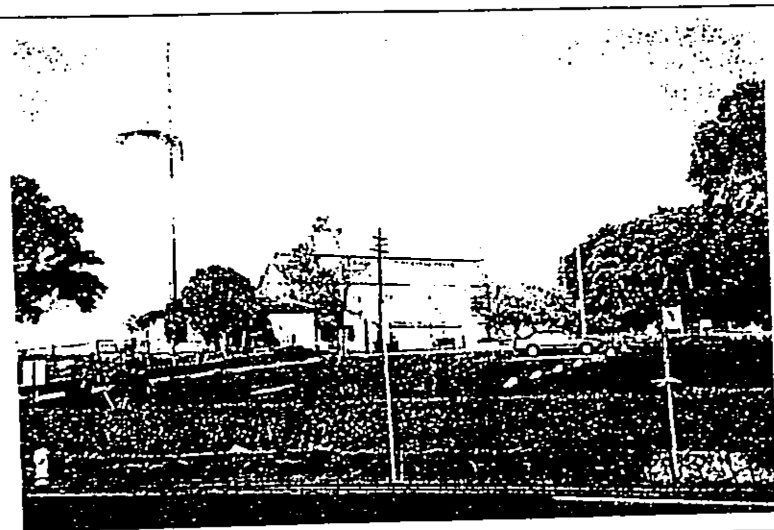


Clayton Project No.	Description	PCB-Containing switch gear boxes on lower level of Generator Building	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000

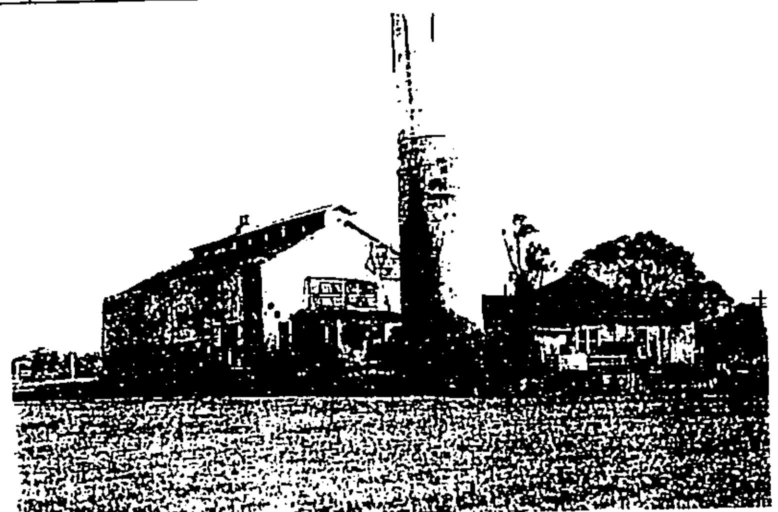
Y 001396

CORRECTION

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

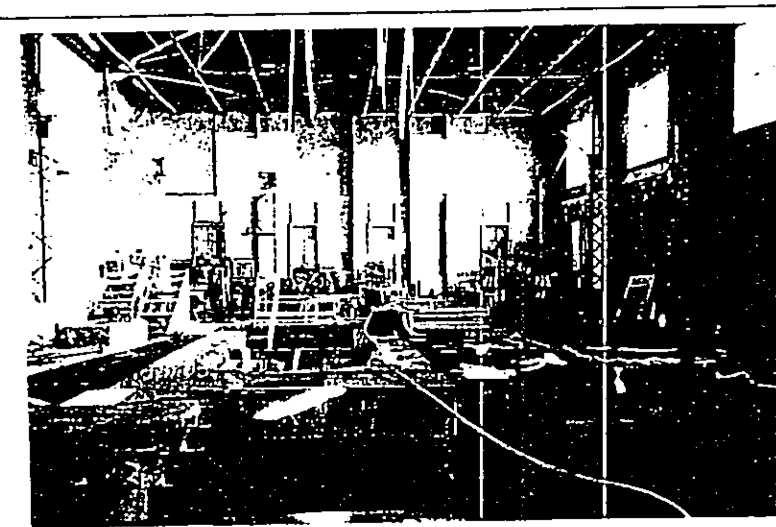


Clayton Project No.	Description	Overview of subject property (front view), looking west	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000

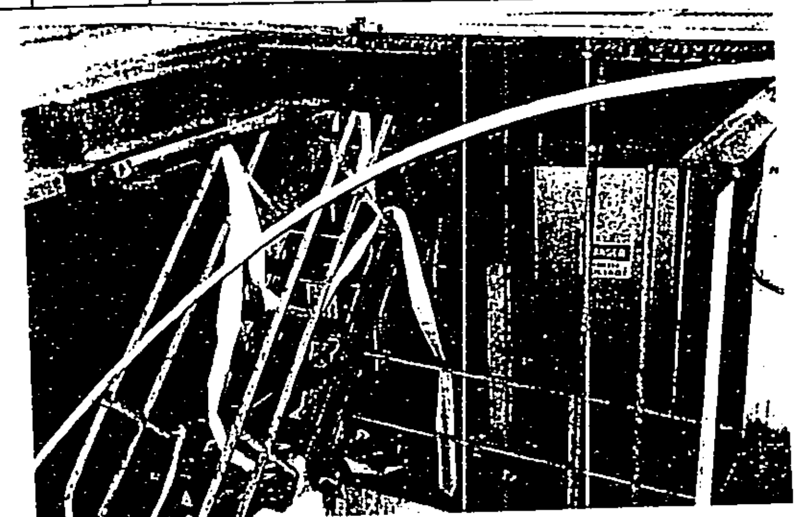


Clayton Project No.	Description	Overview of subject property (rear view), looking northeast	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000

Y 001395

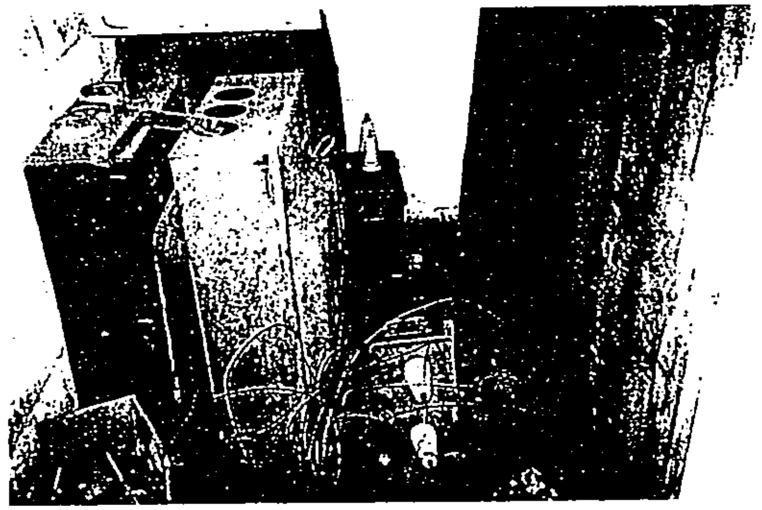


Clayton Project No.	Description	Interior of Generator Building (ground floor), looking north	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000



Clayton Project No.	Description	PCB-Containing switch gear boxes on lower level of Generator Building	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000

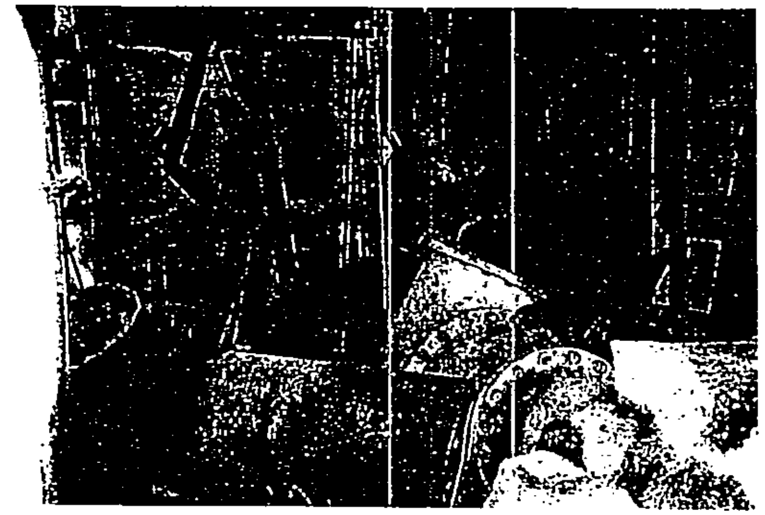
Y 001396



Clayton Project No.	Description	Suspect PCB transformers in tunnel on east side of Generator Building	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000

Clayton Project No.	Description	ACM debris in southwest portion of middle level in Generator Building	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000

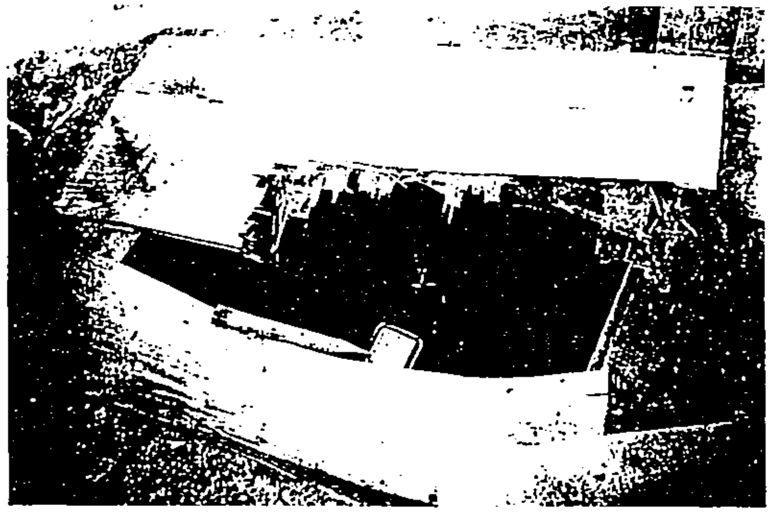
Y 001397



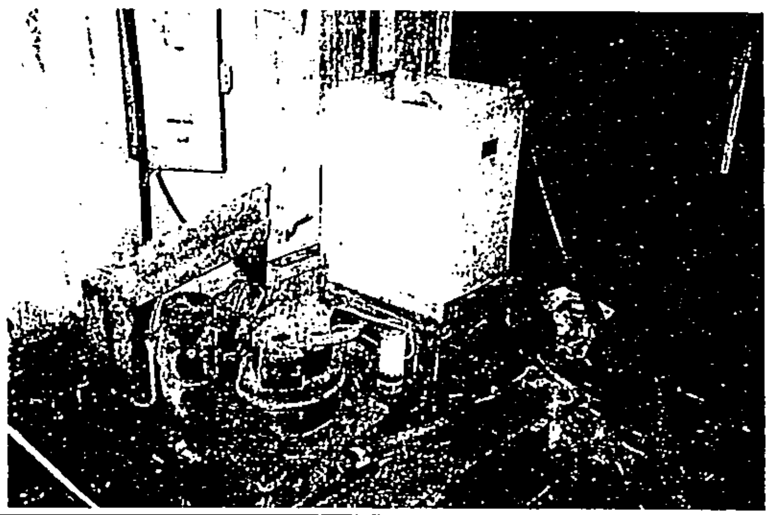
Clayton Project No.	Description	Old steam pipes & debris located on lower level of Generator Building	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000

Clayton Project No.	Description	One of two sumps located on lower level of Generator Bldg.	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000

Y 001398

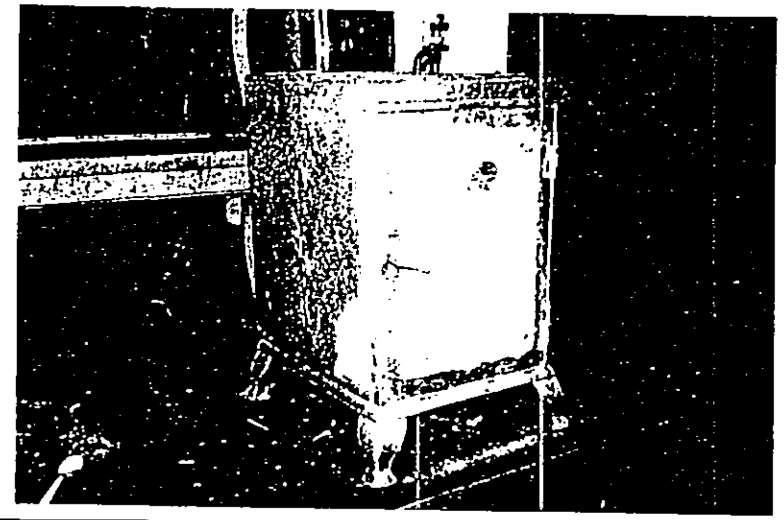


Clayton Project No.	Description	Sump located on north side of Laboratory Building, near the west end	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000



Clayton Project No.	Description	Suspect PCB transformer & capacitor in shed of Laboratory Building	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000

Y 001399



Clayton Project No.	Description	Autoclave with asbestos insulation, located in Laboratory Building	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000

Clayton Project No.	Description	Chlorine gas cylinders located in field south of Laboratory Building	
	Site Name	Former Oahu Sugar Mill Property (Lot 31), Waipahu, Oahu, Hawaii	Photo Date
85-00124.00	Client	YMCA of Honolulu	Feb. 2, 2000

Y 001400

APPENDIX A

LIST OF REFERENCES/SOURCES

Clayton

To evaluate the regulatory status and develop a historical database, documents were researched or personnel interviewed from the following sources:

- American Society For Testing and Materials. 1997. Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. Designation: E 1527-97. Annual Book of ASTM Standards. Philadelphia: ASTM.
- Mr. Don Fukuda, Hawaiian Electric Company, Environmental Department, Honolulu, Hawaii.
- City and County of Honolulu Real Property Assessment Division, Honolulu, Oahu, Hawaii.
- Foote, D.E. et al. 1972. Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. U.S. Department of Agriculture, Soil Conservation Service, in cooperation with the University of Hawaii Agricultural Experiment Station. Washington: GPO.
- Mink, J.F. and L.S. Lau. 1990. Aquifer Identification and Classification for Oahu: Groundwater Protection Strategy for Hawaii. Technical Report No. 179. Honolulu: Water Resources Research Center, University of Hawaii.
- R.M. Towill Corporation, Honolulu, Oahu, Hawaii.
- State of Hawaii, Department of Health, Underground Storage Tank Section, Honolulu, Oahu, Hawaii.
- U.S. Department of the Interior Geological Survey. 1983. 7.5 Minute Topographic Map Waipahu, Hawaii Quadrangle.
- U.S. Environmental Protection Agency. 1990. Rules for Controlling PCBs under the Toxic Substances Control Act. Code of Federal Regulations, Title 40, Part 761. Washington: GPO, December 14.
- VISTA Information Solutions, Inc. (VISTA), San Diego, California.
- State of Hawaii, Department of Land and Natural Resources (DLNR), Division of Water and Land Development, Honolulu, Hawaii.
- Clayton Environmental Consultants. 1999. Phase I Environmental Site Assessment of the Former Post Office Property Located at 94-929 Waipahu Street, Waipahu, Hawaii.

Clayton

APPENDIX B

REGULATORY DATABASE REPORT

SITE ASSESSMENT PLUS REPORT

PROPERTY INFORMATION	CLIENT INFORMATION
Project Name/Ref #: 85-00124.00 Former Waipahu Sugar Mill Property Waipahu Street Waipahu, HI 96797 Latitude/Longitude: (21.389300, 158.010702)	doug oringer CLAYTON ENV CONSULT-HONOLULU 970 N KALAHEO AVE STE C-316 KAILUA, HI 96734

Site Distribution Summary Agency / Database - Type of Records			within 1/8 mile	1/8 to 1/4 mile	1/4 to 1/2 mile	1/2 to 1 mile
A) Databases searched to 1 mile:						
US EPA	NPL	National Priority List	0	0	0	1
US EPA	CORRACTS	RCRA Corrective Actions	0	0	0	3
B) Databases searched to 1/2 mile:						
US EPA	CERCLIS / NFRAP	Sites currently or formerly under review by US EPA	0	0	0	-
US EPA	TSD	RCRA permitted treatment, storage, disposal facilities	0	0	0	-
STATE REG CO	LUST	Leaking Underground Storage Tanks	1	3	5	-
STATE/ REG/CO	SWLF	Permitted as solid waste landfills, incinerators, or transfer stations	0	0	0	-
USGS/STATE	WATER WELLS	Federal and State Drinking Water Sources	15	2	5	-
C) Databases searched to 1/4 mile:						
US EPA	RCRA Viol	RCRA violations/enforcement actions	0	0	-	-
US EPA	TRIS	Toxic Release Inventory database	0	0	-	-
STATE	UST/AST	Registered underground or aboveground storage tanks	4	6	-	-
D) Databases searched to 1/8 mile:						
US EPA	ERNS	Emergency Response Notification System of spills	0	-	-	-
US EPA	GNRTR	RCRA registered small or large generators of hazardous waste	1	-	-	-
STATE	SPILLS	State spills list	0	-	-	-

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Date of Report: January 28, 2000
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This report meets the ASTM standard E-1527 for standard federal and state government database research in a Phase I environmental site assessment. A (-) indicates a distance not searched because it exceeds these ASTM search parameters.

LIMITATION OF LIABILITY

Customer proceeds at its own risk in choosing to rely on VISTA services, in whole or in part, prior to proceeding with any transaction. VISTA cannot be an insurer of the accuracy of the information, errors occurring in conversion of data, or for customer's use of data. VISTA and its affiliated companies, officers, agents, employees and independent contractors cannot be held liable for accuracy, storage, delivery, loss or expense suffered by customer resulting directly or indirectly from any information provided by VISTA.

NOTES

SITE ASSESSMENT PLUS REPORT

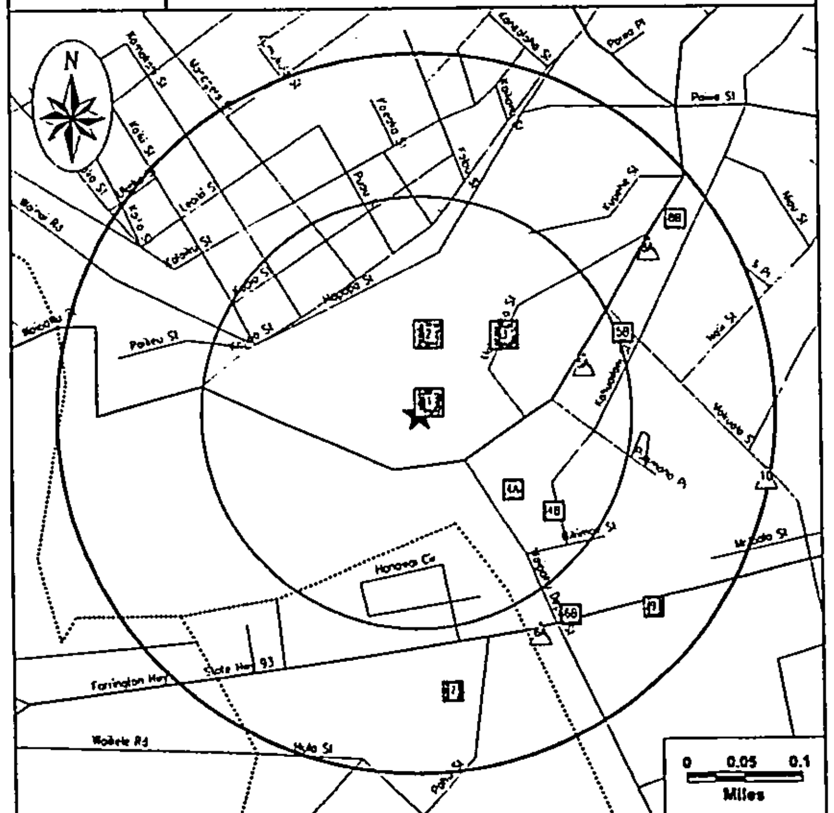
Map of Sites within One Mile

Subject Site	Category: Databases Searched to:	A 1 mi.	B 1/2 mi.	C 1/4 mi.	D 1/8 mi.
★	Single Sites	◆	■	△	○
	Multiple Sites	◆	■	△	○
Highways and Major Roads Roads Railroads Rivers or Water Bodies Utilities		NPL, SPL, CORRACTS (TSD)	CERCLIS\ NFRAP, TSD, LUST, SWLF, SCL	RCRA VIOL, TRIS, UST	ERNS, GENERATORS

If additional databases are listed in the cover page of the report they are also displayed on this map. The map symbol used corresponds to the database category letter A,B,C,D.

SITE ASSESSMENT PLUS REPORT

Map of Sites within Quarter Mile



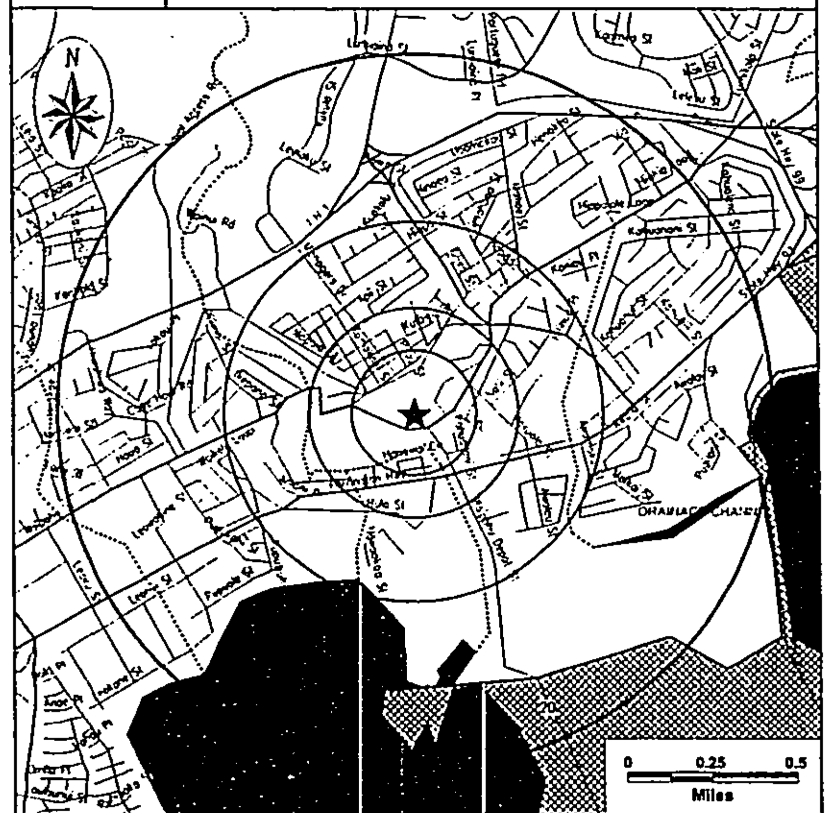
Subject Site	Category: Databases Searched to:	A 1 mi.	B 1/2 mi.	C 1/4 mi.	D 1/8 mi.
★	Single Sites	◆	■	△	○
	Multiple Sites	◆	■	△	○
Highways and Major Roads Roads Railroads Rivers or Water Bodies Utilities		NPL, SPL, CORRACTS (TSD)	CERCLIS\ NFRAP, TSD, LUST, SWLF, SCL	RCRA VIOL, TRIS, UST	ERNS, GENERATORS

If additional databases are listed in the cover page of the report they are also displayed on this map. The map symbol used corresponds to the database category letter A,B,C,D.

Y 001407

SITE ASSESSMENT PLUS REPORT

Sites Represented as Polygons



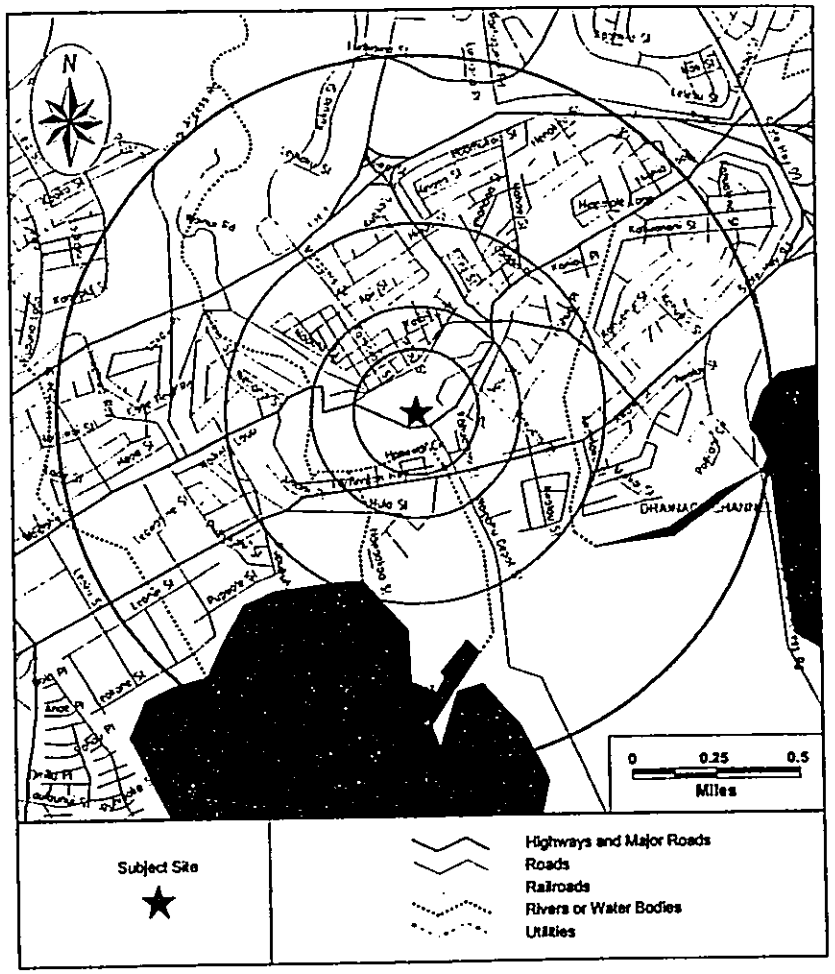
These boundaries are approximated from agency records or other sources such as published maps. They may represent property boundaries, impact zones, or study areas. For more information contact the agency referenced by source number in the site listing.

★ Subject Site	Highways and Major Roads Roads Railroads Rivers or Water Bodies Utilities

Y 001408

SITE ASSESSMENT PLUS REPORT

Street Map



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SITE ASSESSMENT PLUS REPORT

SITE INVENTORY

MAP ID	PROPERTY AND THE ADJACENT AREA (within 1/8 mile)	VISTA ID DISTANCE DIRECTION	A: NPL	A: CORRACTS	B: CERCLIS/NFRAP	B: TSD	B: LUST	B: SWLF	B: WATER WELLS	C: RCRA VIOL	C: TRIS	C: UST/AST	D: ERNS	D: GNRTR	D: SPILLS
1	USGS WATER WELL ID #212322158003807 , HI	8959277 0.00 MI NA							X						
1	USGS WATER WELL ID #212322158003800 , HI	8959270 0.00 MI NA							X						
1	USGS WATER WELL ID #212322158003801 , HI	8959271 0.00 MI NA							X						
1	USGS WATER WELL ID #212322158003802 , HI	8959272 0.00 MI NA							X						
1	USGS WATER WELL ID #212322158003803 , HI	8959273 0.00 MI NA							X						
1	USGS WATER WELL ID #212322158003804 , HI	8959274 0.00 MI NA							X						
1	USGS WATER WELL ID #212322158003806 , HI	8959276 0.00 MI NA							X						
1	USGS WATER WELL ID #212322158003805 , HI	8959275 0.00 MI NA							X						
1	USGS WATER WELL ID #212322158003808 , HI	8959278 0.00 MI NA							X						
2	USGS WATER WELL ID #212325158003802 , HI	8959283 <0.01 MI N							X						
2	USGS WATER WELL ID #212325158003801 , HI	8959282 <0.01 MI N							X						
2	USGS WATER WELL ID #212325158003803 , HI	8959284 <0.01 MI N							X						
2	USGS WATER WELL ID #212325158003809 , HI	8959285 <0.01 MI N							X						
3	WAIPAHU OUTSIDE STORAGE 94-833 MAKAALOHA ST WAIPAHU, HI 96797	4050228 0.04 MI NE										X			
3	WAIPAHU MECHANICAL EQUIPMENT SHOP 94-833 MAKAALOHA ST WAIPAHU, HI 96797	3130488 0.04 MI NE					X					X			
3	OAHU SUGAR CO LTD 94 833 MAKAALOHA ST WAIPAHU, HI 96797	304767 0.04 MI NE												X	

X = search criteria; • = tag-along (beyond search criteria).
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Date of Report: January 28, 2000
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MAP ID	PROPERTY AND THE ADJACENT AREA (within 1/8 mile)	VISTA ID DISTANCE DIRECTION	A		B					C			D		
			NPL	CORRACTS	CERCLIS/NFRAP	TSD	LUST	SWLF	WATER WELLS	RCRA VIOL	TRIS	UST/AST	ERNS	GNRTR	SPILLS
3	WAIPAHU MILL BOILER AREA 94-833 MAKAALOHA ST WAIPAHU, HI 96797	3439701 0.04 MI NE										X			
4A	USGS WATER WELL ID #212318158003401 , HI	8959241 0.05 MI SE							X						
4B	USGS WATER WELL ID #212317158003201 , HI	8959239 0.08 MI SE							X						
5A	WAIPAHU ST. DRAIN REALIGNMENT 94-925 WAIPAHU ST WAIPAHU, HI 96797	6435570 0.09 MI E										X			

MAP ID	SITES IN THE SURROUNDING AREA (within 1/8 - 1/4 mile)	VISTA ID DISTANCE DIRECTION	A		B					C			D		
			NPL	CORRACTS	CERCLIS/NFRAP	TSD	LUST	SWLF	WATER WELLS	RCRA VIOL	TRIS	UST/AST	ERNS	GNRTR	SPILLS
5B	J'S WAIPAHU CHEVRON 94-380 MOKUOLA ST WAIPAHU, HI 96797	2311953 0.13 MI E					X					X			
6A	SHELL SERVICE STATION 94-709 FARRINGTON HWY WAIPAHU, HI 96797	3438456 0.16 MI SE										X			
6B	WAIPAHU AUTO CO. - DIVISION OF SERVC 94-729 FARRINGTON HWY WAIPAHU, HI 96797	4909311 0.16 MI SE					X					X			
7	USGS WATER WELL ID #212309158003701 , HI	8959224 0.18 MI S							X						
8A	WAIPAHU VARIETY, DBA KISO STORE 94-995 WAIPAHU ST WAIPAHU, HI 96797	3440569 0.18 MI NE										X			
8B	USGS WATER WELL ID #212330158002601 , HI	8959300 0.22 MI NE							X						
9	ISLAND MINI-MART WAIPAHU 94-767 FARRINGTON HWY WAIPAHU, HI 96797	5318664 0.20 MI SE					X					X			
10	TIRE WAREHOUSE 94-250 MOKUOLA ST WAIPAHU, HI 96797	3439692 0.25 MI E										X			

X = search criteria; • = tag-along (beyond search criteria).
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MAP ID	SITES IN THE SURROUNDING AREA (within 1/4 - 1/2 mile)	VISTA ID DISTANCE DIRECTION	A		B					C			D		
			NPL	CORRACTS	CERCLIS/NFRAP	TSD	LUST	SWLF	WATER WELLS	RCRA VIOL	TRIS	UST/AST	ERNS	GNRTR	SPILLS
11	SAIKI SONS INC. 94-825 WAIPAHU ST WAIPAHU, HI 96797	3430595 0.26 MI SE					X					•			
12	USGS WATER WELL ID #212330158001801 , HI	8959295 0.34 MI NE							X						
13	USGS WATER WELL ID #212318158010101 , HI	8959242 0.35 MI W							X						
14	BIONIC SELF-SERVE 94-485 FARRINGTON HWY WAIPAHU, HI 96797	3430335 0.37 MI SW					X					•			
15	USGS WATER WELL ID #212300158004801 , HI	8959201 0.39 MI SW							X						
16	USGS WATER WELL ID #212336158001801 , HI	8959335 0.40 MI NE							X						
16	USGS WATER WELL ID #212340158001901 , HI	8959364 0.44 MI NE							X						
17	AMFAC GARDEN HAWAII 94-910 MANAGERS DR / P.O. BOX 537 WAIPAHU, HI 96797	3430490 0.46 MI NW					X					•			
18	ARCO 82116 94-780 FARRINGTON HWY WAIPAHU, HI 96797	12723041 0.47 MI E					X					•			
19	TAJIRO URANAKA 94-767 FARRINGTON HWY WAIPAHU, HI 96797	5056378 0.48 MI SE					X					•			

MAP ID	SITES IN THE SURROUNDING AREA (within 1/2 - 1 mile)	VISTA ID DISTANCE DIRECTION	A		B					C			D		
			NPL	CORRACTS	CERCLIS/NFRAP	TSD	LUST	SWLF	WATER WELLS	RCRA VIOL	TRIS	UST/AST	ERNS	GNRTR	SPILLS
20	USNAVY SHORE INTERMEDIATE MTNC PEARL HBR HONOLULU, HI 96818	4158689 0.75 MI		X						•				•	
20	PEARL HARBOR NAVAL STATION US NAVAL STATION HONOLULU, HI 96818	3440474 0.75 MI	X		•										
20	USNAVY NAVAL SHIPYARD PEARL HARBOR PEARL HBR PEARL HARBOR, HI 96860	3440122 0.75 MI		X						•				•	
20	USNAVY CMDR NVY RG HI PEARL HARBOR NVL BLDG 1526 CENTRAL AVE SHIPYARD PEARL HARBOR, HI 96860	4937453 0.75 MI		X						•				•	

X = search criteria; • = tag-along (beyond search criteria).
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Version 2.6.1

UNMAPPED SITES	VISTA ID	A		B					C			D		
		NPL	CORRACTS	CERCLIS/NFRAP	TSD	LUST	SWLF	WATER WELLS	RCRA VIOL	TRIS	UST/AST	ERNS	GNRTR	SPILLS
OAHU SUGAR COMPANY, LTD. - EWA T P.O. BOX 0 WAIPAHU, HI 96797	3430232					X					X			
WAIPIO PENINSULA OFF WAIPIO POINT ACCESS ROAD WAIPAHU, HI	12758274			X										
NAVAL MAGAZINE LUALUALEI - WAIKELE B FORMER BUILDING 15 TANK 15-T1, 15- WAIPAHU, HI 96797	11514796										X			
ROYAL KUNIA FAST BREAK # 7598 94-673 KUPUOHI LOOP WAIPAHU, HI 96797	12723471										X			
NAVAL MAGAZINE LUALUALEI - WAIKELE B TANK 126-T1, 126-S1 BLDG 126 WAIPAHU, HI 96797	11514410					X					X			

SITE ASSESSMENT PLUS REPORT

DETAILS

PROPERTY AND THE ADJACENT AREA (within 1/8 mile)

VISTA Address*:	USGS WATER WELL ID #212322158003807 HI	VISTA ID#:	8959277	Map ID 1
		Distance/Direction:	0.00 MI / NA	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	
Agency Address:	SAME AS ABOVE			
Well ID:	212322158003807			
Use:	INDUSTRIAL			
Depth:	412.0			
Latitude:	21.389444444444			
Longitude:	-158.0105555555			
Quadrangle Name:	09 WAIPAHU			
Surface Elevation:	60.00			
Date Well Drilled:	01/01/1924			
County FIPS:	15003			

VISTA Address*:	USGS WATER WELL ID #212322158003800 HI	VISTA ID#:	8959270	Map ID 1
		Distance/Direction:	0.00 MI / NA	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	
Agency Address:	SAME AS ABOVE			
Well ID:	212322158003800			
Latitude:	21.389444444444			
Longitude:	-158.0105555555			
Section Township Range:	ETC			
Surface Elevation:	7			
Date Well Drilled:	20060000			
County FIPS:	15003			
Comments:	SITE TYPE: MULTIPLE WELLS			

VISTA Address*:	USGS WATER WELL ID #212322158003801 HI	VISTA ID#:	8959271	Map ID 1
		Distance/Direction:	0.00 MI / NA	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	
Agency Address:	SAME AS ABOVE			
Well ID:	212322158003801			
Use:	IRRIGATION			
Latitude:	21.389444444444			
Longitude:	-158.0105555555			
Quadrangle Name:	09 WAIPAHU			

PROPERTY AND THE ADJACENT AREA (within 1/8 mile) CONT.

Surface Elevation:	60.00
Date Well Drilled:	01/01/1900
County FIPS:	15003

VISTA Address*:	USGS WATER WELL ID #212322158003802 HI	VISTA ID#:	8959272	Map ID 1
		Distance/Direction:	0.00 MI / NA	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212322158003802
Use:	INDUSTRIAL
Latitude:	21.389444444444
Longitude:	-158.0105555555
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	60.00
Date Well Drilled:	01/01/1897
County FIPS:	15003

VISTA Address*:	USGS WATER WELL ID #212322158003803 HI	VISTA ID#:	8959273	Map ID 1
		Distance/Direction:	0.00 MI / NA	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212322158003803
Use:	INDUSTRIAL
Latitude:	21.389444444444
Longitude:	-158.0105555555
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	60.00
Date Well Drilled:	01/01/1897
County FIPS:	15003

VISTA Address*:	USGS WATER WELL ID #212322158003804 HI	VISTA ID#:	8959274	Map ID 1
		Distance/Direction:	0.00 MI / NA	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212322158003804
Depth:	400.0
Latitude:	21.389444444444
Longitude:	-158.0105555555
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	60.00
Date Well Drilled:	01/01/1917
County FIPS:	15003

PROPERTY AND THE ADJACENT AREA (within 1/8 mile) CONT.

VISTA Address*:	USGS WATER WELL ID #212322158003806 HI	VISTA ID#:	8959276	Map ID 1
		Distance/Direction:	0.00 MI / NA	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212322158003806
Depth:	402.0
Latitude:	21.389444444444
Longitude:	-158.0105555555
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	60.00
Date Well Drilled:	01/01/1917
County FIPS:	15003

VISTA Address*:	USGS WATER WELL ID #212322158003805 HI	VISTA ID#:	8959275	Map ID 1
		Distance/Direction:	0.00 MI / NA	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212322158003805
Depth:	400.0
Latitude:	21.389444444444
Longitude:	-158.0105555555
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	60.00
Date Well Drilled:	01/01/1917
County FIPS:	15003

VISTA Address*:	USGS WATER WELL ID #212322158003808 HI	VISTA ID#:	8959278	Map ID 1
		Distance/Direction:	0.00 MI / NA	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212322158003808
Use:	IRRIGATION
Depth:	430.0
Latitude:	21.389444444444
Longitude:	-158.0105555555
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	60.00
Date Well Drilled:	01/01/1924
County FIPS:	15003

PROPERTY AND THE ADJACENT AREA (within 1/8 mile) CONT.

VISTA Address*:	USGS WATER WELL ID #212325158003802 HI	VISTA ID#:	8959283	Map ID 2
		Distance/Direction:	<0.01 MI / N	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212325158003802
Use:	INDUSTRIAL
Depth:	364.0
Latitude:	21.390277777777
Longitude:	-158.0105555555
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	64.00
Date Well Drilled:	02/01/1962
County FIPS:	15003

VISTA Address*:	USGS WATER WELL ID #212325158003801 HI	VISTA ID#:	8959282	Map ID 2
		Distance/Direction:	<0.01 MI / N	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212325158003801
Use:	INDUSTRIAL
Depth:	320.0
Latitude:	21.390277777777
Longitude:	-158.0105555555
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	64.00
Date Well Drilled:	01/01/1962
County FIPS:	15003

VISTA Address*:	USGS WATER WELL ID #212325158003803 HI	VISTA ID#:	8959284	Map ID 2
		Distance/Direction:	<0.01 MI / N	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212325158003803
Use:	INDUSTRIAL
Depth:	378.0
Latitude:	21.390277777777
Longitude:	-158.0105555555
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	64.00
Date Well Drilled:	04/01/1962
County FIPS:	15003

PROPERTY AND THE ADJACENT AREA (within 1/8 mile) CONT.

VISTA Address*:	USGS WATER WELL ID #212325158003809 HI	VISTA ID#:	8959285	Map ID 2
		Distance/Direction:	<0.01 MI / N	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212325158003809
Latitude:	21.390277777777
Longitude:	-158.0105555555
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	64.00
County FIPS:	15003
Comments:	SITE TYPE: MULTIPLE WELLS

VISTA Address*:	WAIPAHU OUTSIDE STORAGE 94-833 MAKAALOHA ST WAIPAHU, HI 96797	VISTA ID#:	4050228	Map ID 3
		Distance/Direction:	0.04 MI / NE	
		Plotted as:	Point	
STATE UST - State Underground Storage Tank / SRC# 6305		Agency ID:	9-200945	

Agency Address:	SAME AS ABOVE
Underground Tanks:	2
Aboveground Tanks:	NOT REPORTED
Tanks Removed:	NOT REPORTED

Tank ID:	R 8U	Tank Status:	OUT OF SERVICE
Tank Contents:	DIESEL	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	12500 (GALLONS)	Tank Material:	NOT AVAILABLE
Tank ID:	R 9U	Tank Status:	OUT OF SERVICE
Tank Contents:	DIESEL	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	12500 (GALLONS)	Tank Material:	NOT AVAILABLE

VISTA Address*:	WAIPAHU MECHANICAL EQUIPMENT SHOP 94-833 MAKAALOHA ST WAIPAHU, HI 96797	VISTA ID#:	3430488	Map ID 3
		Distance/Direction:	0.04 MI / NE	
		Plotted as:	Point	
STATE UST - State Underground Storage Tank / SRC# 6305		Agency ID:	9-200943	

Agency Address:	SAME AS ABOVE
Underground Tanks:	1
Aboveground Tanks:	NOT REPORTED
Tanks Removed:	NOT REPORTED

Tank ID:	R 2U	Tank Status:	OUT OF SERVICE
Tank Contents:	USED OIL	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	250 (GALLONS)	Tank Material:	NOT AVAILABLE

PROPERTY AND THE ADJACENT AREA (within 1/8 mile) CONT.

STATE LUST - State Leaking Underground Storage Tank / SRC# 6306		EPA/Agency ID:	N/A
Agency Address:	WAIPAHU MECHANICAL EQUIPMENT SHOP 94-833 MAKAALOHA ST WAIPAHU, HI 96797		
Facility ID:	9-200943		
Leak ID#:	920025		
Leak Date:	12/12/91		
Remediation Status:	CONFIRMED RELEASE		

VISTA Address*:	OAHU SUGAR CO LTD 94 833 MAKAALOHA ST WAIPAHU, HI 96797	VISTA ID#:	304767	Map ID 3
		Distance/Direction:	0.04 MI / NE	
		Plotted as:	Point	
RCRA-SmGen - RCRA-Small Generator / SRC# 6379		EPA ID:	HID009158114	
Agency Address:	OAHU SUGAR COMPANY 94-833 MAKAALOHA ST WAIPAHU, HI 96797			
Generator Class:	Generates 100 kg /month but less than 1000 kg /month of non-acutely hazardous waste			

VISTA Address*:	WAIPAHU MILL BOILER AREA 94-833 MAKAALOHA ST WAIPAHU, HI 96797	VISTA ID#:	3439701	Map ID 3
		Distance/Direction:	0.04 MI / NE	
		Plotted as:	Point	
STATE UST - State Underground Storage Tank / SRC# 6305		Agency ID:	9-200942	
Agency Address:	SAME AS ABOVE			
Underground Tanks:	1			
Aboveground Tanks:	NOT REPORTED			
Tanks Removed:	NOT REPORTED			
Tank ID:	R-1U	Tank Status:	OUT OF SERVICE	
Tank Contents:	DIESEL	Leak Monitoring:	NOT AVAILABLE	
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE	
Tank Size (Units):	5000 (GALLONS)	Tank Material:	NOT AVAILABLE	

VISTA Address*:	USGS WATER WELL ID #212318158003401 HI	VISTA ID#:	8959241	Map ID 4A
		Distance/Direction:	0.05 MI / SE	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	
Agency Address:	SAME AS ABOVE			
Well ID:	212318158003401			
Use:	DOMESTIC			
Latitude:	21.3883333333333			
Longitude:	-158.0094444444			
Quadrangle Name:	09 WAIPAHU			
Surface Elevation:	14.00			
County FIPS:	15003			

PROPERTY AND THE ADJACENT AREA (within 1/8 mile) CONT.

VISTA Address*:	USGS WATER WELL ID #212317158003201 HI	VISTA ID#:	8959239	Map ID 4B
		Distance/Direction:	0.08 MI / SE	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	
Agency Address:	SAME AS ABOVE			
Well ID:	212317158003201			
Use:	UNUSED			
Depth:	224.0			
Latitude:	21.3880555555555			
Longitude:	-158.0088888888			
Quadrangle Name:	09 WAIPAHU			
Surface Elevation:	13.00			
Date Well Drilled:	01/01/1907			
County FIPS:	15003			

VISTA Address*:	WAIPAHU ST. DRAIN REALIGNMENT 94-925 WAIPAHU ST WAIPAHU, HI 96797	VISTA ID#:	6635570	Map ID 5A
		Distance/Direction:	0.09 MI / E	
		Plotted as:	Point	
STATE UST - State Underground Storage Tank / SRC# 6305		Agency ID:	9-103188	
Agency Address:	SAME AS ABOVE			
Underground Tanks:	1			
Aboveground Tanks:	NOT REPORTED			
Tanks Removed:	NOT REPORTED			
Tank ID:	E-1U	Tank Status:	ACTIVE/IN SERVICE	
Tank Contents:	OTHER	Leak Monitoring:	NOT AVAILABLE	
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE	
Tank Size (Units):	1000 (GALLONS)	Tank Material:	NOT AVAILABLE	

SITES IN THE SURROUNDING AREA (within 1/8 - 1/4 mile)

VISTA Address*:	J'S WAIPAHU CHEVRON 94-380 MOKUOLA ST WAIPAHU, HI 96797	VISTA ID#:	2311953	Map ID 5B
		Distance/Direction:	0.13 MI / E	
		Plotted as:	Point	
STATE UST - State Underground Storage Tank / SRC# 6305		Agency ID:	9-201233	
Agency Address:	SAME AS ABOVE			
Underground Tanks:	9			
Aboveground Tanks:	NOT REPORTED			
Tanks Removed:	NOT REPORTED			
Tank ID:	H-AU	Tank Status:	ACTIVE/IN SERVICE	
Tank Contents:	OTHER	Leak Monitoring:	NOT AVAILABLE	
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE	
Tank Size (Units):	30 (GALLONS)	Tank Material:	NOT AVAILABLE	

SITES IN THE SURROUNDING AREA (within 1/8 - 1/4 mile) CONT.

Tank ID:	H BU	Tank Status:	ACTIVE/IN SERVICE
Tank Contents:	OTHER	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	30 (GALLONS)	Tank Material:	NOT AVAILABLE
Tank ID:	R-1U	Tank Status:	OUT OF SERVICE
Tank Contents:	UNKNOWN	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	NOT REPORTED (NOT AVAILABLE)	Tank Material:	NOT AVAILABLE
Tank ID:	R 2U	Tank Status:	OUT OF SERVICE
Tank Contents:	UNKNOWN	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	NOT REPORTED (NOT AVAILABLE)	Tank Material:	NOT AVAILABLE
Tank ID:	R 3U	Tank Status:	OUT OF SERVICE
Tank Contents:	UNKNOWN	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	NOT REPORTED (NOT AVAILABLE)	Tank Material:	NOT AVAILABLE
Tank ID:	R-4U	Tank Status:	OUT OF SERVICE
Tank Contents:	UNKNOWN	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	550 (GALLONS)	Tank Material:	NOT AVAILABLE
Tank ID:	1U	Tank Status:	ACTIVE/IN SERVICE
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	10000 (GALLONS)	Tank Material:	NOT AVAILABLE
Tank ID:	2U	Tank Status:	ACTIVE/IN SERVICE
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	10000 (GALLONS)	Tank Material:	NOT AVAILABLE
Tank ID:	3U	Tank Status:	ACTIVE/IN SERVICE
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	10000 (GALLONS)	Tank Material:	NOT AVAILABLE

STATE LUST - State Leaking Underground Storage Tank / SRC# 6306		EPA/Agency ID:	N/A
Agency Address:	JS WAIPAHU CHEVRON 94-380 MOKUOLA ST WAIPAHU, HI 96797		
Facility ID:	9-201233		
Leak ID#:	950021		
Leak Date:	11/7/94		
Remediation Status:	CONFIRMED RELEASE		

Y 001421

SITES IN THE SURROUNDING AREA (within 1/8 - 1/4 mile) CONT.

VISTA Address*:	SHELL SERVICE STATION 94-709 FARRINGTON HWY WAIPAHU, HI 96797	VISTA ID#: Distance/Direction: Plotted as:	3438456 0.16 MI / SE Point	Map ID 6A

STATE UST - State Underground Storage Tank / SRC# 6305		Agency ID:	9-201015
Agency Address:	SAME AS ABOVE		
Underground Tanks:	5		
Aboveground Tanks:	NOT REPORTED		
Tanks Removed:	NOT REPORTED		
Tank ID:	R-1U	Tank Status:	OUT OF SERVICE
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	6000 (GALLONS)	Tank Material:	NOT AVAILABLE
Tank ID:	R 2U	Tank Status:	OUT OF SERVICE
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	4000 (GALLONS)	Tank Material:	NOT AVAILABLE
Tank ID:	R-3U	Tank Status:	OUT OF SERVICE
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	7500 (GALLONS)	Tank Material:	NOT AVAILABLE
Tank ID:	R 4U	Tank Status:	OUT OF SERVICE
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	6000 (GALLONS)	Tank Material:	NOT AVAILABLE
Tank ID:	R 5U	Tank Status:	OUT OF SERVICE
Tank Contents:	USED OIL	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	550 (GALLONS)	Tank Material:	NOT AVAILABLE

VISTA Address*:	WAIPAHU AUTO CO. - DIVISION OF SERVC 94-729 FARRINGTON HWY WAIPAHU, HI 96797	VISTA ID#: Distance/Direction: Plotted as:	4909311 0.16 MI / SE Point	Map ID 6B

STATE UST - State Underground Storage Tank / SRC# 6305		Agency ID:	9-200882
Agency Address:	SAME AS ABOVE		
Underground Tanks:	1		
Aboveground Tanks:	NOT REPORTED		
Tanks Removed:	NOT REPORTED		
Tank ID:	R-1U	Tank Status:	OUT OF SERVICE
Tank Contents:	USED OIL	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	500 (GALLONS)	Tank Material:	NOT AVAILABLE

Y 001422

STATE LUST - State Leaking Underground Storage Tank / SRC# 6306		EPA/Agency ID:	N/A
Agency Address:	WAIPAHU AUTO CO. - DIVISION OF SERVCO 94-729 FARRINGTON HWY WAIPAHU, HI 96797		
Facility ID:	9-200882		
Leak ID#:	980210		
Leak Date:	8/11/98		
Remediation Status:	SITE CLEANUP COMPLETED		

Map ID 7

VISTA Address*:	USGS WATER WELL ID #212309158003701 HI	VISTA ID#:	8959224
		Distance/Direction:	0.18 MI / S
		Plotted as:	Point
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A
Agency Address:	SAME AS ABOVE		
Well ID:	212309158003701		
Use:	INSTITUTION		
Depth:	131.0		
Latitude:	21.3858333333333		
Longitude:	-158.0102777777		
Quadrangle Name:	09 WAIPAHU		
Surface Elevation:	22.00		
Date Well Drilled:	05/01/1958		
County FIPS:	15003		

Map ID 8A

VISTA Address*:	WAIPAHU VARIETY, DBA KISO STORE 94-995 WAIPAHU ST WAIPAHU, HI 96797	VISTA ID#:	3440569
		Distance/Direction:	0.18 MI / NE
		Plotted as:	Point
STATE UST - State Underground Storage Tank / SRC# 6305		Agency ID:	9-200261
Agency Address:	SAME AS ABOVE		
Underground Tanks:	1		
Aboveground Tanks:	NOT REPORTED		
Tanks Removed:	NOT REPORTED		
Tank ID:	R-1U	Tank Status:	OUT OF SERVICE
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	1000 (GALLONS)	Tank Material:	NOT AVAILABLE

Map ID 8B

VISTA Address*:	USGS WATER WELL ID #212330158002601 HI	VISTA ID#:	8959300
		Distance/Direction:	0.22 MI / NE
		Plotted as:	Point
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A
Agency Address:	SAME AS ABOVE		
Well ID:	212330158002601		
Depth:	188.0		
Latitude:	21.391666666668		
Longitude:	-158.0072222222		
Quadrangle Name:	09 WAIPAHU		
Surface Elevation:	18.00		

County FIPS:	15003

Map ID 9

VISTA Address*:	ISLAND MINI-MART WAIPAHU 94-767 FARRINGTON HWY WAIPAHU, HI 96797	VISTA ID#:	5348664
		Distance/Direction:	0.20 MI / SE
		Plotted as:	Point
STATE UST - State Underground Storage Tank / SRC# 6305		Agency ID:	9-202938
Agency Address:	SAME AS ABOVE		
Underground Tanks:	3		
Aboveground Tanks:	NOT REPORTED		
Tanks Removed:	NOT REPORTED		
Tank ID:	R-1U	Tank Status:	OUT OF SERVICE
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	10000 (GALLONS)	Tank Material:	NOT AVAILABLE
Tank ID:	R-2U	Tank Status:	OUT OF SERVICE
Tank Contents:	DIESEL	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	10000 (GALLONS)	Tank Material:	NOT AVAILABLE
Tank ID:	R-3U	Tank Status:	OUT OF SERVICE
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	10000 (GALLONS)	Tank Material:	NOT AVAILABLE
STATE LUST - State Leaking Underground Storage Tank / SRC# 6306		EPA/Agency ID:	N/A
Agency Address:	ISLAND MINI-MART WAIPAHU 94-767 FARRINGTON HWY WAIPAHU, HI 96797		
Facility ID:	9-202938		
Leak ID#:	980183		
Leak Date:	6/17/98		
Remediation Status:	CONFIRMED RELEASE		

Map ID 10

VISTA Address*:	TIRE WAREHOUSE 94-250 MOKUOLA ST WAIPAHU, HI 96797	VISTA ID#:	3439692
		Distance/Direction:	0.25 MI / E
		Plotted as:	Point
STATE UST - State Underground Storage Tank / SRC# 6305		Agency ID:	9-201258
Agency Address:	SAME AS ABOVE		
Underground Tanks:	1		
Aboveground Tanks:	NOT REPORTED		
Tanks Removed:	NOT REPORTED		
Tank ID:	R-1U	Tank Status:	OUT OF SERVICE
Tank Contents:	UNKNOWN	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	NOT AVAILABLE
Tank Size (Units):	NOT REPORTED (NOT AVAILABLE)	Tank Material:	NOT AVAILABLE

SITES IN THE SURROUNDING AREA (within 1/4 - 1/2 mile)

VISTA Address*:	SAIKI SONS INC. 94-825 WAIPAHU ST WAIPAHU, HI 96797	VISTA ID#:	3430595	Map ID 11
		Distance/Direction:	0.26 MI / SE	
		Plotted as:	Point	
STATE LUST - State Leaking Underground Storage Tank / SRC# 6306		EPA/Agency ID:	N/A	

Agency Address:	SAIKI SONS INC 94-825 WAIPAHU ST WAIPAHU, HI 96797
Facility ID:	9 200308
Leak ID#:	910051
Leak Date:	10/1/91
Remediation Status:	LUST CLEANUP INITIATED

VISTA Address*:	USGS WATER WELL ID #212330158001801 HI	VISTA ID#:	8959299	Map ID 12
		Distance/Direction:	0.34 MI / NE	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212330158001801
Depth:	395 0
Latitude:	21 3916666666666
Longitude:	-158 005
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	15 00
County FIPS:	15003

VISTA Address*:	USGS WATER WELL ID #212318158010101 HI	VISTA ID#:	8959242	Map ID 13
		Distance/Direction:	0.35 MI / W	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212318158010101
Depth:	232 0
Latitude:	21.3883333333333
Longitude:	-158 0169444444
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	16 00
County FIPS:	15003

VISTA Address*:	BIONIC SELF-SERVE 94-485 FARRINGTON HWY WAIPAHU, HI 96797	VISTA ID#:	3430335	Map ID 14
		Distance/Direction:	0.37 MI / SW	
		Plotted as:	Point	
STATE LUST - State Leaking Underground Storage Tank / SRC# 6306		EPA/Agency ID:	N/A	

Agency Address:	BIONIC SELF-SERVE 94-485 FARRINGTON HWY WAIPAHU, HI 96797
Facility ID:	9-201097
Leak ID#:	880014
Leak Date:	2/1/99

SITES IN THE SURROUNDING AREA (within 1/4 - 1/2 mile) CONT.

Remediation Status:	SITE CLEANUP COMPLETED

VISTA Address*:	USGS WATER WELL ID #212300158004801 HI	VISTA ID#:	8959201	Map ID 15
		Distance/Direction:	0.39 MI / SW	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212300158004801
Use:	UNUSED
Depth:	241 0
Latitude:	21.3833333333333
Longitude:	-158 0133333333
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	12 00
Date Well Drilled:	01/01/1898
County FIPS:	15003

VISTA Address*:	USGS WATER WELL ID #212336158001801 HI	VISTA ID#:	8959339	Map ID 16
		Distance/Direction:	0.40 MI / NE	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212336158001801
Depth:	221 0
Latitude:	21 3933333333333
Longitude:	-158 005
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	21 00
Date Well Drilled:	01/01/1921
County FIPS:	15003

VISTA Address*:	USGS WATER WELL ID #212340158001901 HI	VISTA ID#:	8959364	Map ID 16
		Distance/Direction:	0.44 MI / NE	
		Plotted as:	Point	
USGS Wells - Federal Drinking Water Sources / SRC# 5384		EPA/Agency ID:	N/A	

Agency Address:	SAME AS ABOVE
Well ID:	212340158001901
Use:	UNUSED
Depth:	1090
Latitude:	21.3944444444444
Longitude:	-158 0052777777
Quadrangle Name:	09 WAIPAHU
Surface Elevation:	26 00
Date Well Drilled:	06/01/1990
County FIPS:	15003

SITES IN THE SURROUNDING AREA (within 1/4 - 1/2 mile) CONT.

				Map ID
VISTA Address*:	AMFAC GARDEN HAWAII 94-910 MANAGERS DR / P.O. BOX 537 WAIPAHU, HI 96797	VISTA ID#: Distance/Direction: Plotted as:	3430496 0.46 MI / NW Point	17
STATE LUST - State Leaking Underground Storage Tank / SRC# 6306		EPA/Agency ID:	N/A	
Agency Address:	AMFAC GARDEN HAWAII 94-910 MANAGERS DR / P O BOX 537 WAIPAHU, HI 96797			
Facility ID:	9-200912			
Leak ID#:	920164			
Leak Date:	7/29/94			
Remediation Status:	SITE CLEANUP COMPLETED			

				Map ID
VISTA Address*:	ARCO 82116 94-780 FARRINGTON HWY WAIPAHU, HI 96797	VISTA ID#: Distance/Direction: Plotted as:	12723041 0.47 MI / E Point	18
STATE LUST - State Leaking Underground Storage Tank / SRC# 6306		EPA/Agency ID:	N/A	
Agency Address:	ARCO 82116 94-780 FARRINGTON HWY WAIPAHU, HI 96797			
Facility ID:	9 201865			
Leak ID#:	980138			
Leak Date:	8/10/98			
Remediation Status:	SITE CLEANUP COMPLETED			

				Map ID
VISTA Address*:	TAJIRO URANAKA 94-767 FARRINGTON HWY WAIPAHU, HI 96797	VISTA ID#: Distance/Direction: Plotted as:	5056578 0.48 MI / SE Point	19
STATE LUST - State Leaking Underground Storage Tank / SRC# 6306		EPA/Agency ID:	N/A	
Agency Address:	TAJIRO URANAKA 94-767 FARRINGTON HWY WAIPAHU, HI 96797			
Facility ID:	9-201203			
Leak ID#:	900066			
Leak Date:	12/15/95			
Remediation Status:	SITE CLEANUP COMPLETED			

SITES IN THE SURROUNDING AREA (within 1/2 - 1 mile)

				Map ID
VISTA Address*:	USNAVY SHORE INTERMEDIATE MTNC PEARL HBR HONOLULU, HI 96818	VISTA ID#: Distance Plotted as:	4158688 0.75 MI Polygon	20
CORRACTS / SRC# 6379		EPA ID:	HI8170090007	
Agency Address:	USNAVY SHORE INTERMEDIATE MAINT ACTVIT BOX 141 PEARL HARBOR, HI 96860			
Prioritization Status:	LOW			
RCRA Facility Assessment Completed:	NO			
Notice of Contamination:	NO			
Determination of need For a RFI (RCRA Facility Investigation):	NO			
RFI Imposed:	NO			
RFI Workplan Notice of Deficiency Issued:	NO			
RFI Workplan Approved:	NO			
RFI Report Received:	NO			
RFI Approved:	NO			
No Further Corrective Action at this Time:	YES			
Stabilization Mesaures Evaluation:	YES			
CMS (Corrective Measure Study) Imposition:	NO			
CMS Workplan Approved:	NO			
CMS Report Received:	NO			
CMS Approved:	NO			
Date for Remedy Selection (CM Imposed):	NO			
Corrective Measures Design Approved:	NO			
Corrective Measures Investigation Workplan Approved:	NO			
Certification of Remedy Completion:	NO			
Stabilization Measures Implementation:	NO			
Stabilization Measures Completed:	NO			
Corrective Action Process Termination:	NO			
RCRA-TSD CORRACTS / SRC# 6379		EPA ID:	HI8170090007	
Agency Address:	USNAVY SHORE INTERMEDIATE MAINT ACTVIT BOX 141 PEARL HARBOR, HI 96860			
Off-Site Waste Received:	NO			
Land Disposal:	NO			
Incinerator:	NO			
Storage/Treatment:	NO			

SITES IN THE SURROUNDING AREA (within 1/2 - 1 mile) CONT.

VISTA Address*:	PEARL HARBOR NAVAL STATION US NAVAL STATION HONOLULU, HI 96818	VISTA ID#:	3440424	Map ID 20
		Distance	0.75 MI	
		Plotted as:	Polygon	

NPL - National Priority List / SRC# 6558		EPA ID: HI4170090076
Agency Address:	PEARL HARBOR NAVAL COMPLEX PEARL HARBOR, HI	
EPA Region:	0	
Congressional District:	0	
Federal Facility:	Agency Code ()	
Facility Ownership:	NOT AVAILABLE	
Site Incident Category:	unknown	
Federal Facility Docket:	Agency Code ()	
NPL Status:	UNKNOWN	
Incident Type:	Unknown	
Proposed NPL Update #:	0	
Final NPL Update #:	0	
Financial Management System ID:	NOT REPORTED	
Latitude:	0	
Longitude:	0	
Lat/Long Source:	Agency Code ()	
Lat/Long Accuracy:	Unknown	
Dioxin Tier:	Unknown	
USGS Hydro Unit:	0	
RCRA Indicator:	Unknown	

SITES IN THE SURROUNDING AREA (within 1/2 - 1 mile) CONT.

VISTA Address*:	USNAVY NAVAL SHIPYARD PEARL HARBOR PEARL HBR PEARL HARBOR, HI 96860	VISTA ID#:	3440122	Map ID 20
		Distance	0.75 MI	
		Plotted as:	Polygon	

CORRACTS / SRC# 6379		EPA ID: HI6170024339
Agency Address:	PEARL HARBOR N S Y AND I M F PEARL HARBOR NAVAL BASE COMPLE PEARL HARBOR, HI 968605350	
Prioritization Status:	HIGH	
RCRA Facility Assessment Completed:	NO	
Notice of Contamination:	NO	
Determination of need For a RFI (RCRA Facility Investigation):	NO	
RFI Imposed:	YES	
RFI Workplan Notice of Deficiency Issued:	NO	
RFI Workplan Approved:	NO	
RFI Report Received:	NO	
RFI Approved:	NO	
No Further Corrective Action at this Time:	YES	
Stabilization Mesaures Evaluation:	YES	
CMS (Corrective Measure Study) Imposition:	NO	
CMS Workplan Approved:	NO	
CMS Report Received:	NO	
CMS Approved:	NO	
Date for Remedy Selection (CM Imposed):	NO	
Corrective Measures Design Approved:	NO	
Corrective Measures Investigation Workplan Approved:	NO	
Certification of Remedy Completion:	NO	
Stabilization Measures Implementation:	NO	
Stabilization Measures Completed:	NO	
Corrective Action Process Termination:	NO	

RCRA-TSD CORRACTS / SRC# 6379		EPA ID: HI6170024339
Agency Address:	PEARL HARBOR N S Y AND I M F PEARL HARBOR NAVAL BASE COMPLE PEARL HARBOR, HI 968605350	
Off-Site Waste Received:	NO	
Land Disposal:	NO	
Incinerator:	NO	
Storage/Treatment:	YES	

SITES IN THE SURROUNDING AREA (within 1/2 - 1 mile) CONT.

VISTA Address*:	USNAVY CMDR NVY RG HI PEARL HARBOR NVL BLDG 1526 CENTRAL AVE SHIPYARD PEARL HARBOR, HI 96860	VISTA ID#:	4937453
		Distance	0.75 MI
		Plotted as:	Polygon

Map ID 20

CORRACTS / SRC# 6379		EPA ID:	HI1170024334
Agency Address:	SAME AS ABOVE		
Prioritization Status:	MEDIUM		
RCRA Facility Assessment Completed:	NO		
Notice of Contamination:	NO		
Determination of need For a RFI (RCRA Facility Investigation):	NO		
RFI Imposed:	YES		
RFI Workplan Notice of Deficiency Issued:	NO		
RFI Workplan Approved:	NO		
RFI Report Received:	NO		
RFI Approved:	NO		
No Further Corrective Action at this Time:	YES		
Stabilization Mesaures Evaluation:	NO		
CMS (Corrective Measure Study) Imposition:	NO		
CMS Workplan Approved:	NO		
CMS Report Received:	NO		
CMS Approved:	NO		
Date for Remedy Selection (CM Imposed):	NO		
Corrective Measures Design Approved:	NO		
Corrective Measures Investigation Workplan Approved:	NO		
Certification of Remedy Completion:	NO		
Stabilization Measures Implementation:	NO		
Stabilization Measures Completed:	NO		
Corrective Action Process Termination:	NO		

RCRA-TSD CORRACTS / SRC# 6379		EPA ID:	HI1170024334
Agency Address:	SAME AS ABOVE		
Off-Site Waste Received:	NO		
Land Disposal:	NO		
Incinerator:	NO		
Storage/Treatment:	YES		

UNMAPPED SITES

VISTA Address*:	OAHU SUGAR COMPANY, LTD. - EWA T P.O. BOX 0 WAIPAHU, HI 96797	VISTA ID#:	3430232

STATE LUST - State Leaking Underground Storage Tank / SRC# 6306		EPA/Agency ID:	N/A
Agency Address:	OAHU SUGAR COMPANY, LTD - MILLYARD P.O. BOX 0 WAIPAHU, hi 96797		
Facility ID:	9-200944		
Leak ID#:	890014		
Leak Date:	6/6/96		
Remediation Status:	LUST CLEANUP INITIATED		

VISTA Address*:	WAIPIO PENINSULA OFF WAIPIO POINT ACCESS ROAD WAIPAHU, HI	VISTA ID#:	12758274

CERCLIS / SRC# 6474		EPA ID:	HISFN0905537
Agency Address:	SAME AS ABOVE		
EPA Region:	9		
Congressional District:	0		
Federal Facility:	Agency Code ()		
Facility Ownership:	NOT AVAILABLE		
Site Incident Category:	unknown		
Federal Facility Docket:	Agency Code ()		
NPL Status:	NOT ON NPL		
Incident Type:	Unknown		
Proposed NPL Update #:	0		
Final NPL Update #:	0		
Financial Management System ID:	NOT REPORTED		
Latitude:	0		
Longitude:	0		
Lat/Long Source:	Agency Code ()		
Lat/Long Accuracy:	Unknown		
Dioxin Tier:	Unknown		
USGS Hydro Unit:	0		
RCRA Indicator:	Unknown		
Unit Id:	0		
Unit Name:	SITEWIDE		

Type:	DISCOVERY	Lead Agency:	EPA FUND-FINANCED
Qualifier:	UNKNOWN	Category:	Unknown
Name:	NOT REPORTED	Actual Start Date:	NOT REPORTED
Plan Status:	Unknown	Actual Completion Date:	JANUARY 1, 2000

UNMAPPED SITES CONT.

VISTA Address*:	NAVAL MAGAZINE LUALUALEI - WAIKELE B TANK 126-T1, 126-S1 BLDG 126 WAIPAHU, HI 96797	VISTA ID#:	11514410
STATE LUST - State Leaking Underground Storage Tank / SRC# 6306		EPA/Agency ID:	N/A
Agency Address:	NAVAL MAGAZINE LUALUALEI - LUALUALEI BRA TANK 479, 480, 481, 482 LUALUALEI, HI 96792		
Facility ID:	9-202365		
Leak ID#:	990131		
Leak Date:	1/13/99		
Remediation Status:	CONFIRMED RELEASE		

SITE ASSESSMENT PLUS REPORT

DESCRIPTION OF DATABASES SEARCHED

A) DATABASES SEARCHED TO 1 MILE

NPL
SRC#: 6558

VISTA conducts a database search to identify all sites within 1 mile of your property.
The agency release date for NPL was December, 1999.

The National Priorities List (NPL) is the EPA's database of uncontrolled or abandoned hazardous waste sites identified for priority remedial actions under the Superfund program. A site must meet or surpass a predetermined hazard ranking system score, be chosen as a state's top priority site, or meet three specific criteria set jointly by the US Dept of Health and Human Services and the US EPA in order to become an NPL site.

CORRACTS
SRC#: 6379

VISTA conducts a database search to identify all sites within 1 mile of your property.
The agency release date for HWDMS/RCRIS was September, 1999.

The EPA maintains this database of RCRA facilities which are undergoing "corrective action". A "corrective action order" is issued pursuant to RCRA Section 3008 (h) when there has been a release of hazardous waste or constituents into the environment from a RCRA facility. Corrective actions may be required beyond the facility's boundary and can be required regardless of when the release occurred, even if it predates RCRA.

B) DATABASES SEARCHED TO 1/2 MILE

CERCLIS
SRC#: 6474

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for CERCLIS was October, 1999.

The CERCLIS List contains sites which are either proposed to or on the National Priorities List(NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL. The information on each site includes a history of all pre-remedial, remedial, removal and community relations activies or events at the site, financial funding information for the events, and unrestricted enforcement activities.

NFRAP
SRC#: 6475

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for CERCLIS-NFRAP was October, 1999.

NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly, or the contamination was not serious enough to require Federal Superfund action or NPL consideration.

RCRA-TSD
SRC#: 6379

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for HWDMS/RCRIS was September, 1999.

The EPA's Resource Conservation and Recovery Act (RCRA) Program identifies and tracks hazardous waste from the point of generation to the point of disposal. The RCRA Facilities database is a compilation by the EPA of facilities which report generation, storage, transportation, treatment or disposal of hazardous waste. RCRA TSDs are facilities which treat, store and/or dispose of hazardous waste.

SWLF
SRC#: 6164

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for Permitted Landfills, Transfer Station Incinerator Facilities Database was May, 1999.

This database is provided by the Department of Health, Solid Hazardous Waste Branch. The agency may be contacted at: 808-586-4240.

The Hawaii Permitted Landfill, Transfer Station Incinerator Facilities Database does not provide a facility street address, city, or zip code.

LUST
SRC#: 6306

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for Active Leaking Underground Storage Tank List was July, 1999.

This database is provided by the Department of Health, Solid Hazardous Waste Branch. The agency may be contacted at: 808-586-4226.

The Hawaii Leak Report provides additional owner address information which is impossible to provide in this format. For the additional owner address information please contact 1-800-877-3824.

Water Wells
SRC#: 5384

VISTA conducts a database search to identify all sites within 1/2 mile of your property.
The agency release date for USGS WATER WELLS was March, 1998.

The Ground Water Site Inventory (GWSI) database was provided by the United States Geological Survey (USGS). The database contains information for over 1,000,000 wells and other sources of groundwater which the USGS has studied, used, or otherwise had reason to document through the course of research. The agency may be contacted at 703-648-6819.

C) DATABASES SEARCHED TO 1/4 MILE

RCRA-Viols/Enf

VISTA conducts a database search to identify all sites within 1/4 mile of your property.
The agency release date for HWDMS/RCRIS was September, 1999.

The EPA's Resource Conservation and Recovery Act (RCRA) Program identifies and tracks hazardous waste from the point of generation to the point of disposal. The RCRA Facilities database is a compilation by the EPA of facilities which report generation, storage, transportation, treatment or disposal of hazardous waste. RCRA Violators are facilities which have been cited for RCRA Violations at least once since 1980. RCRA Enforcements are enforcement actions taken against RCRA violators.

UST's
SRC#: 6305

VISTA conducts a database search to identify all sites within 1/4 mile of your property.
The agency release date for UST Section Database was July, 1999.

This database is provided by the Department of Health, Solid Hazardous Waste Branch. The agency may be contacted at: 808-586-4226; Caution-Many states do not require registration of heating oil tanks, especially those used for residential purposes.

TRIS
SRC#: 4946

VISTA conducts a database search to identify all sites within 1/4 mile of your property.
The agency release date for TRIS was January, 1998.

Section 313 of the Emergency Planning and Community Right-to-Know Act (also known as SARA Title III) of 1986 requires the EPA to establish an inventory of Toxic Chemicals emissions from certain facilities(Toxic Release Inventory System). Facilities subject to this reporting are required to complete a Toxic Chemical Release Form(Form R) for specified chemicals.

D) DATABASES SEARCHED TO 1/8 MILE

ERNS
SRC#: 6181

VISTA conducts a database search to identify all sites within 1/8 mile of your property.
The agency release date for was August, 1999.

The Emergency Response Notification System (ERNS) is a national database containing records from October 1986 to the release date above and is used to collect information for reported releases of oil and hazardous substances. The database contains information from spill reports made to federal authorities including the EPA, the US Coast Guard, the National Response Center and the Department of Transportation. The ERNS hotline number is (202) 260-2342.

RCRA-LgGen
SRC#: 6379

VISTA conducts a database search to identify all sites within 1/8 mile of your property.
The agency release date for HWDMS/RCRIS was September, 1999.

The EPA's Resource Conservation and Recovery Act (RCRA) Program identifies and tracks hazardous waste from the point of generation to the point of disposal. The RCRA Facilities database is a compilation by the EPA of facilities which report generation, storage, transportation, treatment or disposal of hazardous waste. RCRA Large Generators are facilities which generate at least 1000 kg./month of non-acutely hazardous waste (or 1 kg./month of acutely hazardous waste).

RCRA-SmGen
SRC#: 6379

VISTA conducts a database search to identify all sites within 1/8 mile of your property.
The agency release date for HWDMS/RCRIS was September, 1999.

The EPA's Resource Conservation and Recovery Act (RCRA) Program identifies and tracks hazardous waste from the point of generation to the point of disposal. The RCRA Facilities database is a compilation by the EPA of facilities which report generation, storage, transportation, treatment or disposal of hazardous waste. RCRA Small and Very Small generators are facilities which generate less than 1000 kg./month of non-acutely hazardous waste.

SPILL SRC#: 6307	VISTA conducts a database search to identify all sites within 1/8 mile of your property. The agency release date for Spill List was July, 1999. This database is provided by the Department of Health, Hazard Evaluation Emergency Response Program. The agency may be contacted at: 808-586-4652. The Department of Health Spills List provides a short description of the circumstances of each spill. For more information regarding these sites please contact 1-800-877-3824.

End of Report

Clayton

APPENDIX C

ASBESTOS LABORATORY REPORT

EMSL Analytical, Inc.

382 South Abbott Avenue
Milpitas, CA 95035
Phone: (408) 934-7010 Fax: (408) 934-7015

EMSL

Attn.: Ray Benzing
Clayton Environmental Consultants
Honolulu Regional Office
970 North Kalaheo Ave., Suite C-316
Kailua, Oahu, HI 96734

Monday, February 14, 2000

Ref Number: CA00677

POLARIZED LIGHT MICROSCOPY (PLM)

Performed by EPA 600/R-93/116 Method*

Project: 85-00124.00

Sample	Location	Appearance	Sample Treatment	ASBESTOS % Type	NON-ASBESTOS % Fibrous	NON-ASBESTOS % Non-Fibrous
3806	Asphalt Shingle Roofing	Black Fibrous Heterogeneous	Crushed/Dissolved	None Detected	35% Cellulose	15% Ca Carbonate 50% Matrix
3807	9" Pink Floor Tile	Brown Fibrous Heterogeneous	Crushed/Dissolved	5% Chrysotile	5% Cellulose	50% Ca Carbonate 40% Matrix
3807 M	Mastic	Black Fibrous Heterogeneous	Crushed/Dissolved	3% Chrysotile	10% Cellulose	20% Ca Carbonate 67% Matrix
3808	2x2 AT Upper Walls and Ceiling	Tan/White Fibrous Heterogeneous	Crushed/Dissolved	None Detected	80% Cellulose	20% Matrix
3809	12" Wood Tone FT	White/Brown Fibrous Heterogeneous	Crushed/Dissolved	None Detected	5% Cellulose	40% Ca Carbonate 55% Matrix
3810	Mag Insulation on of 3 5m. Ovens	White Fibrous Heterogeneous	Crushed/Dissolved	20% Amosite 10% Crocidolite 10% Chrysotile	10% Cellulose	40% Matrix 10% Other

Comments: For all obviously heterogeneous samples easily separated into subsamples, and for layered samples, each component is analyzed separately.
Also, "# of Layers" refers to number of separable subsamples.
* NY samples analyzed by ELAP 198.1 Method.

Ryan Cozart
Analyst

Approved
Signatory

Disclaimer: PLM has been known to miss asbestos in a small percentage of samples which contain asbestos. Thus negative PLM results cannot be guaranteed. EMSL suggests that samples reported as <1% or none detected be tested with either SEM or TEM. Detection limit for quantitative 1000 point count technique is 0.1%. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL. The above test must not be used by the client to claim product endorsement by NVLAP nor any agency of the United States Government. Laboratory is not responsible for the accuracy of results when requested to physically separate and analyze layered samples. [illegible]

EMSL Analytical, Inc.

382 South Abbott Avenue
Milpitas, CA 95035
Phone: (408) 934-7010 Fax: (408) 934-7015

Attn.: Ray Benzing
Clayton Environmental Consultants
Honolulu Regional Office
970 North Kalaheo Ave., Suite C-316
Kailua, Oahu, HI 96734

Monday, February 14, 2000

Ref Number: CA00677

POLARIZED LIGHT MICROSCOPY (PLM)

Performed by EPA 600/R-93/116 Method*

Project: 85-00124.00

Sample	Location	Appearance	Sample Treatment	ASBESTOS % Type	NON-ASBESTOS % Fibrous	NON-ASBESTOS % Non-Fibrous
3811	Cloth Gasket on Lg Autoclave	White/Tan Fibrous Heterogeneous	Crushed/Dissolved	40% Chrysotile	20% Cellulose	40% Matrix
3812	Cementitious Lining in Fume Hoods - Lab Area	Grey/Silver Fibrous Heterogeneous	Crushed/Dissolved	None Detected	5% Cellulose	40% Ca Carbonate 55% Matrix
3813	Mag Pipe Insulation on Loose Pipe in Room outside Bldg	White Fibrous Heterogeneous	Crushed/Dissolved	None Detected	5% Cellulose	20% Gypsum 75% Other
3814	Cement and White Paint on Ext. of Smoke Stack	Grey Fibrous Heterogeneous	Crushed/Dissolved	10% Chrysotile	20% Cellulose	20% Ca Carbonate 50% Matrix
3815	Ext./Int. Hard Plaster Walls of Bldg.	Grey Fibrous Heterogeneous	Crushed/Dissolved	None Detected	20% Cellulose	50% Ca Carbonate 30% Matrix
3816	Gypsum Board Wall in office	White/Tan Fibrous Heterogeneous	Crushed/Dissolved	None Detected	40% Cellulose	60% Matrix

Comments: For all obviously heterogeneous samples easily separated into subsamples, and for layered samples, each component is analyzed separately. Also, "# of Layers" refers to number of separable subsamples.

* NY samples analyzed by ELAP 198.1 Method.

Ryan Cozart
Analyst

Approved Signatory

EMSL Analytical, Inc.

382 South Abbott Avenue
Milpitas, CA 95035
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Kailua, Oahu, HI 96734

Monday, February 14, 2000

Ref Number: CA00677

POLARIZED LIGHT MICROSCOPY (PLM)

Performed by EPA 600/R-93/116 Method*

Project: 85-00124.00

Sample	Location	Appearance	Sample Treatment	ASBESTOS % Type	NON-ASBESTOS % Fibrous	NON-ASBESTOS % Non-Fibrous
3817	Gaskets on Steel Steam Piping - Mid Level S.W. Area	Brown Fibrous Homogeneous	Crushed/Dissolved	None Detected	40% Cellulose	20% Ca Carbonate 40% Matrix
3818	Mag Debris on Floor	White Fibrous Heterogeneous	Crushed/Dissolved	20% Amosite 15% Crocidolite	20% Cellulose	20% Ca Carbonate 25% Matrix

Comments: For all obviously heterogeneous samples easily separated into subsamples, and for layered samples, each component is analyzed separately. Also, "# of Layers" refers to number of separable subsamples.

* NY samples analyzed by ELAP 198.1 Method.

Ryan Cozart
Analyst

Approved Signatory

Disclaimer: PLM has been known to miss asbestos in a small percentage of samples which contain asbestos. Thus negative PLM results cannot be guaranteed. EMSL suggests that samples reported as <1% or none detected be tested with either SEM or TEM. Detection limit for quantitative 1000 point count technique is 0.1%. The above test report relates only to the items tested. This report may not be reproduced, except in full, without written approval by EMSL. The above test must not be used by the client to claim product endorsement by NVLAP nor any agency of the United States Government. Laboratory is not responsible for the accuracy of results when requested to physically separate and analyze layered samples.

Analysis performed by EMSL Milpitas [illegible]

ASBESTOS BULK SAMPLING DATA SHEET

Field Inspector: T. Swartz Date: 2-2-00

Sample No.	Bldg. Name/No.	Material Description	Material Location	Estimated Amount
3806	Oahu Sugar Lab Bldg.	Asphalt shingle roofing	Rooftop	
3807		9" pink flr. tiles/mastic	Office ~150ϕ	
3808		2'x2' a.t. on upper walls + ceil.	~6'x10' 450ϕ	
3809		12" wood tone f.t.	Main lab area + 1 office	
3810		Mag. insul. on one of 3 sm. ovens (autoclaves) ~20ϕ ft.		
3811		Cloth gasket on lg. autoclave	~10 lin. ft.	
3812	↓	Cementitious lining in fume hoods - Lab area	~400ϕ	(may ...)
3813	Gen. Bldg.	Mag. pipe insul. on loose pipe in room outside bldg.		10'8"
3814		Cement + white paint on ext. of smoke stack		
3815		Ext/int. hard plaster walls of bldg.		
3816		Gyp. board wall in office		
3817		Gaskets on steel steam piping - Mid-level, S.W. area		
3818	↓	Mag. debris on floor	↓	↓

Y 001442

EMSL

EMSL Analytical, Inc.
CHAIN OF CUSTODY

Asbestos

EMSL Representative: Connie Frasca

Your Company Name: Clayton Environmental Cons. Honolulu Regional Office

EMSL-Bill to: Same

Street: 970 North Kalaheo Ave
Box #: Suite C-316
City/State: Kailua, HI Zip 96734

Street:
Box #:
City/State: Zip:

Phone Results to: Name
Telephone #: (808) 531-5708

Fax Results to: Name Tim Swartz
Fax Number: (808) 537-4084

Project Name/Number: 85-00124.00

Purchase Order #:

MATRIX

☐ Air ☑ Bulk ☐ Wipe ☐ Floor Tile ☐ Drinking Water ☐ Wastewater ☐ Soil ☐ Dust

TURNAROUND

☑ 6-10 Days ☐ 5 Days ☐ 72 Hours ☐ 48 Hours ☐ 24 Hour ☐ 12 Hour ☐ Same Day* ☐ 6 Hours

*S.D. - A.M. delivery by Fed. Ex.-Results by Mid-night or earlier

PCM
☐ NIOSH 7400
☐ OSHA
☐ Other:

☑ PLM
☐ EPA 600
☐ NOB
☐ Point Count
☐ Other:

TEM
☐ Qualitative
☐ Quantitative

TEM AIR
☐ AHERA
☐ NIOSH 7402
☐ Level I
☐ Level II

TEM BULK
☐ Drop Mount (Qualitative)
☐ Chatfield
☐ Chatfield / SEM QC
☐ Conventional (Quantitative)
☐ EMSL Method
☐ NOB
☐ NOB / SEM QC
☐ Micro Vac - Quantitative
☐ Micro Vac - Qualitative

TEM WATER
☐ Wastewater
☐ Drinking Water EPA 100.2
☐ Water - NY Wastewater
☐ Water-NY Drinking Water

TEM WIPE
☐ Quantitative
☐ Qualitative

XRD
☐ Asbestos
☐ Silica

OTHER
☐

Client Sample # (s) 3806 - 3818 Total Samples: 13

Relinquished: [signature] Date: 2-2-2000 Time: 1430

Received: [signature] Date: 2-4-00 Time: 9:20 a

Received: Date: Time:

NOTE: Please duplicate this form and use additional sheets if necessary.

Y 001443

APPENDIX D

TAX ASSESSMENT RECORDS

Table of Tax Assessment Records

TMK [1] 9-4-161:4	Transaction
1997	Parcel was created from TMK 9402-73 and deeded from Amfac Property Development Corp. to Oahu Sugar Co. Ltd. (area = 90,594 square feet)
TMK [1] 9-4-2:73	
1996	Parcel was created from TMK 9402-4 and deeded from Oahu Sugar Co. Ltd. to Amfac Property Development Corp., (area listed as 62.414 acres)
1997	Parcel subdivided & dropped into various parcels including (TMK 94161-4).
TMK [1] 9-4-2:4	
1948	Parcel (70.8 acres) owner listed as the Oahu Sugar Co., Ltd.; Waipahu Soto Mission listed as lessee for 25-year term.
1955-56	Two easements granted to Robinson Estate.
1968	2.041 acres dropped into TMK 9402-21; parcel area reduced to 68.759 acres.
1970	4.887 acres dropped into TMK 9402-21; parcel size reduced to 63.872 acres.
1971	60-foot wide easement granted to C&C of Honolulu for roadway.
1972-73	Parcel size increased to 64.907 acres in transfer with TMK 9402-5.
1973	Lease to Waipahu Soto Mission expired.
1993	Parcel owner listed as Oahu Sugar Co. Ltd., and area listed as 62.852 acres.
1994-95	Property subdivided into various planned pareeels, area listed as 62.356 acres.
1996	61.823 acres revised to 62.414 acres and dropped into TMK 9402-73 (new), (remaining area = 23,240 square feet).
1997	Parcel transferred to TMK 94160-33, & TMK was dropped.
TMK [1] 9-4-160:33	
1997	Parcel (23,240 square feet) created from TMK 9402-4; parcel owner listed as Oahu Sugar Co. Ltd.
1997	Parcel subdivided & area increased to 25,446 square feet in transfer with TMK 94160-20.
1997	Parcel deeded from Oahu Sugar Co. to Amfac Property Development Corp.
1998	Parcel deeded from Amfac Property Dev. to Amfac Property Investment Corp.
TMK [1] 9-4-160:20	
1997	Parcel (16,004 square feet) created from TMK 9402-73, owner listed as Amfac Property Dev. Corp.
1997	Parcel subdivided and area increased to 16, 217 square feet in transfer with (TMKs 94160-21, -24, -28, & -33).
1997	Parcel deeded from Amfac Property Devel. Corp. to A&B Properties Inc.
TMK [1] 9-4-160:1	
1997	Parcel created from TMK 9402-73, owner listed as Amfac Property Dev. Corp., area listed as 18,479 square feet (SF).
1997	Parcel deeded from Amfac Property Devel. Corp. to A&B Properties Inc.
TMK [1] 9-4-02:5	
1947	Owner listed as James Robinson Estate, area listed as 112.875 acres
1947	1.55 acres to TMK 9402-10, area reduced to 111.325 acres.
1953	Parcel deeded to Mark A. Robinson Trust, et al.

Table of Tax Assessment Records (continued)

Clayton

1955	14.42 acres to TMK 9402-12, , area reduced to 96.905 acres.
1955	Area revised from 96.905 acres to 103.187 acres.
1960-63	Parcel leased from Robinson to Cap Inv. Co. to Pack etal & canceled, from Hustace etal to Oahu Sugar, from Walters etal to Oahu Sugar, from D. Robinson to Oahu Sugar, from Oahu Sugar to Robinson etal.
1963	Robinson Estate (.99424913%) interest in parcel deeded to Oahu Sugar Co.
1965	Remaining Victoria Ward Estate interest in parcel deeded to Oahu Sugar Co.
1969	Parcel size increased to 145.673 acres in transfer with TMK 9402-03.
1972-73	Parcel reduced to 34.128 acres in transfers with TMKs 9402-04, -23, & -24.
1976-77	Parecel size increased to 39.595 acres in transfer with TMK 9402-04.
1983	Parcel deeded to Amfac Inc.
1986	Parcel deeded to Amfac Property Corp.
TMK [1] 9-4-02:3	
1939	Parcel (151.875 acres) owner listed as Robinson Estate.
1947	5.343 acres to TMK 9402:12, area reduced to 146.532 acres.
1955	3.322 acres to TMK 9402-7, area reduced to 143.21 acres.
1957	Parcel deeded to Oahu Sugar Co. Ltd.
1969	Parcel increased to 177.112 acres in transfers with TMKs 9402-05, & -06.
1979	9.08 acres to TMK 9402-31, area reduced to 159.747 acres.
1983	0.845 acre to 9402-41, area reduced to 158.902 acres.
1983	Parcel deeded to Amfac Inc.
1986	Parcel deeded to Amfac Property Corp.
TMK [1] 9-4-02:6	
1947	Parcel (140.25 acres) owners: (2) JLP Robinson & (2) MA Robinson.
1947	26.86 acres to TMK 9402-11, area reduced to 113.39 acres.
1947	5.368 acres to TMK 9402-12, area reduced to 108.022 acres.
1947	(2) JLP Robinson died, probate.
1955	Area revised from 108.022 acres to 108.572 acres
1954	Parcel deeded from (2) JLP Robinson Estate to Mark A. Robinson Trust
1954	Parcel deeded to Capital Investment Co, Ltd.
1954	Parcel deeded to Oahu Sugar Co. Ltd.
1954-1969	Parcel size was reduced to 27.826 acres following series of corrections and subdivisions wherein lots dropped and trnaferred with other TMKs.
1968	Parcel deeded to State of Hawaii
1968	Parcel size increased to 31.691 acres from TMKs 9402-02, -07, -08
1971-72	Parcel dropped into State Highway project.
TMK [1] 9-4-02:2	
1939	Oahu Railway & Land Co. listed as owner of 10.027 acre parcel
1943	Transfer .665 acres to & .641 acres from TMK 9402-07 with Oahu Sugar Co.
1947	2.226 acres to TMK 9402-12, parcel size reduced to 7.801 acres.
1951	Parcel deeded to United States of America
1969	Correction of ownership, parcel deeded to Oahu Sugar Co.
1969	16.285 acres added from TMK 9402-07, area increased to 24.086 acres.
1968	Portion of parcel dropped into State road project, area reduced to22.843 acres.

Table of Tax Assessment Records (continued)

Clayton

1969	10.564 acres to TMK 9402-07, parcel size reduced to 12.279 acres.
1983	Parcel deeded to Amfac Inc.
1986	Parcel deeded to Amfac Property Corp.
TMK [1] 9-4-02:7	
1943	Parcel (54.893 acres) created from TMK 9402-02, owner = Oahu Sugar Co.
1943	Parcel deeded to Oahu Railway & Land Co.
1947	41.930 acres to TMK 9402-12, reducing area to 12.963 acres.
1956	3.322 acres from TMK 9402-03, increasing area to 16.285 acres.
1969	Area of parcel reduced to 10.564 acres in transfer with TMK 9402-02.
1977-78	Area reduced to 8.982 acres in transaction with Federal and State Gov'ts.
1983	Parcel deeded to Amfac Inc.
1986	Parcel deeded to Amfac Property Corp.

Appendix I-2

Subsurface Investigation and Ash Sampling Report

Honolulu Regional Office

970 North Kalaheo Avenue
Suite C-316
Kailua, Oahu, HI 96734
808.531.6708
Fax 808.537.4084
www.claytongrp.com

Clayton Group Services

Subsurface Investigation and Ash Sampling
at the
Former Oahu Sugar Mill Property
(TMK: [1]9-4-161: Parcel 4)
Waipahu, Oahu, Hawaii

for
YMCA OF HONOLULU
1441 Pali Highway
Honolulu, Oahu, Hawaii

Clayton Project No. 85-00167.00

May 4, 2000

Honolulu Regional Office

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1.0 INTRODUCTION

Mr. Glenn Tsugawa of YMCA of Honolulu retained Clayton Group Services, Inc. (Clayton) to conduct a subsurface investigation and analyze ash at the Former Oahu Sugar Mill located on Waipahu Street, Waipahu, Oahu, Hawaii. The work was performed in accordance with Clayton proposal number 00-HI-7071, Change Order No. 1.

2.0 PURPOSE

The purpose of this project was to (1) assess the soil in the vicinity of a former underground storage tank (UST) on the subject property for possible petroleum contamination; and (2) sample and analyze ash located in and around the smoke stack to assess the ash for possible hazardous constituents.

3.0 SCOPE OF WORK

Clayton performed the following scope of work:

- Collected and analyzed soil samples from six boreholes (B-1, B-2, B-3, B-4, B-5 and B-6) using a Direct Push Sampling system (Geoprobe).
- Collected and analyzed two ash samples.
- Analyzed the six soil samples selectively for the following constituents:
  - Total petroleum hydrocarbon scan (TPH-Scan) using CA-LUFT Modified Method 8015;
  - Benzene, toluene, ethylbenzene, and xylenes (BTEX) using the Environmental Protection Agency (EPA) Method 8021; and
  - Polynuclear aromatic hydrocarbon (PAH) group (acenaphthene, benzo(a)pyrene, fluoranthene and naphthalene) using EPA Method 8270 Selected Ion Monitoring (SIM).
- Analyzed the two ash samples for Total Resource Conservation and Recovery Act priority metals (Total RCRA Metals) including arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver using EPA methods 6010B, 7060A, 7740 and 7471A.
- Prepared this report presenting our findings, results of laboratory analyses, and conclusions.

4.0 GENERAL INFORMATION

4.1 SITE DESCRIPTION

The subject property is an irregular-shaped parcel that encompasses 90,594 square feet of land area on Waipahu Street, Waipahu, Oahu, Hawaii, in an industrial and residential setting. It is improved with three former Oahu Sugar Company sugar mill structures, including the Smoke Stack, Generator Building, and Laboratory Building, as well as an adjoining asphalt-paved parking lot to the east. These structures are the only remaining improvements from the former sugar mill complex. They are currently vacant and used only as storage space by the YMCA. The property is located approximately 3/4-mile northeast of Pearl Harbor's West Loch and approximately 1,300 feet northeast of Waikele Stream. The site location is shown on Figure 1 behind the Figures tab.

4.2 BACKGROUND

The Smoke Stack is an approximately 220 feet tall concrete structure, which was reportedly used to burn sugar cane waste (bagasse) when the sugar mill was in operation. The Generator Building is a three-level building constructed of concrete and hard plaster, with the two lower levels existing below the ground surface. This structure formerly housed steam-driven electrical generators that powered the sugar mill, but the generators have been removed from the building. The Laboratory Building is a single-story wooden structure with a large laboratory area, five offices, and a storage shed attached to the southwest corner of the building.

A Phase I Environmental Site Assessment conducted by Clayton, identified recognized environmental conditions in connection with the subject property. Two recognized environmental conditions were addressed in this investigation and are listed below:

- A former 5,000-gallon diesel UST associated with the boiler
- Ash inside the Smoke Stack

The 5,000-gallon diesel UST associated with the boiler was located along the fence line just southeast of the Laboratory Building, and was used to power the boiler ignitors. This UST was reportedly removed by Brewer Environmental Services in the mid-1980s. A copy of the completed UST Notification form was located, which documented the closure of the UST. However, since no UST closure report or evidence of soil collection and analyses was available, Clayton recommended a subsurface investigation to assess the soil in the vicinity of the former 5,000-gallon diesel UST and piping.

A significant amount of ash was observed inside the base of the Smoke Stack and on the ground surface surrounding the smoke stack. The stack was reportedly used only to burn bagasse (sugar cane waste). The resulting ash was collected at the base of the boiler and transported by conveyor belt to trucks, which transported the ash to a local plant nursery for use as a soil additive. Clayton recommended the sampling and analysis of the ash located in and around smoke stack to assess the ash for possible hazardous properties.

5.0 FIELD ACTIVITIES

On April 7, 2000, Clayton supervised the drilling of six exploratory boreholes (B-1, B-2, B-3, B-4, B-5, and B-6) using a Geoprobe system operated by Geolabs, Inc, a subcontractor to Clayton. Clayton also collected ash samples from the interior and exterior of the existing smoke stack. The six borehole locations and the two ash sampling locations are shown on Figure 2 behind the Figures tab. Photographs of the site and sampling activities are presented behind the Photograph Tab.

5.1 SOIL SAMPLE COLLECTION

The six boreholes were drilled to depths ranging between 7 and 15 feet below existing grade surface (bgs). Boreholes B-1 and B-2 were positioned at the approximate location of the former UST. Soil samples were collected from depths of 10-feet and 15 feet bgs. Boreholes B-3, B-4, B-5 and B-6 were positioned in the area between the former UST location and the former boiler unit where the UST pipelines may have ran. Samples were collected from depths of 5-feet bgs in each of the four boreholes. Refusal was encountered in boreholes B-4 and B-5 at a depth of 7 feet bgs. A second sample was collected from boreholes B-3 and B-6 at a depth of 10-feet bgs. A total of 10 soil samples were collected from the boreholes.

The soil samples were collected using Geoprobe's Large-Bore, a closed piston tip discrete sampler. Soil samples were collected in 1.125-inch diameter by 22 inches long stainless steel sleeves, which line the sampling tube. After sample collection, the sampler was extracted from the subsurface, and the sleeve containing the sample was removed from the tube. After removing the stainless steel sleeves from the sampler, the ends were immediately covered with a Teflon™ sheet and polyethylene end cap. The sample containers were labeled and stored in a portable cooler with frozen gel ice. The samples were delivered, by overnight express carrier, to Columbia Analytical Services, Inc. located in Canoga Park, California following standard chain-of-custody procedures.

A portion of the soil obtained from each sampling depth was placed in a separate sealed plastic bag and allowed to volatilize. These samples were subjected to field headspace analysis using a photoionization detector (PID) after being allowed to volatilize for at least 15 minutes. Headspace measurements taken on the soil samples from the six boreholes reported organic vapor measurements (OVM) at background levels of 0.0 parts per million (ppm) to 0.7 ppm. The PID readings are presented on the boring logs in Appendix A.

The surface of the area investigated was covered with grass, weeds and patches of exposed soil. The soil encountered in the boreholes was clayey silt. Refusal was encountered in boreholes B-4 and B-5 at a depth of 7 feet bgs. Borehole logs for the six boreholes are presented in Appendix A.

The sampler and associated sampling equipment were cleaned between each borehole. The equipment cleaning process involved brushing or scraping off excess soil particles, washing in a non-phosphate detergent solution, and rinsing in water.

5.2 ASH SAMPLE COLLECTION

Two ash samples were collected on the subject property. Sample Stack-Int was collected from the base inside the stack. Sample Stack-Ext was collected from the ground surface at the exterior of the stack. The ash was very fine and dark gray in color. It was collected with hand trowels and placed into pre-washed eight-ounce glass jars. A separate pre-cleaned hand trowel was used for each sample.

6.0 ANALYTICAL RESULTS

Six soil samples (B1-15, B2-15, B3-5, B4-5, B5-5, and B6-5) were submitted to Columbia Analytical Services in Canoga Park, California for analyses. Each sample was analyzed for TPH-scan using CA-LUFT Modified Method 8015. Since detectable quantities of petroleum were identified in samples B2-15, B4-5, and B6-5, they were further analyzed for BTEX using EPA Method 8021 and PAHs using EPA Method 8270 SIM. The results for the soil samples were compared to the Department of Health (DOH) Tier 1 Action Levels. The soil analytical results are summarized in Table 1 behind the Tables tab.

The two ash samples were analyzed for Total RCRA Metals using EPA methods 6010B, 7060A, 7740 and 7471A. The results for the ash samples were compared to DOH Tier 1 Action Levels; however, when a DOH standard was not available, the EPA Preliminary Remediation Goals (PRGs) were used. The ash analytical results are summarized in Table 2 behind the Tables tab. The laboratory analytical reports and chain-of-custody forms are included in Appendix B.

6.1 ANALYTICAL RESULTS OF SOIL SAMPLES

The TPH-Scan identifies concentrations of gasoline range organics (C6-C12 GRO), diesel range organics (C13-C22 DRO), heavy range (C23-C32 HRO), and total petroleum hydrocarbons (TPH). The TPH-Scan indicated three of the six samples had no detectable concentration of TPH. The remaining three samples, B2-15, B4-5, and B6-5, indicated TPH concentrations of 15 mg/kg, 480 mg/kg and 86 mg/kg, respectively. These concentrations are below the DOH Tier 1 Action Level of 5,000 mg/kg.
Since detectable quantities of petroleum were identified in samples B2-15, B4-5, and B6-5, they were further analyzed for BTEX and PAH. The BTEX analyses indicated no detectable concentrations of BTEX in the three samples analyzed.

The PAH analyses indicated detectable concentrations in two of the three samples analyzed (samples B4-5 and B6-5). Acenaphthene and naphthalene were detected in sample B4-5; however, the concentrations did not exceed the DOH Tier 1 Action Levels. Benzo(a)pyrene and fluoranthene were detected in samples B4-5 and B6-5. In sample B6-5, the concentrations were below the DOH Tier 1 Action Levels. However, sample B4-5 reported a result of 14 mg/kg for benzo(a)pyrene and 22 mg/kg for fluoranthene. These concentrations are above the DOH Tier 1 Action Levels of 1 mg/kg for benzo(a)pyrene and 11 mg/kg for fluoranthene.

6.2 ANALYTICAL RESULTS OF ASH SAMPLES

The two ash samples (Stack-Int and Stack-Ext) were analyzed for Total RCRA Metals. Total arsenic was detected in sample Stack-Int at a concentration of 20 mg/kg, which is below the EPA PRG of 22 mg/kg. Total metal as barium was detected in both of the samples at concentrations of 120 and 80 mg/kg; however, these concentrations were below the EPA PRG of 5,400 mg/kg. Total cadmium was detected at a concentration of 1 mg/kg in sample Stack-Int, which is below the DOH Tier 1 Action Level of 38 mg/kg. Total metal as chromium was detected in each of the samples at concentrations of 130 and 9 mg/kg; however, these concentrations were below the EPA PRG of 210 mg/kg. Total lead was detected at a concentration of 7 mg/kg in sample Stack-Int, which is below the DOH Action Level of 400 mg/kg. Total metals as mercury, selenium and silver were not detected in the samples.

7.0 SUMMARY AND CONCLUSIONS

On April 7, 2000, Clayton conducted a subsurface investigation and collected ash samples for analysis at the Former Oahu Sugar Mill located in Waipahu, Oahu, Hawaii. Six soil samples were analyzed from six exploratory boreholes (B1, B2, B3, B4, B5, and B6) and two ash samples were collected from the interior and exterior of the existing smoke stack.

Total RCRA Metals analyses of the two ash samples indicated no concentrations of metals above either the DOH Tier 1 Action Levels or the PRGs.

The TPH-Scan indicated three of the six samples had no detectable concentrations of TPH. The remaining three samples, B2-15, B4-5, and B6-5, indicated TPH concentrations of 15 mg/kg, 480 mg/kg and 86 mg/kg, respectively. These concentrations are below the DOH Tier 1 Action Level of 5,000 mg/kg.

Samples B2-15, B4-5, and B6-5 were also analyzed for BTEX and PAH. The BTEX analyses indicated no detectable concentrations of BTEX in the three samples analyzed.

The PAH analyses indicated detectable concentrations of PAHs in two of the three samples analyzed (samples B4-5 and B6-5). In sample B6-5, the concentrations were below the DOH Tier 1 Action Levels. However, sample B4-5 reported a result of 14 mg/kg for benzo(a)pyrene and 22 mg/kg for fluoranthene. These concentrations are

above the DOH Tier 1 Action Levels of 1 mg/kg for benzo(a)pyrene and 11 mg/kg for fluoranthene.

Because PAH concentrations were detected in B-4 above DOH Tier 1 Action Levels, Clayton recommends that additional investigation be performed. The investigation will involve drilling of boreholes or excavation of test pits to assess the lateral and vertical extent of contamination in the vicinity of B-4.

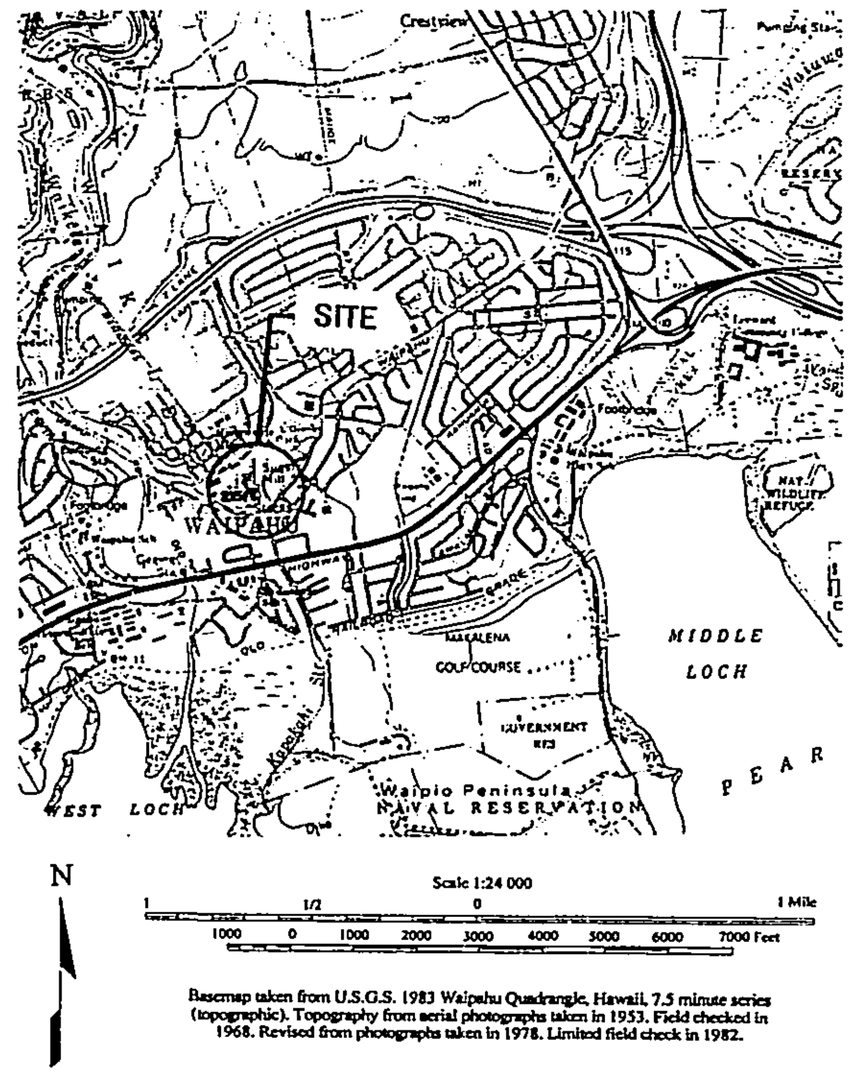
8.0 LIMITATIONS

The information and opinions rendered in this report are exclusively for use by YMCA of Honolulu. Clayton Group Services, Inc. will not distribute this report without your consent except as may be required by law or court order. The information and opinions expressed in this report are given in response to our limited assignment and should be evaluated and implemented only in light of that assignment. We accept responsibility for the competent performance of our duties in executing the assignment and preparing this report in accordance with the normal standards of our profession but disclaim any responsibility for consequential damages.

This report prepared by:	This report reviewed by:
John P. Rau, R.G. Senior Geologist Honolulu Regional Office	Daniel P. Ford, R.G. Director Honolulu Regional Office

FIGURES

Y 001587



Basemap taken from U.S.G.S. 1983 Waipahu Quadrangle, Hawaii, 7.5 minute series (topographic). Topography from aerial photographs taken in 1953. Field checked in 1968. Revised from photographs taken in 1978. Limited field check in 1982.

Clayton GROUP SERVICES	85-00167.00	VICINITY MAP	FIGURE 1
	5/4/00	Former Oahu Sugar Mill Property (Lot 31) Waipahu Street, Waipahu, Oahu, Hawaii	
	TJS		
	DPF	YMCA of Honolulu	

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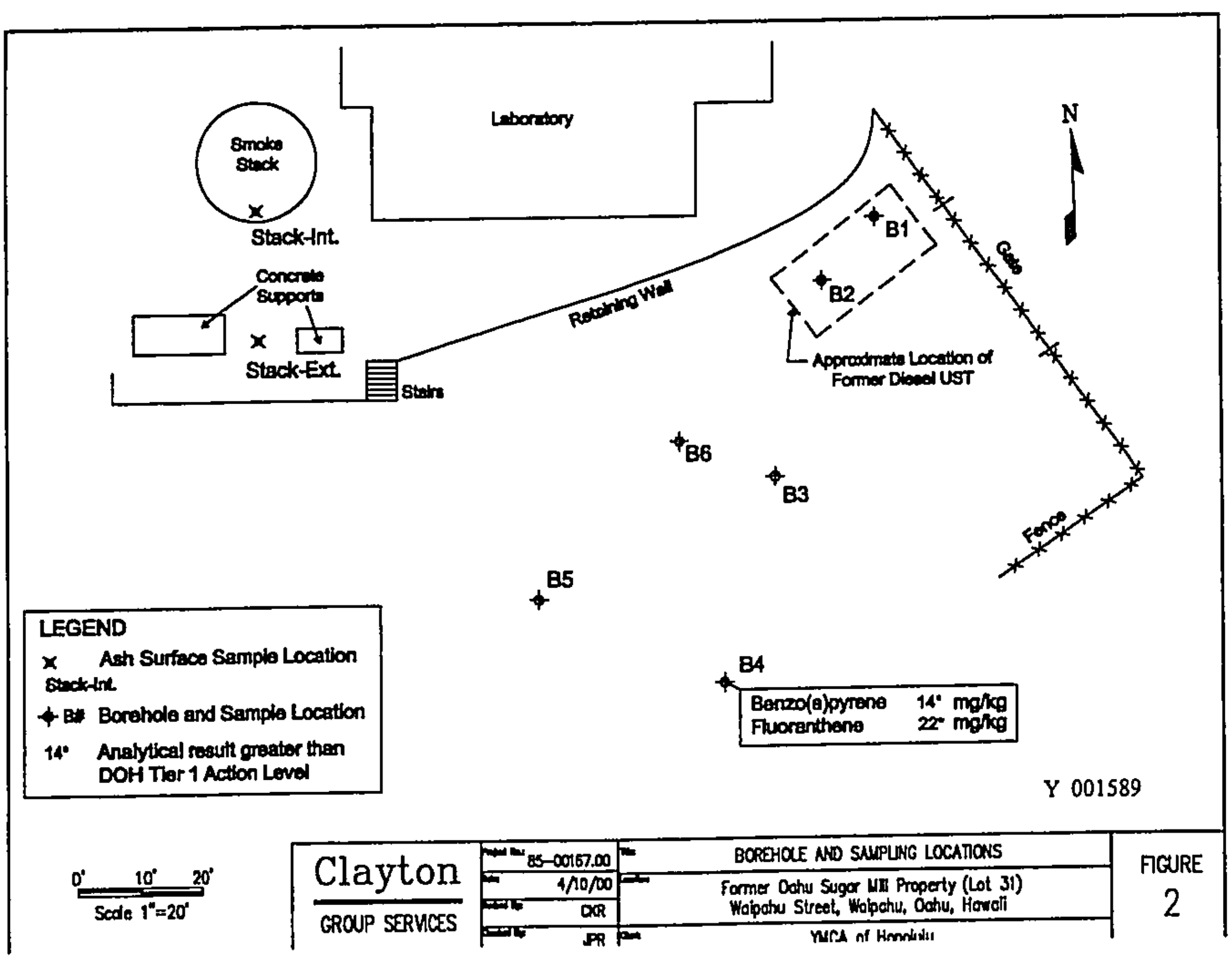
TABLES

Y 001590



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Clayton

TABLE 1
Subsurface Soil Sample Analytical Results
Former Oahu Sugar Mill Property
Waipahu, Oahu, Hawaii
Clayton Project No.: 85-00167.00
Sampling Date: April 7, 2000

Analyte	EPA Method	B1-15 (mg/kg)	B2-15 (mg/kg)	B3-5 (mg/kg)	B4-5 (mg/kg)	B5-5 (mg/kg)	B6-5 (mg/kg)	DOH Level
TPH SCAN								
C6-C12 GRO	8015M	ND (<10)	ND (<10)	ND (<10)	48	ND (<10)	ND (<10)	2,000
C13-C22 DRO	8015M	ND (<10)	ND (<10)	ND (<10)	160	ND (<10)	17	5,000
C23-C32 HRO	8015M	ND (<10)	15	ND (<10)	270	ND (<10)	69	5,000
TPH	8015M	ND (<30)	ND (<30)	ND (<30)	480	ND (<30)	86	5,000
BTEX								
Benzene	8021B	--	ND (<0.005)	--	ND (<0.005)	--	ND (<0.005)	1.7
Toluene	8021B	--	ND (<0.005)	--	ND (<0.005)	--	ND (<0.005)	34
Ethylbenzene	8021B	--	ND (<0.005)	--	ND (<0.005)	--	ND (<0.005)	0.5
Total Xylenes	8021B	--	ND (<0.005)	--	ND (<0.005)	--	ND (<0.005)	23
PAHs								
Acenaphthene	8270 SIM	--	ND (<0.05)	--	0.05	--	ND (<0.05)	18
Benzo(a)pyrene	8270 SIM	--	ND (<0.05)	--	**14***	--	0.11	1
Fluoranthene	8270 SIM	--	ND (<0.05)	--	**22***	--	0.14	11
Naphthalene	8270 SIM	--	ND (<0.05)	--	0.053	--	ND (<0.05)	41

EPA Environmental Protection Agency
mg/kg milligram per kilogram
DOH Department of Health
ND (<MDL) Not Detected followed by the laboratory method detection limit (MDL).
-- Not Analyzed
GRO Gasoline Range Organics
DRO Diesel Range Organics
HRO Heavy Oil Range Organics
SIM Selected Ion Monitoring
Bold* Result is greater than DOH Tier 1 Action Level

Notes
1. The Method Reporting Limit is elevated because of matrix interferences and because the sample required dilution.

Clayton

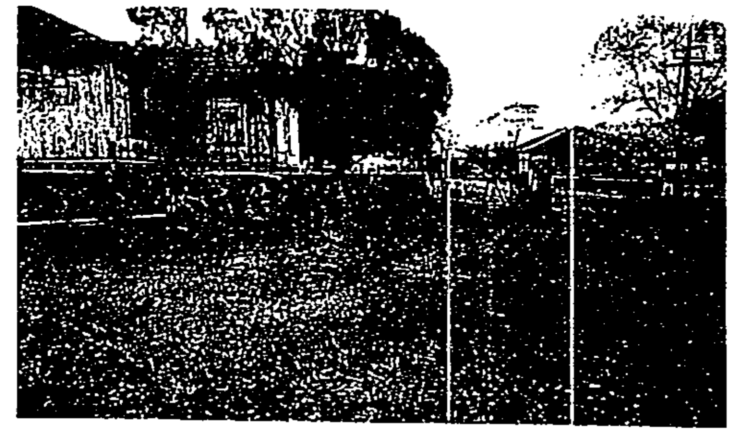
TABLE 2
Ash Sample Analytical Results
Former Oahu Sugar Mill Property
Waipahu, Oahu, Hawaii
Clayton Project No.: 85-00167.00
Sampling Date: April 7, 2000

Analyte	EPA Method	Stack-Int (mg/kg)	Stack-Ext (mg/kg)	DOH Level	EPA PRG
Total Arsenic	7060A	20	ND (<2.0)	NS	22
Total Barium	6010B	120	80	NS	5,400
Total Cadmium	6010B	1.0	ND (<1.0)	38	37
Total Chromium	6010B	130	9.0	NS	210
Total Lead	6010B	7.0	ND (<5.0)	400	400
Total Mercury	7471A	ND (<0.1)	ND (<0.1)	NS	23
Total Selenium	7740	ND (<5.0)	ND (<5.0)	NS	390
Total Silver	6010B	ND (<1.0)	ND (<1.0)	NS	390

EPA Environmental Protection Agency
DOH Department of Health
mg/kg milligram per kilogram
PRG Preliminary Remediation Goals
ND (<MDL) Not Detected followed by the laboratory method detection limit (MDL).
NS No Standard

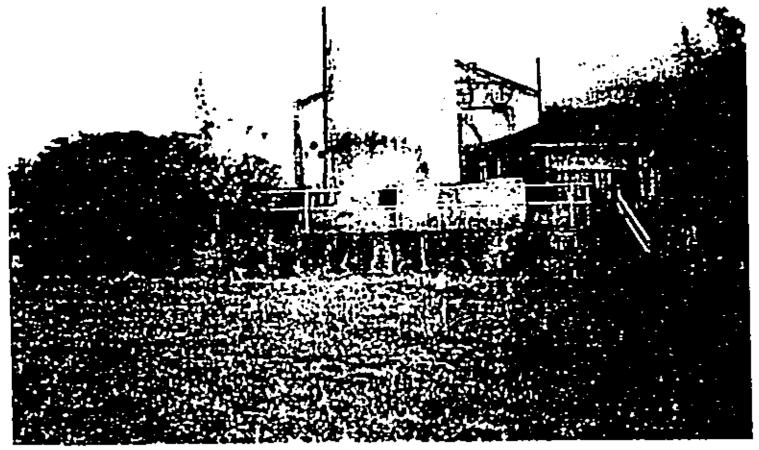
Clayton

PHOTOGRAPHS

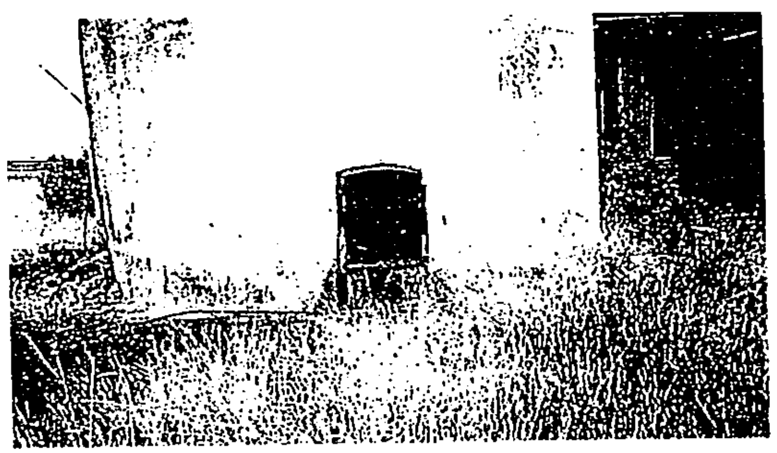


Clayton Project No.	Description	The former location of the 5,000-gallon diesel UST. The Laboratory building is visible in the left side of the photograph.	Photo 1
85-00167.00	Site Name	Former Oahu Sugar Mill Property, Waipahu, Oahu, Hawaii	Photo Date
	Client	YMCA of Honolulu	April 7, 2000

Clayton Project No.	Description	Direct Push Sampling (DPS) rig at borehole B-1.	Photo 2
85-00167.00	Site Name	Former Oahu Sugar Mill Property, Waipahu, Oahu, Hawaii	Photo Date
	Client	YMCA of Honolulu	April 7, 2000



Clayton Project No.	Description	Smoke stack	Photo 5
	Site Name	Former Oahu Sugar Mill Property, Waipahu, Oahu, Hawaii	Photo Date
85-00167.00	Client	YMCA of Honolulu	April 7, 2000



Clayton Project No.	Description	Interior of smoke stack.	Photo 6
	Site Name	Former Oahu Sugar Mill Property, Waipahu, Oahu, Hawaii	Photo Date
85-00167.00	Client	YMCA of Honolulu	April 7, 2000

Clayton

APPENDIX A

BORING LOGS

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Clayton
ENVIRONMENTAL CONSULTANTS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 85-00167.00	BORING/WELL NUMBER B-1
PROJECT NAME Former Oahu Sugar Mill	DATE DRILLED 4/7/00
LOCATION TMK: (1)9-4-161: Parcel 4, Waipahu, HI	CASING TYPE/DIAMETER N/A
DRILLING METHOD Direct Push Sampling	SCREEN TYPE/SLOT N/A
SAMPLING METHOD Geoprobe Large-Bore Sampler	GRAVEL PACK TYPE N/A
GROUND ELEVATION ~50-feet	GROUT TYPE/QUANTITY N/A
TOP OF CASING	DEPTH TO WATER
LOGGED BY J. Rau	GROUND WATER ELEVATION
REMARKS	

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
					5					
			L-BR		10			CLAYEY SILT; reddish brown (5YR 4/3); MH; 100% fines; non-plastic; stiff; dry; no odor.		
0.0	N/A	0.5	SMPL B1-11			MH			12.0	
			L-BR					CLAYEY SILT; dark reddish brown (5YR 3/2); MH; 95% fines, trace basalt and coralline sand; non-plastic; stiff; dry; no odor.		
0.0	N/A	0.5	SMPL B1-15		15				16.0	
								Borehole completed at 16 feet below grade surface.		

BORING_WELL 00167.GPJ CLEW_HI.GDT 4/27/00

Y 001598

Clayton
ENVIRONMENTAL CONSULTANTS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 85-00167.00
PROJECT NAME Former Oahu Sugar Mill
LOCATION TMK: [1]9-4-161: Parcel 4, Waipahu, HI
DRILLING METHOD Direct Push Sampling
SAMPLING METHOD Geoprobe Large-Bore Sampler
GROUND ELEVATION ~50-feet
TOP OF CASING
LOGGED BY J. Rau
REMARKS

BORING/WELL NUMBER B-2
DATE DRILLED 4/7/00
CASING TYPE/DIAMETER N/A
SCREEN TYPE/SLOT N/A
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	DEPTH (ft. BGL)	U.S.C.S.	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
				5				
0.0	N/A	0.5	L-BR SMPL B2-11	10	MH	CLAYEY SILT; reddish brown (5YR 4/3); MH; 90% fines, 10% basalt and coralline gravel; non-plastic; stiff; dry; no odor.	12.0	
0.0	N/A	0.5	L-BR SMPL B2-15	15		CLAYEY SILT; dark reddish brown (5YR 3/2); MH; 95% fines, trace basalt and coralline gravel; non-plastic; stiff; dry; no odor.	16.0	
						Borehole completed at 16 feet below grade surface.		

BORING WELL 00167.GPJ CLENV HI.GDT 4/7/00

Y-001599

Clayton
ENVIRONMENTAL CONSULTANTS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 85-00167.00
PROJECT NAME Former Oahu Sugar Mill
LOCATION TMK: [1]9-4-161: Parcel 4, Waipahu, HI
DRILLING METHOD Direct Push Sampling
SAMPLING METHOD Geoprobe Large-Bore Sampler
GROUND ELEVATION ~50-feet
TOP OF CASING
LOGGED BY J. Rau
REMARKS

BORING/WELL NUMBER B-3
DATE DRILLED 4/7/00
CASING TYPE/DIAMETER N/A
SCREEN TYPE/SLOT N/A
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	DEPTH (ft. BGL)	U.S.C.S.	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0.0	N/A	0.5	L-BR SMPL B3-5	5	MH	CLAYEY SILT; dark reddish brown (5YR 3/3); MH; 95% fines, trace basalt and coralline gravel; non-plastic; very stiff; moist; no odor.	6.0	
0.1	N/A	0.5	L-BR SMPL B3-10	10		CLAYEY SILT; dark reddish brown (5YR 3/2); MH; 95% fines, trace basalt and coralline gravel; non-plastic; stiff; dry; no odor.	12.0	
						Borehole completed at 12 feet below grade surface.		

BORING WELL 00167.GPJ CLENV HI.GDT 4/7/00

Y 001600

Clayton ENVIRONMENTAL CONSULTANTS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 85-00167.00
PROJECT NAME Former Oahu Sugar Mill
LOCATION TMK: 1119-4-161; Parcel 4, Waipahu, HI
DRILLING METHOD Direct Push Sampling
SAMPLING METHOD Geoprobe Large-Bore Sampler
GROUND ELEVATION ~50-feet
TOP OF CASING
LOGGED BY J. Rau
REMARKS

BORING/WELL NUMBER B-4
DATE DRILLED 4/7/00
CASING TYPE/DIAMETER N/A
SCREEN TYPE/SLOT N/A
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0.7	N/A	0.5	L-BR SMPL B4-5		5	MH		CLAYEY SILT; dark reddish brown (5YR 2.5/2) with black streaks; MH; 95% fines, trace basalt and coralline sand; low plasticity; very stiff; moist; no odor.	6.0	
								Refusal at 7 feet below grade surface. Borehole complete.	7.0	

BORING_WELL 00167.GPJ CLENV_HI.GDT 4/7/00

Y 001601

Clayton ENVIRONMENTAL CONSULTANTS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 85-00167.00
PROJECT NAME Former Oahu Sugar Mill
LOCATION TMK: 1119-4-161; Parcel 4, Waipahu, HI
DRILLING METHOD Direct Push Sampling
SAMPLING METHOD Geoprobe Large-Bore Sampler
GROUND ELEVATION ~50-feet
TOP OF CASING
LOGGED BY J. Rau
REMARKS

BORING/WELL NUMBER B-5
DATE DRILLED 4/7/00
CASING TYPE/DIAMETER N/A
SCREEN TYPE/SLOT N/A
GRAVEL PACK TYPE N/A
GROUT TYPE/QUANTITY N/A
DEPTH TO WATER
GROUND WATER ELEVATION

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0.0	N/A	0.5	L-BR SMPL B5-5		5	MH		CLAYEY SILT; dark reddish brown (5YR 3/2); MH; 95% fines, trace gravel and sand; non-plastic; stiff; dry; no odor.	6.0	
								Refusal at 7 feet below grade surface. Borehole complete.	7.0	

BORING_WELL 00167.GPJ CLENV_HI.GDT 4/7/00

Y 001602

Clayton
ENVIRONMENTAL CONSULTANTS

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 85-00167.00	BORING/WELL NUMBER B-6
PROJECT NAME Former Oahu Sugar Mill	DATE DRILLED 4/7/00
LOCATION TMK: 1(1)9-4-161; Parcel 4, Waipahu, HI	CASING TYPE/DIAMETER N/A
DRILLING METHOD Direct Push Sampling	SCREEN TYPE/SLOT N/A
SAMPLING METHOD Geoprobe Large-Bore Sampler	GRAVEL PACK TYPE N/A
GROUND ELEVATION ~50-feet	GROUT TYPE/QUANTITY N/A
TOP OF CASING	DEPTH TO WATER
LOGGED BY J. Rau	GROUND WATER ELEVATION
REMARKS	

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft. BGL)	U.S.C.S.	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	CONTACT DEPTH	WELL DIAGRAM
0.0	N/A	0.5	L-BR SMPL B6-5		5	MH		CLAYEY SILT; dark reddish brown (5YR 3/2); MH; 100% fines; non-plastic; stiff; dry; no odor.	6.0	
0.0	N/A	0.5	L-BR SMPL B6-10					CLAYEY SILT; dark reddish brown (5YR 3/2); MH; 100% fines; non-plastic; stiff; dry; no odor.	12.0	
								Borehole completed at 12 feet below grade surface.		

BORING_WELL 00167.GPJ CLEHV HI.GDT 4/27/00

Y 001603

Clayton

APPENDIX B

LABORATORY ANALYTICAL REPORTS
AND
CHAIN OF CUSTODY FORM

Columbia Analytical Services INC
An Employee-Owned Company

April 28, 2000

John Rau
Clayton Environmental Consultants
970 N. Kalaheo Ave.
C316
Kailua, HI 96734

Re: Former Oahu Sugar Mill/Project # 85-00167.00

Dear John:

Enclosed are the results of the samples submitted to our laboratory on April 10, 2000. For your reference, these analyses have been assigned our service request number L2001292.

All analyses were performed in accordance with our laboratory's quality assurance program. Results are intended to be considered in their entirety and apply only to the samples analyzed. Columbia Analytical Services is not responsible for use of less than the complete report.

Columbia Analytical Services is certified for environmental analyses by the California Department of Health Services (certificate number: 1296A, expiration: August 31, 2000).

If you have any questions, please call me at (818) 587-5550, extension 310.

Respectfully submitted,

Columbia Analytical Services, Inc.

L. Ross Fenstermaker
Project Chemist

LRF/md

Columbia Analytical Services, Inc.

Acronyms

8015M	California DHS LUFT Method
A2LA	American Association for Laboratory Accreditation
ASTM	American Society for Testing and Materials
BOD	Biochemical Oxygen Demand
BTEX	Benzene/Toluene/Ethylbenzene/Xylenes
CAM	California Assessment Metals
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service Registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
COD	Chemical Oxygen Demand
CRDL	Contract Required Detection Limit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOE	Department of Ecology
DOH or DHS	Department of Health Services
ELAP	Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank sample
ICP	Inductively Coupled Plasma atomic emission spectrometry
ICV	Initial Calibration Verification sample
J	Estimated concentration. The value is less than the MRL, but greater than or equal to the MDL. If the value is equal to the MRL, the result is actually <MRL before rounding.
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified
MBAS	Methylene Blue Active Substances
MCL	Maximum Contaminant Level. The highest permissible concentration of a substance allowed in drinking water as established by the U.S. EPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl-tert-Butyl Ether
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the paper industry for Air and Stream Improvement
ND	None Detected at or above the Method Reporting/Detection Limit (MRL/MDL)
NIOSH	National Institute for Occupational Safety and Health
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	*Standard Methods for the Examination of Water and Wastewater*, 18th Ed., 1992.
STLC	Solubility Threshold Limit Concentration
SW	*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, 1986 and as amended by Updates I, II, IIA, and IIB.
TCLP	Toxicity Characteristics Leaching Procedure
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL. If the value is equal to the PQL, the result is actually <PQL before rounding.
TRPH	Total Recoverable Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)

Y 001606

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: 4/7/00
Date Received: 4/10/00

BTEX

Sample Name: B2-15
Lab Code: L2001292-004
Test Notes:

Units: mg/Kg (ppm)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	
Toluene	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	
Ethylbenzene	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	
Xylenes, Total	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	

Approved By: [signature] Date: 4-28-00

Y 001607

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/15-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: 4/7/00
Date Received: 4/10/00

BTEX

Sample Name: B4-5
Lab Code: L2001292-007
Test Notes:

Units: mg/Kg (ppm)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	
Toluene	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	
Ethylbenzene	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	
Xylenes, Total	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	

Approved By: _______ Date: 4-21-00

Y 001608

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/15-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: 4/7/00
Date Received: 4/10/00

BTEX

Sample Name: B6-5
Lab Code: L2001292-009
Test Notes:

Units: mg/Kg (ppm)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	
Toluene	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	
Ethylbenzene	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	
Xylenes, Total	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	

Approved By: _______ Date: 4-28-00

Y 001609

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: NA
Date Received: NA

BTEX

Sample Name: Method Blank
Lab Code: L200414-MB1
Test Notes:

Units: mg/Kg (ppm)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Benzene	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	
Toluene	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	
Ethylbenzene	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	
Xylenes, Total	EPA 5030	8021B	0.005	1	NA	4/14/00	ND	

Approved By: JH Date: 4-18-00 Y 001610

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: 4/7/00
Date Received: 4/10/00

Hydrocarbon Scan / Fuel Characterization

Sample Name: B1-15
Lab Code: L2001292-002
Test Notes: X5

Units: mg/Kg (ppm)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
C6 - C12 GRO	EPA 3550M	8015M	10	1	4/11/00	4/11/00	ND	
C13 - C22 DRO	EPA 3550M	8015M	10	1	4/11/00	4/11/00	ND	
C23 - C32 HRO	EPA 3550M	8015M	10	1	4/11/00	4/11/00	ND	
Total Petroleum Hydrocarbons	EPA 3550M	8015M	30	1	4/11/00	4/11/00	ND	
Fuel Characterization	EPA 3550M	8015M					NA	

GRO Gasoline Range Organics
DRO Diesel Range Organics
HRO Heavy Oil Range Organics
X5 Quantified with diesel fuel.

Approved By: JH Date: 4-28-00 Y 001611

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: 4/7/00
Date Received: 4/10/00

Hydrocarbon Scan / Fuel Characterization

Sample Name: B2-15
Lab Code: L2001292-004
Test Notes: X5

Units: mg/Kg (ppm)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
C6 - C12 GRO	EPA 3550M	8015M	10	1	4/11/00	4/12/00	ND	
C13 - C22 DRO	EPA 3550M	8015M	10	1	4/11/00	4/12/00	ND	
C23 - C32 HRO	EPA 3550M	8015M	10	1	4/11/00	4/12/00	15	
Total Petroleum Hydrocarbons	EPA 3550M	8015M	30	1	4/11/00	4/12/00	ND	
Fuel Characterization	EPA 3550M	8015M						HC3

GRO Gasoline Range Organics
DRO Diesel Range Organics
HRO Heavy Oil Range Organics
X5 Quantified with diesel fuel.

HC3 Chromatogram fingerprint is not characteristic of any particular fuel type; however, hydrocarbons eluting within the stated carbon range(s) were detected.

Approved By: [signature] Date: 4-28-00 Y 001612

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: 4/7/00
Date Received: 4/10/00

Hydrocarbon Scan / Fuel Characterization

Sample Name: B3-5
Lab Code: L2001292-005
Test Notes: X5

Units: mg/Kg (ppm)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
C6 - C12 GRO	EPA 3550M	8015M	10	1	4/11/00	4/11/00	ND	
C13 - C22 DRO	EPA 3550M	8015M	10	1	4/11/00	4/11/00	ND	
C23 - C32 HRO	EPA 3550M	8015M	10	1	4/11/00	4/11/00	ND	
Total Petroleum Hydrocarbons	EPA 3550M	8015M	30	1	4/11/00	4/11/00	ND	
Fuel Characterization	EPA 3550M	8015M					NA	

GRO Gasoline Range Organics
DRO Diesel Range Organics
HRO Heavy Oil Range Organics
X5 Quantified with diesel fuel.

Approved By: [signature] Date: 4-28-00 Y 001613

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/15-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: 4/7/00
Date Received: 4/10/00

Hydrocarbon Scan / Fuel Characterization

Sample Name: B4-5
Lab Code: L2001292-007
Test Notes: X5

Units: mg/Kg (ppm)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
C6 - C12 GRO	EPA 3550M	8015M	10	2	4/11/00	4/12/00	48	
C13 - C22 DRO	EPA 3550M	8015M	10	2	4/11/00	4/12/00	160	
C23 - C32 HRO	EPA 3550M	8015M	10	2	4/11/00	4/12/00	270	
Total Petroleum Hydrocarbons	EPA 3550M	8015M	30	2	4/11/00	4/12/00	480	
Fuel Characterization	EPA 3550M	8015M						HC3

GRO Gasoline Range Organics
DRO Diesel Range Organics
HRO Heavy Oil Range Organics
X5 Quantified with diesel fuel.

HC3 Chromatogram fingerprint is not characteristic of any particular fuel type; however, hydrocarbons eluting within the stated carbon range(s) were detected.

Approved By: JH Date: 4-28-00 Y 001614

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/15-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: 4/7/00
Date Received: 4/10/00

Hydrocarbon Scan / Fuel Characterization

Sample Name: B5-3
Lab Code: L2001292-008
Test Notes: X5

Units: mg/Kg (ppm)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
C6 - C12 GRO	EPA 3550M	8015M	10	1	4/11/00	4/11/00	ND	
C13 - C22 DRO	EPA 3550M	8015M	10	1	4/11/00	4/11/00	ND	
C23 - C32 HRO	EPA 3550M	8015M	10	1	4/11/00	4/11/00	ND	
Total Petroleum Hydrocarbons	EPA 3550M	8015M	30	1	4/11/00	4/11/00	ND	
Fuel Characterization	EPA 3550M	8015M					NA	

GRO Gasoline Range Organics
DRO Diesel Range Organics
HRO Heavy Oil Range Organics
X5 Quantified with diesel fuel.

Approved By: JH Date: 4-28-00 Y 001615

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Clayton Group Services, Inc.	Service Request:	L2001292
Project:	Former Oahu Sugar Mill/85-00167.00	Date Collected:	4/7/00
Sample Matrix:	Soil	Date Received:	4/10/00

Hydrocarbon Scan / Fuel Characterization

Sample Name:	B6-5	Units:	mg/Kg (ppm)
Lab Code:	L2001292-009	Basis:	Wet
Test Notes:	X5		

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
C6 - C12 GRO	EPA 3550M	8015M	10	1	4/11/00	4/12/00	ND	
C13 - C22 DRO	EPA 3550M	8015M	10	1	4/11/00	4/12/00	17	
C23 - C32 HRO	EPA 3550M	8015M	10	1	4/11/00	4/12/00	69	
Total Petroleum Hydrocarbons	EPA 3550M	8015M	30	1	4/11/00	4/12/00	86	
Fuel Characterization	EPA 3550M	8015M						HC3

GRO Gasoline Range Organics
DRO Diesel Range Organics
HRO Heavy Oil Range Organics
X5 Quantified with diesel fuel.

HC3 Chromatogram fingerprint is not characteristic of any particular fuel type; however, hydrocarbons eluting within the stated carbon range(s) were detected.

Approved By: ________ Date: 4-28-00 Y 001616

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Clayton Group Services, Inc.	Service Request:	L2001292
Project:	Former Oahu Sugar Mill/85-00167.00	Date Collected:	NA
Sample Matrix:	Soil	Date Received:	NA

Hydrocarbon Scan / Fuel Characterization

Sample Name:	Method Blank	Units:	mg/Kg (ppm)
Lab Code:	L200411-MB	Basis:	Wet
Test Notes:	X5		

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
C6 - C12 GRO	EPA 3550M	8015M	10	1	4/11/00	4/11/00	ND	
C13 - C22 DRO	EPA 3550M	8015M	10	1	4/11/00	4/11/00	ND	
C23 - C32 HRO	EPA 3550M	8015M	10	1	4/11/00	4/11/00	ND	
Total Petroleum Hydrocarbons	EPA 3550M	8015M	30	1	4/11/00	4/11/00	ND	
Fuel Characterization	EPA 3550M	8015M					NA	

GRO Gasoline Range Organics
DRO Diesel Range Organics
HRO Heavy Oil Range Organics
X5 Quantified with diesel fuel.

Approved By: ________ Date: 4-28-00 Y 001617

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/15-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: 4/7/00
Date Received: 4/10/00

Selected Ion Monitoring (SIM)
Base Neutral Semivolatile Organic Compounds

Sample Name: B2-15
Lab Code: L2001292-004
Test Notes: C2A

Units: ug/Kg (ppb)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Naphthalene	EPA 3550	8270SIM	5	10	4/20/00	4/21/00	<50	
Acenaphthene	EPA 3550	8270SIM	5	10	4/20/00	4/21/00	<50	
Fluoranthene	EPA 3550	8270SIM	5	10	4/20/00	4/21/00	<50	
Benzo(a)pyrene	EPA 3550	8270SIM	5	10	4/20/00	4/21/00	<50	

C2A MRL is elevated because of matrix interferences and because the sample required diluting.

Approved By: ___ Date: 4-28-00

Y 001618

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/15-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: 4/7/00
Date Received: 4/10/00

Selected Ion Monitoring (SIM)
Base Neutral Semivolatile Organic Compounds

Sample Name: B4-5
Lab Code: L2001292-007
Test Notes: C2A

Units: ug/Kg (ppb)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Naphthalene	EPA 3550	8270SIM	5	10	4/20/00	4/21/00	53	
Acenaphthene	EPA 3550	8270SIM	5	10	4/20/00	4/21/00	50	
Fluoranthene	EPA 3550	8270SIM	5	500	4/20/00	4/21/00	22000	
Benzo(a)pyrene	EPA 3550	8270SIM	5	500	4/20/00	4/21/00	14000	

C2A MRL is elevated because of matrix interferences and because the sample required diluting.

Approved By: ___ Date: 4-28-00

Y 001619

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: 4/7/00
Date Received: 4/10/00

Selected Ion Monitoring (SIM)
Base Neutral Semivolatile Organic Compounds

Sample Name: B6-5
Lab Code: L2001292-009
Test Notes: C2A

Units: ug/Kg (ppb)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Naphthalene	EPA 3550	8270SIM	5	10	4/20/00	4/21/00	<50	
Acenaphthene	EPA 3550	8270SIM	5	10	4/20/00	4/21/00	<50	
Fluoranthene	EPA 3550	8270SIM	5	10	4/20/00	4/21/00	140	
Benzo(a)pyrene	EPA 3550	8270SIM	5	10	4/20/00	4/21/00	110	

C2A MRL is elevated because of matrix interferences and because the sample required diluting.

Approved By: [signature] Date: 4-28-00 Y 001620

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: NA
Date Received: NA

Selected Ion Monitoring (SIM)
Base Neutral Semivolatile Organic Compounds

Sample Name: Method Blank
Lab Code: L200420-MB
Test Notes:

Units: ug/Kg (ppb)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Naphthalene	EPA 3550	8270SIM	5	1	4/20/00	4/20/00	ND	
Acenaphthene	EPA 3550	8270SIM	5	1	4/20/00	4/20/00	ND	
Fluoranthene	EPA 3550	8270SIM	5	1	4/20/00	4/20/00	ND	
Benzo(a)pyrene	EPA 3550	8270SIM	5	1	4/20/00	4/20/00	ND	

Approved By: [signature] Date: 4-21-00 Y 001621

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
BTEX

Prep Method: EPA 5030
Analysis Method: 8021B

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Test Notes	Percent Recovery 4-Bromofluorobenzene
B2-15	L2001292-004		71
B4-5	L2001292-007		64
B6-5	L2001292-009		86
Method Blank	L200414-MB1		95
Batch QC	L2001314-014MS		86
Batch QC	L2001314-014DMS		93

CAS Acceptance Limits: 60-130

Approved By: ___ Date: 4-28-00 Y 001622

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 4/14/00

Matrix Spike/Duplicate Matrix Spike Summary
BTEX

Sample Name: Batch QC
Lab Code: L2001314-014MS, L2001314-014DMS
Test Notes:

Units: mg/Kg (ppm)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Benzene	EPA 5030	8021B	0.005	0.0127	0.0127	ND	0.0127	0.0140	100	110	39-150	10	
Toluene	EPA 5030	8021B	0.005	0.140	0.140	0.00822	0.153	0.170	109	121	46-148	11	
Ethylbenzene	EPA 5030	8021B	0.005	0.0352	0.0352	ND	0.0339	0.0367	96	104	32-160	8	

Approved By: ___ Date: 4-28-00

Y 001623

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: NA
Date Received: NA
Date Extracted: 4/11/00
Date Analyzed: 4/11/00

Matrix Spike/Duplicate Matrix Spike Summary
Hydrocarbon Scan / Fuel Characterization

Sample Name: B5-5
Lab Code: L2001292-008MS, L2001292-008DMS
Test Notes:

Units: mg/Kg (ppm)
Basis: Wet

										Percent Recovery				
Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	MS	DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Diesel	EPA 3550M	8015M	10	200	200	ND	169	139	84	70	41-136	19	

Approved By: ___ Date: 4-28-00

Y 001625

Y 001624

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: NA

Surrogate Recovery Summary
Selected Ion Monitoring (SIM)

Prep Method: EPA 3550
Analysis Method: 8270SIM

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Test Notes	Percent Recovery Nitrobenzene-d5	2-Fluorobiphenyl	Terphenyl-d14
B2-15	L2001292-004		77	94	102
B4-5	L2001292-007		77	94	78
B6-5	L2001292-009		76	100	102
Method Blank	L200420-MB		102	104	109
Batch QC	L2001329-004MS		104	97	122
Batch QC	L2001329-004DMS		104	98	125
CAS Acceptance Limits:			23-120	30-115	18-137

Spiked Amount =

Approved By: _Ht_ Date: 4-28-00 Y 001626

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Soil

Service Request: L2001292
Date Collected: NA
Date Received: NA
Date Extracted: 4/20/00
Date Analyzed: 4/20/00

Matrix Spike/Duplicate Matrix Spike Summary
Selected Ion Monitoring (SIM)

Sample Name: Batch QC
Lab Code: L2001329-004MS, L2001329-004DMS
Test Notes:

Units: ug/Kg (ppb)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Naphthalene	EPA 3550	8270SIM	5	33.3	33.3	ND	29.3	29.3	88	88	60-140	<1	
Acenaphthene	EPA 3550	8270SIM	5	33.3	33.3	ND	30.7	30.7	92	92	60-140	<1	
Phenanthrene	EPA 3550	8270SIM	5	33.3	33.3	ND	31.3	30.3	94	91	60-140	3	
Pyrene	EPA 3550	8270SIM	5	33.3	33.3	ND	32.3	33.7	97	101	60-140	4	

Approved By: _Ht_ Date: 4-28-00 Y 001627

Page No.:

Columbia Analytical Services INC.
An Employee-Owned Company

April 28, 2000

John Rau
Clayton Group Services, Inc.
970 N. Kalaheo Avenue
#C316
Kailua, HI 96734

Re: Former Oahu Sugar Mill/Project #85-00167.00

Dear John:

Enclosed are the results of the samples submitted to our laboratory on April 10, 2000. For your reference, these analyses have been assigned our service request number L2001293.

All analyses were performed in accordance with our laboratory's quality assurance program. Results are intended to be considered in their entirety and apply only to the samples analyzed. Columbia Analytical Services is not responsible for use of less than the complete report.

Columbia Analytical Services is certified for environmental analyses by the California Department of Health Services (certificate number: 1296A, expiration: August 31, 2000).

If you have any questions, please call me at (818) 587-5550, extension 310.

Respectfully submitted,

Columbia Analytical Services, Inc.

L. Ross Fenstermaker
Project Chemist

LRF/

Y 001629

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

Columbia Analytical Services INC. 6925 Canoga Avenue • Canoga Park, CA 91303 • (818) 587-5550 • Fax (818) 587-5555

DATE 4-7-00 PAGE 1 OF 1

PROJECT NAME Former Oahu Sugar Mill 85-00167.00
PROJECT MANAGER John Rau
COMPANY/ADDRESS Clayton Group Services
970 North Kalaheo Avenue, C-316
Kailua, HI 96734 PHONE (808) 521-6708
SAMPLERS SIGNATURE

ANALYSIS REQUESTED: L2001292

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	TPH Gas/BTEX 8015/8020	TPH 8015 Modified Diesel / FCO Gasoline C	BTEX 8020	Total Petroleum Hydrocarbons EPA 418.1	Halogenated Volatiles 8010/8010	Volatile Organics GC/MS 8240/8260	Base Neutral/Acid Organics GC/MS 8270 - PAHs	CAM Metals 6010/7000	REMARKS
B1-11	4-7-00	0827	1	Soil	1									
B1-15	4-7-00	0844	2		1		X							
B2-11	4-7-00	0857	3		1									
B2-15	4-7-00	0909	4		1		X	✓				✓		
B3-5	4-7-00	0930	5		1		X							
B3-10	4-7-00	0940	6		1									
B4-5	4-7-00	0950	7		1		X	✓				✓		
B5-5	4-7-00	1007	8		1		X							
B6-5	4-7-00	1019	9		1		X	✓				✓		
B6-10	4-7-00	1026	10	Soil	1									

RELINQUISHED BY: John P. Rau, Signature; Printed Name John P. Rau; Firm Clayton Group Services; Date/Time 4/10/00 0840

RECEIVED BY: Tracie Sobbe, Signature; Printed Name TRACIE SOBBE; Firm VNP-CAS; Date/Time 4/10/00 840

TURNAROUND REQUIREMENTS: ___ 24 hr. ___ 48 hr. ___ 5 day; X Standard; ___ Other (Specify); X Provide Verbal Preliminary Results; Requested Report Date ______

REPORT REQUIREMENTS: ___ I. Routine Report; ___ II. Report (includes DUP, MS, MSD, as required, may be charged as samples); ___ III. Data Validation Report (includes All Raw Data); ___ RWQCB

INVOICE INFORMATION: P.O.# ______; Bill To Clayton Group Services

SAMPLE RECEIPT: Shipping VIA: ______; Shipping #: ______; Condition: ______; Lab No: ______

RELINQUISHED BY: Tracie Sobbe, Signature; Printed Name TRACIE SOBBE; Firm VNP CAS; Date/Time 4/10/00 1000

RECEIVED BY: Signature; Printed Name Lacey Cricler; Firm CAS; Date/Time 4/11/00 @ 0950 via Fed Ex

SPECIAL INSTRUCTIONS/COMMENTS:

Y 001628

Columbia Analytical Services, Inc.

Acronyms

8015M	California DHS LUFT Method
A2LA	American Association for Laboratory Accreditation
ASTM	American Society for Testing and Materials
BOD	Biochemical Oxygen Demand
BTEX	Benzene/Toluene/Ethylbenzene/Xylenes
CAM	California Assessment Metals
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service Registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
COD	Chemical Oxygen Demand
CRDL	Contract Required Detection Limit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOE	Department of Ecology
DOH or DHS	Department of Health Services
ELAP	Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank sample
ICP	Inductively Coupled Plasma atomic emission spectrometry
ICV	Initial Calibration Verification sample
J	Estimated concentration. The value is less than the MRL, but greater than or equal to the MDL. If the value is equal to the MDL, the result is actually <MDL before rounding.
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified
MBAS	Methylene Blue Active Substances
MCL	Maximum Contaminant Level. The highest permissible concentration of a substance allowed in drinking water as established by the U.S. EPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl-tert-Butyl Ether
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the paper industry for Air and Stream Improvement
ND	None Detected at or above the Method Reporting/Detection Limit (MRL/MDL)
NIOSH	National Institute for Occupational Safety and Health
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	*Standard Methods for the Examination of Water and Wastewater*, 18th Ed., 1992.
STLC	Solubility Threshold Limit Concentration
SW	*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, 1986 and as amended by Updates I, II, IIA, and IIB.
TCLP	Toxicity Characteristics Leaching Procedure
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL. If the value is equal to the PQL, the result is actually <PQL before rounding.
TRPH	Total Recoverable Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Solid

Service Request: L2001293
Date Collected: 4/7/00
Date Received: 4/10/00

Metals

Sample Name: STACK-INT
Lab Code: L2001293-001
Test Notes:

Units: mg/Kg (ppm)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Digested	Date Analyzed	Result	Result Notes
Arsenic, Total	EPA 3050B	7060A	2	1	4/12/00	4/12/00	20	
Barium, Total	EPA 3050B	6010B	1	1	4/12/00	4/13/00	120	
Cadmium, Total	EPA 3050B	6010B	1	1	4/12/00	4/13/00	1	
Chromium, Total	EPA 3050B	6010B	2	1	4/12/00	4/13/00	130	
Lead, Total	EPA 3050B	6010B	5	1	4/12/00	4/13/00	7	
Mercury, Total	METHOD	7471A	0.1	1	4/11/00	4/12/00	ND	
Selenium, Total	EPA 3050B	7740	5	1	4/12/00	4/13/00	ND	
Silver, Total	EPA 3050B	6010B	1	1	4/12/00	4/13/00	ND	

Approved By: [signature] Date: 4-28-00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/15-00167.00
Sample Matrix: Solid

Service Request: L2001293
Date Collected: 4/7/00
Date Received: 4/10/00

Metals

Sample Name: STACK-EXT
Lab Code: L2001293-002
Test Notes:

Units: mg/Kg (ppm)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Digested	Date Analyzed	Result	Result Notes
Arsenic, Total	EPA 3050B	7060A	2	1	4/12/00	4/12/00	ND	
Barium, Total	EPA 3050B	6010B	1	1	4/12/00	4/13/00	80	
Cadmium, Total	EPA 3050B	6010B	1	1	4/12/00	4/13/00	ND	
Chromium, Total	EPA 3050B	6010B	2	1	4/12/00	4/13/00	9	
Lead, Total	EPA 3050B	6010B	5	1	4/12/00	4/13/00	ND	
Mercury, Total	METHOD	7471A	0.1	1	4/11/00	4/12/00	ND	
Selenium, Total	EPA 3050B	7740	5	1	4/12/00	4/13/00	ND	
Silver, Total	EPA 3050B	6010B	1	1	4/12/00	4/13/00	ND	

Approved By: Ht Date: 4-28-00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/15-00167.00
Sample Matrix: Solid

Service Request: L2001293
Date Collected: NA
Date Received: NA

Metals

Sample Name: Method Blank
Lab Code: L200412-MB3
Test Notes:

Units: mg/Kg (ppm)
Basis: Wet

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Digested	Date Analyzed	Result	Result Notes
Arsenic, Total	EPA 3050B	7060A	2	1	4/12/00	4/12/00	ND	
Barium, Total	EPA 3050B	6010B	1	1	4/12/00	4/13/00	ND	
Cadmium, Total	EPA 3050B	6010B	1	1	4/12/00	4/13/00	ND	
Chromium, Total	EPA 3050B	6010B	2	1	4/12/00	4/13/00	ND	
Lead, Total	EPA 3050B	6010B	5	1	4/12/00	4/13/00	ND	
Mercury, Total	METHOD	7471A	0.1	1	4/11/00	4/12/00	ND	
Selenium, Total	EPA 3050B	7740	5	1	4/12/00	4/13/00	ND	
Silver, Total	EPA 3050B	6010B	1	1	4/12/00	4/13/00	ND	

Approved By: Ht Date: 4-28-00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Solid

Service Request: L2001293
Date Collected: NA
Date Received: NA
Date Digested: 4/12/00
Date Analyzed: 4/13/00

Matrix Spike/Duplicate Matrix Spike Summary
Metals

Sample Name: Batch QC
Lab Code: L2001239-001MS, L2001239-001DMS
Test Notes:

Units: mg/Kg (ppm)
Basis: Wet

										Percent Recovery				
												CAS	Relative	
	Prep	Analysis		Spike Level		Sample	Spike Result					Acceptance	Percent	Result
Analyte	Method	Method	MRL	MS	DMS	Result	MS	DMS	MS	DMS		Limits	Difference	Notes
Arsenic, Total	EPA 3050B	7060A	5	20.0	20.0	3.2	18.2	19.8	75	83		75-125	8	
Barium, Total	EPA 3050B	6010B	1	125	125	37.3	139	159	81	97		75-125	13	
Cadmium, Total	EPA 3050B	6010B	1	10.0	10.0	ND	9.40	9.40	94	94		75-125	<1	
Chromium, Total	EPA 3050B	6010B	2	50.0	50.0	8.4	50.8	52.3	85	88		75-125	3	
Lead, Total	EPA 3050B	6010B	5	50.0	50.0	8.1	53.0	51.4	90	87		75-125	3	
Selenium, Total	EPA 3050B	7740	5	20.0	20.0	ND	19.3	18.2	97	91		75-125	6	
Silver, Total	EPA 3050B	6010B	1	25.0	25.0	ND	20.8	20.3	83	81		75-125	2	

Approved By: ______ Kt ______ Date: 4-28-00

Y 001634

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Clayton Group Services, Inc.
Project: Former Oahu Sugar Mill/85-00167.00
Sample Matrix: Solid

Service Request: L2001293
Date Collected: NA
Date Received: NA
Date Digested: 4/11/00
Date Analyzed: 4/12/00

Matrix Spike/Duplicate Matrix Spike Summary
Metals

Sample Name: Batch QC
Lab Code: L2001279-001MS, L2001279-001DMS
Test Notes:

Units: mg/Kg (ppm)
Basis: Wet

									Percent Recovery				
											CAS	Relative	
	Prep	Analysis		Spike Level		Sample	Spike Result				Acceptance	Percent	Result
Analyte	Method	Method	MRL	MS	DMS	Result	MS	DMS	MS	DMS	Limits	Difference	Notes
Mercury, Total	METHOD	7471A	0.1	0.500	0.500	ND	0.497	0.500	99	100	75-125	<1	

Approved By: ______ Kt ______ Date: 4-28-00

Y 001635

Columbia Analytical Services[inc] 537

6925 Canoga Avenue • Canoga Park, CA 91303 • (818) 587-5550 • Fax (818) 587-5555

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 4-7-00 PAGE 1 OF 1

PROJECT NAME Former Oahu Sugar Mill # 85-00167.00

PROJECT MANAGER John Rau

COMPANY/ADDRESS Clayton Group Services
920 North Kalaheo Avenue, C-316
Kailua, Hawaii 96734 PHONE (808) 531-6705

SAMPLERS SIGNATURE [signature]

L2001293 ANALYSIS REQUESTED

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	TPH Gas/BTEX 8015/8020/602	TPH/8015 Modified Diesel □ FC □ Gasoline □	BTEX 8020/8020	Total Petroleum Hydrocarbons EPA 418.1	Halogenated Volatiles 601/8010	Volatile Organics GC/MS 624/8240/8260	Base Neutral Acid Organic GC/MS 625/8270	Metals 6010/7000 RCRA TOTAL	REMARKS
STACK-INT	4-7-00	1052	1	Solid/Ash	1								X	
STACK-EXT	4-7-00	1054	2	Solid/Ash	1								X	

RELINQUISHED BY:	RECEIVED BY:
Signature: [signature]	Signature: [signature]
Printed Name: John P. Rau	Printed Name: TRACIE SOBER
Firm: Clayton Group Services	Firm: KWIO CAS
Date/Time: 4/10/00 0840	Date/Time: 4/10/00 840

TURNAROUND REQUIREMENTS
- ___ 24 hr. ___ 48 hr. ___ 5 day
- X Standard
- ___ Other (Specify)
- X Provide Verbal Preliminary Results

Requested Report Date ______

REPORT REQUIREMENTS
- X I. Routine Report
- ___ II. Report (includes DUP,MS MSD, as required, may be charged as samples)
- ___ III. Data Validation Report (includes All Raw Data)
- ___ RWQCB

INVOICE INFORMATION
P.O. # ______
Bill To Clayton Group Services

SAMPLE RECEIPT:
Shipping VIA: ______
Shipping #: ______
Condition: ______
Lab No: ______

RELINQUISHED BY:	RECEIVED BY:
Signature: [signature]	Signature: [signature]
Printed Name: TRACIE SOBER	Printed Name: Greg Grider
Firm: KWIO CAS	Firm: CAS
Date/Time: 4/10/00 1000	Date/Time: 4/11/00 @ 0950 via FedEx

SPECIAL INSTRUCTIONS/COMMENTS:

Y 001636

H200050

Appendix I-3

Letter from the State of Hawai'i Department of Health Office of Hazard Evaluation and Emergency Response

LINDA LINGLE
GOVERNOR OF HAWAII

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

LORETTA J. FUDDY, A.C.S.W., M.P.H.
ACTING DIRECTOR OF HEALTH

DEC 24 2002

In reply, please refer to:
File:
02-314 ZI

December 17, 2002

Mr. Tom Schnell, AICP
PBR Hawaii
1001 Bishop Street #650
Pacific Tower
Honolulu, Hawaii 96813

Dear Mr. Schnell:

Subject: REQUEST FOR PUBLIC INFORMATION – 94-440 Mokuola Street, Waipahu 96797, TMK 9-4-161: 02

The Hazard Evaluation and Emergency Response (HEER) Office does not have any information pertaining to the above subject site.

Please be advised that the absence of the information on reports of spills or releases does not absolve the owner from future clean up liabilities under the Resource Conservation and Recovery Act (RCRA) or the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the Hawaii Environmental Response Law, as amended, or any other applicable state or federal regulations.

If you have any questions, please contact the HEER Office at (808) 586-4249. In addition, you are welcome to visit our web site at http:www.state.hi.us/health/eh/heer.

Sincerely,

Keith E. Kawaoka, Office Manager
Hazard Evaluation and Emergency Response Office

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

'M. FRANK BRANDT, FASLA
CHAIRMAN

THOMAS S. WITTEN, ASLA
PRESIDENT

R. STAN DUNCAN, ASLA
EXECUTIVE VICE-PRESIDENT

USSELL Y.J. CHUNG, ASLA
EXECUTIVE VICE-PRESIDENT

JAMES LEONARD, AICP
MANAGING DIRECTOR
HILO OFFICE

VINCENT SHIGEKUNI
SENIOR ASSOCIATE

GRANT MURAKAMI, AICP
ASSOCIATE

HONOLULU OFFICE
1001 BISHOP STREET
PACIFIC TOWER, SUITE 650
ONOLULU, HAWAI'I 96813-3429
TEL: (808) 521-5631
FAX: (808) 523-1402
MAIL: sysadmin@pbrhawaii.com

HILO OFFICE
101 AUPUNI STREET
ILO LAGOON CENTER SUITE 310
HILO, HAWAI'I 96720-4276
TEL: (808) 961-3333
FAX: (808) 961-4989
E-MAIL: pbrhilo@lava.net

WAILUKU OFFICE
2123 KAOHU STREET
WAILUKU, HAWAI'I 96793-2204
TEL: (808) 242-2878
FAX: (808) 242-2902
E-MAIL: pbrmaui@lava.net

November 20, 2002

Ms. Liz Galvez
Office of Hazard Evaluation and Emergency Response
Department of Health,
State of Hawaii
919 Ala Moana Boulevard Room 201
Honolulu, Hawaii 96814

SUBJECT: PRESENCE OF TOXIC CHEMICALS OR RADIOACTIVE CHEMICALS AT THE LEEWARD YMCA SITE IN WAIPAHU

Dear Ms. Galvez:

PBR HAWAII is assisting the Young Men's Christian Association (YMCA) of Honolulu in the process of expanding their Leeward YMCA facility on its current site. The Leeward YMCA is located at 94-440 Mokuola Street, Waipahu 96797, on property identified by TMK 9-4-161: 02 and TMK 9-4-161: 04.

Leeward YMCA is seeking a U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant for the project and, as such, must comply with the HUD environmental requirements of 24 CFR 58, which includes completion of the HUD Statutory Checklist. This letter is being sent to the State of Hawaii Department of Health as part of the consultation process required for completion of the HUD Statutory Checklist.

Specifically, we are writing to consult with the State of Hawaii Department of Health in regard to the toxic chemicals or radioactive chemicals that may be present on the site or may affect the project. Would you please check your files and database to see if there is any record of potential problems on the site related to toxic chemicals or radioactive chemicals? Also, would you please provide a written reply even if you have no record of potential problems?

Please contact me if you have any questions. Thank you for your assistance in this matter.

Sincerely,

PBR HAWAII

Tom Schnell, AICP
Associate

Attachment

REQUEST TO ACCESS A GOVERNMENT RECORD

DATE: November 20, 2002

TO: Hazard Evaluation & Emergency Response Office (Fax: 586-7537)

FROM: Tom Schnell/PBR Hawaii
Name or Alias
1001 Bishop Street, Pacific Tower, Suite 650, Honolulu, HI 96813
Contact Information
521-5631, Fax: 523-1402

Although you are not required to provide any personal information, you should provide enough information to allow the agency to contact you about this request. The processing of this request may be stopped if the agency is unable to contact you. Therefore, please provide any information that will allow the agency to contact you (name or alias, telephone or fax number, mailing address, e-mail address, etc.).

I WOULD LIKE THE FOLLOWING GOVERNMENT RECORD:

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Please see attached letter.

I WOULD LIKE: (please check one or more of the options below)

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☐ If the agency maintains the records in a form other than paper, please advise in which format you would prefer to have the record.

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Office Manager   Date

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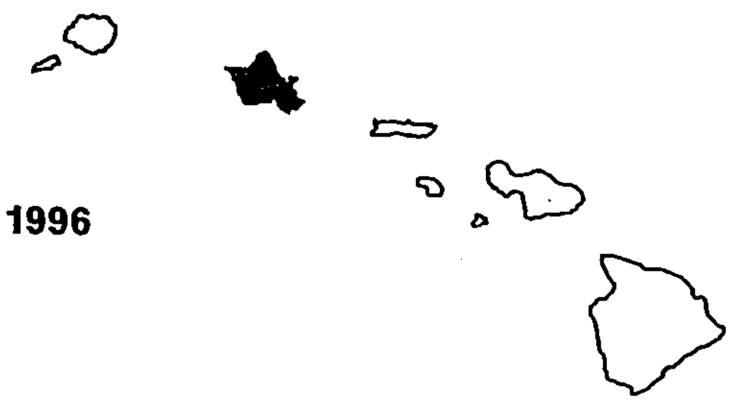
Appendix J

Traffic Impact Analysis Report

TRAFFIC IMPACT ANALYSIS REPORT

OAHU SUGAR COMPANY PROPERTY
WAIPAHU, HAWAII



MARCH 1996

Prepared for

AMFAC/JMB HAWAII, INC.

Prepared by

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS • SURVEYORS

TRAFFIC IMPACT ANALYSIS REPORT

FOR THE

OAHU SUGAR COMPANY PROPERTY

PREPARED FOR

AMFAC/JMB HAWAII, INC.

Prepared By

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
Engineers • Surveyors
Honolulu • Wailuku • Hilo, Hawaii

March 18, 1996

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

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ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

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I. INTRODUCTION

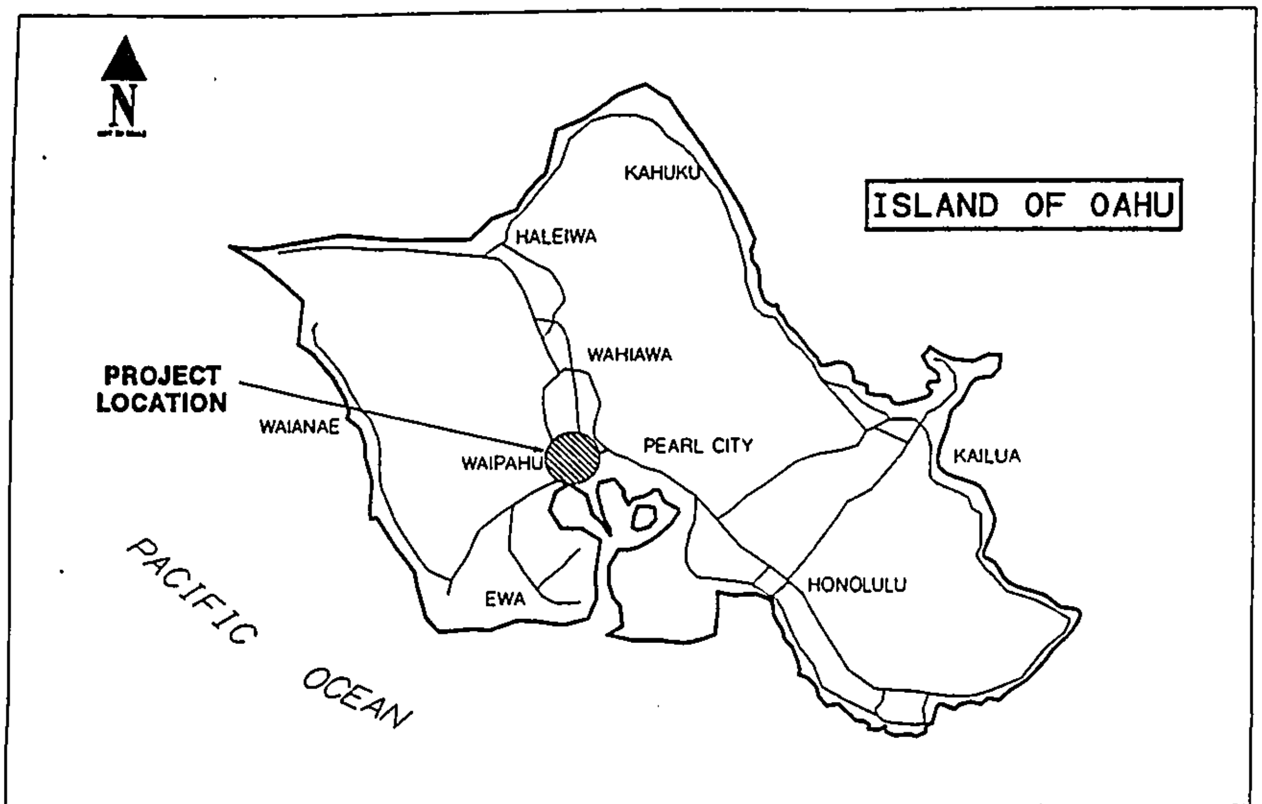
This report documents the findings of the traffic study conducted by Austin, Tsutsumi & Associates, Inc. (ATA) to evaluate the potential traffic impacts and circulation needs for the development of the Oahu Sugar Company Property in Waipahu.

PROJECT DESCRIPTION

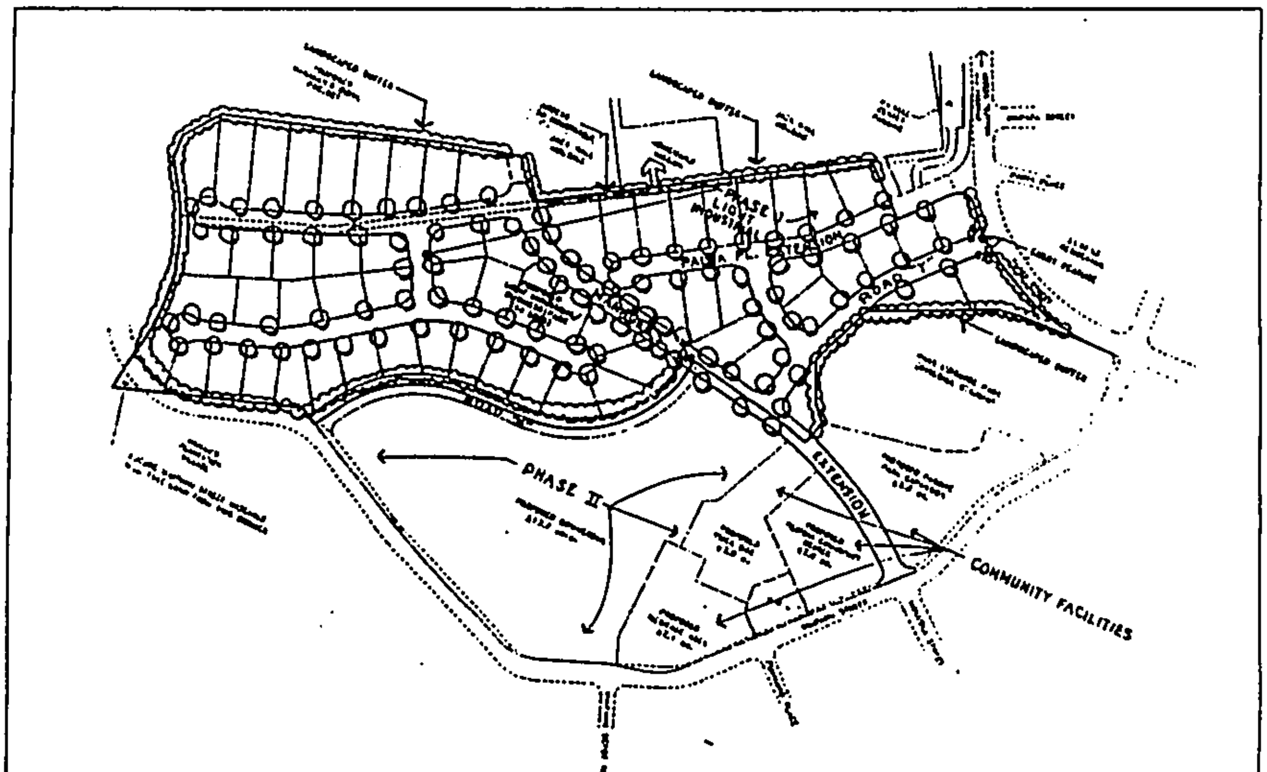
The Oahu Sugar Company (OSC) Project consists of the development of a 37-acre light industrial park with approximately 64 lots, and the development of an adjacent 20-acre commercial site. A portion of the 20-acre commercial site is proposed to include a number of community facilities including a YMCA, a Filipino community center, and a site for a Heritage Park/museum center near the existing smoke stack. The remaining portion of the site, approximately 3 acres, will be for the expansion of Hans L'Orange Park.

Figure 1 shows the general location of the project site in Waipahu, Oahu. Figure 2 shows the proposed site plan. The site is specifically identified as TMK: 9-4-02:04.

The layout of the light industrial park site and the associated roadways conform to the Waipahu Special Area Plan (SAP) as presented to the City Council in January 1996. In general, the Waipahu SAP calls for the extension of Manager's Drive from the bridge over the H-1 Freeway to Waipahu Street at Mokuola Street. In addition, new connecting roadways are proposed from Paiwa Street to Manager's Drive extension, following an alignment just mauka of Hans L'Orange Park's northern boundary and from Waipahu Street near the existing Auaili Street intersection to Manager's Drive extension.



AMFAC/JMB HAWAII, INC. OAHU SUGAR COMPANY PROPERTY	ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS • SURVEYORS PROJECT LOCATION	FIGURE 1



SOURCE: PBR HAWAII, FEBRUARY 12, 1996

AMFAC/JMB HAWAII INC. OAHU SUGAR COMPANY PROPERTY	ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS • SURVEYORS SITE MAP	FIGURE 2

Construction of the Project is expected to be phased. The first area to be developed is the light industrial subdivision and its associated roadways. The development of the light industrial subdivision will begin with the area between Paiwa Street and Manager's Drive extension, followed by the area west of Manager's Drive extension. As part of the Phase I development, the collector road between Manager's Drive extension and Paiwa Street (Road Y) and that portion of Manager's Drive extension within the Oahu Sugar Property to the Waipahu Street/Mokuola Street intersection will be constructed. Phase I of the Project is anticipated to be complete some time in the Year 2000. Although the timing of the "community facilities" is not certain at this time, for the purpose of this study, they are assumed to be completed along with the Phase I development by the Year 2000.

The subsequent Phase II of the Project will be the development of the commercial center along with the connecting roadway (Road X) between Waipahu Street (near Hawaii's Plantation Village) and Manager's Drive extension. The completion date of this phase of construction is not certain at this time but will more than likely be some time after the Year 2000.

STUDY METHODOLOGY

The purpose of the study is to analyze potential traffic impacts on the roadway system within the study area. Potential roadway improvements, which are required to allow the street system to accommodate the future traffic volumes after completion of the Project, are identified in this study.

It is anticipated that Phase I of the Project will be completed and fully occupied by the Year 2000. Although the commercial center is currently planned to be developed, it is not certain exactly when it will be completed and occupied. For the purpose of identifying overall traffic impacts and determining potential on-site and off-site roadway requirements, an overall but separate analysis of future conditions with Phase II of the proposed Project will also be analyzed for the Year 2000. Under this scenario, the City's 39.6-acre Manager's Drive Site development, located west of the future Manager's Drive extension and between the H-1 Freeway and the light industrial subdivision will also be included in the analysis.

Therefore, this traffic study will analyze the existing scenario and three scenarios for the Year 2000. The scenarios are as follows:

- Existing - The analysis of existing traffic conditions is intended to provide the traffic baseline conditions for the study. The existing conditions analysis includes assessment of land use, streets and highways, traffic volumes, and current operating conditions.

- Year 2000 Base (Without Project) - This is an analysis of future traffic conditions for the study area in the Year 2000 without Project generated traffic. The objective of this phase of the study is to forecast future traffic conditions for the study area in the Year 2000 without the Project, to serve as a basis against which Project impacts can be measured.

- Year 2000 With Phase I - This is an analysis of future traffic conditions with traffic expected to be generated by Phase I (industrial park) plus the community center/YMCA and the Hans L'Orange Park Expansion of the proposed Project in the Year 2000 added to Year 2000 Base traffic forecasts. This then identifies the traffic impacts of the proposed Phase I generated traffic on the Year 2000 traffic operating conditions.

- Year 2000 With Phases I and II and the City's Manager's Drive Site - This is an analysis of future traffic conditions with traffic expected to be generated by Oahu Sugar Company's Phases I and II and the City's Manager's Drive Site in the Year 2000 added to Year 2000 Base traffic forecasts. The purpose of this scenario is to identify the potential vehicular impacts due to the buildout of the subject area. Vehicular impacts identified will be used for planning potential on-site and off-site roadway improvements.

Nine existing intersections and four future intersections have been identified within the study area to be analyzed during the AM and PM peak hours for each of the traffic scenarios described above. The thirteen intersections are:

Existing Intersections

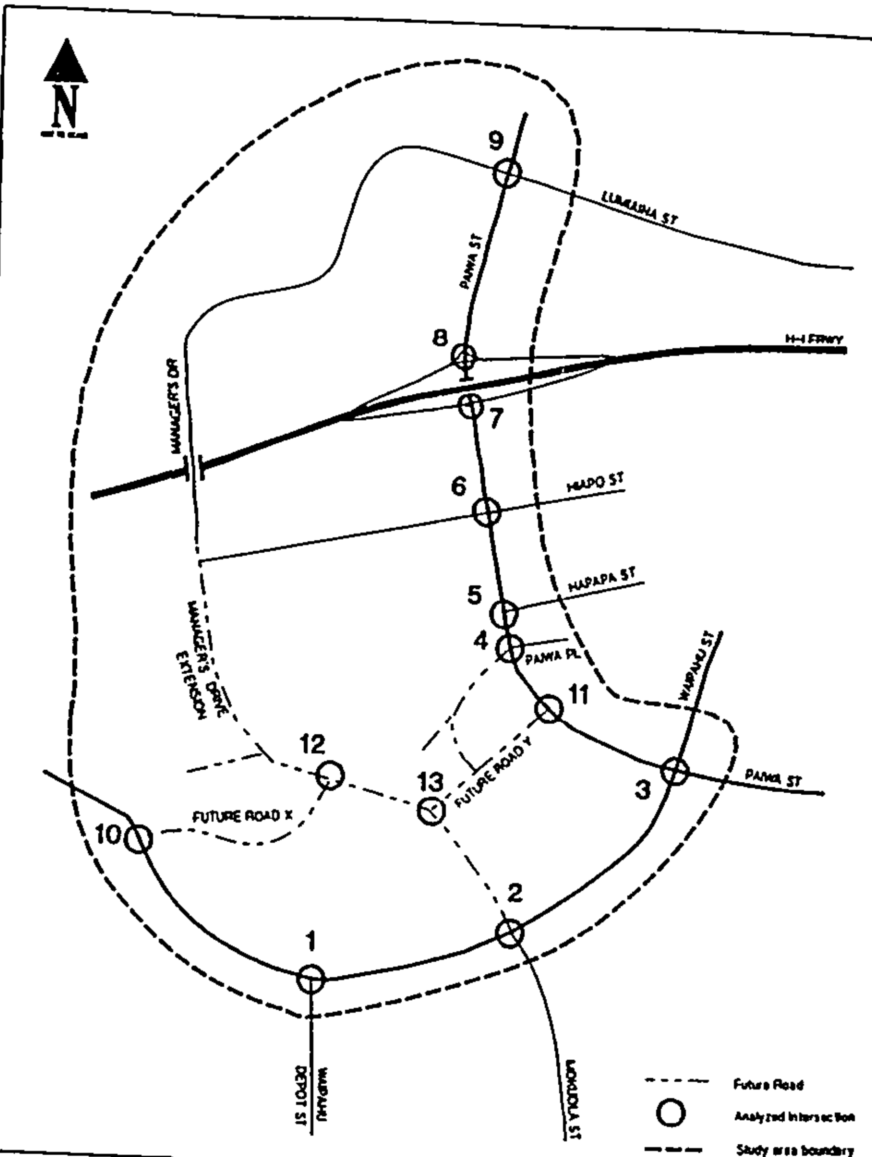
1. Waipahu Street and Waipahu Depot Street or "Depot Road" (signalized)
2. Waipahu Street and Mokuola Street (signalized)
3. Waipahu Street and Paiwa Street (signalized)
4. Paiwa Street and Paiwa Place (stop-controlled) - traffic signals are currently being installed and are expected to be in operation by April 1996
5. Paiwa Street and Hapapa Street (stop controlled) - traffic signals are currently being installed and are expected to be in operation by April 1996
6. Paiwa Street and Hiapo Street (signalized)
7. Paiwa Street and H-1 Eastbound Ramps (signalized)
8. Paiwa Street and H-1 Westbound Ramps (signalized)
9. Paiwa Street and Lumiaina Street (signalized)

Future Intersections

10. Waipahu Street and Road X
11. Paiwa Street and Road Y
12. Manager's Drive and Road X
13. Manager's Drive and Road Y

The four future intersections are associated with the proposed Project, and will, therefore, only be analyzed under "With Project" scenarios.

The study area is bounded by Lumiaina Street to the north, Paiwa Street to the east, Waipahu Street to the south and Waikele Stream to the west. Figure 3 shows the study area and the locations of the thirteen intersections mentioned above.



AMFAC/JMB HAWAII INC.
OAHU SUGAR COMPANY PROPERTY
ATA
STUDY AREA AND LOCATION OF ANALYZED INTERSECTIONS
FIGURE 3

II. EXISTING CONDITIONS

A field investigation was undertaken to develop a description of existing conditions and infrastructure within the study area. Information relevant to the study includes land use, an inventory of streets, traffic volumes, and current operating conditions on the roadway system.

EXISTING ROADWAY SYSTEM

This section describes the existing circulation system serving the study area, including number of travel lanes, street classifications, and traffic control devices. Brief descriptions of the facilities within the study area follow:

- H-1 Freeway - The H-1 Freeway is the main artery serving the primary urban area on Oahu. Within the study area, the H-1 Freeway runs east-west with four lanes (including an HOV lane) in each direction.

- Waipahu Street - Waipahu Street is a two-lane city street which runs east-west between Kunia Road and Kamehameha Highway. Waipahu Street is a major collector/distributor road through Waipahu Town serving residences, small commercial areas, parks and schools. On certain segments, Waipahu Street is a narrow street with curving alignments. Within the study area, Waipahu Street is signalized at Depot Road, Mokuola Street and Paiwa Street.

- Paiwa Street - Paiwa Street is a collector road which runs north-south between the newly developed Waikele community and Farrington Highway (south of Farrington Highway, it continues as Awanui Street). From the Waikele community (near the

Waikele Golf Club) to just south of the H-1 Eastbound Ramps, Paiwa Street is a four-lane, divided roadway fronting residential uses, a golf course and the Waikele Shopping Center. Between the H-1 Eastbound Ramps and Hiapo Street, Paiwa Street is an access restricted, four-lane, undivided collector road fronting mainly residential uses. South of Hiapo Street to Farrington Highway, Paiwa Street operates as a two-lane roadway. Within the study area, Paiwa Street is signalized at Waipahu Street, Hiapo Street, H-1 Eastbound Ramps, H-1 Westbound Ramps, and Lumiaina Street. Currently, traffic signals are being installed at Hapapa Street and at Paiwa Place. The traffic signals are expected to be in operation by April 1996.

- Waipahu Depot Street or "Depot Road" - Depot Road is a two-lane city street which runs north-south between Waipahu Street and Farrington Highway (and continues south beyond the police training facility on Waipio Peninsula). Within the study area, Depot Road serves mainly commercial uses.

- Mokuola Street - Mokuola Street is a two-lane city street which runs north-south between Waipahu Street and Farrington Highway (south of Farrington Highway, it continues as Awalau Street). Within the study area, Mokuola Street serves mainly residential uses as well as the Waipahu Civic Center and some commercial uses.

- Hapapa Street - Hapapa Street is a two-lane local street which runs east-west between Paiwa Street and Mahoe Street. Hapapa Street forms a T-intersection at Paiwa Street. Currently, traffic signals are being installed and are expected to be in operation by April of 1996. Hapapa Street serves residential uses.

- Hiapo Street - Hiapo Street is a two-lane, east-west collector street which begins west of Paiwa Street and extends east and southeast where it connects to Waipahu Street near the Waiawa Interchange. Within the study area, Hiapo Street serves mainly residential uses.

- Lumiaina Street - Lumiaina Street is an east-west collector street which runs from Kamehameha Highway through the Waikele community just north of the H-1

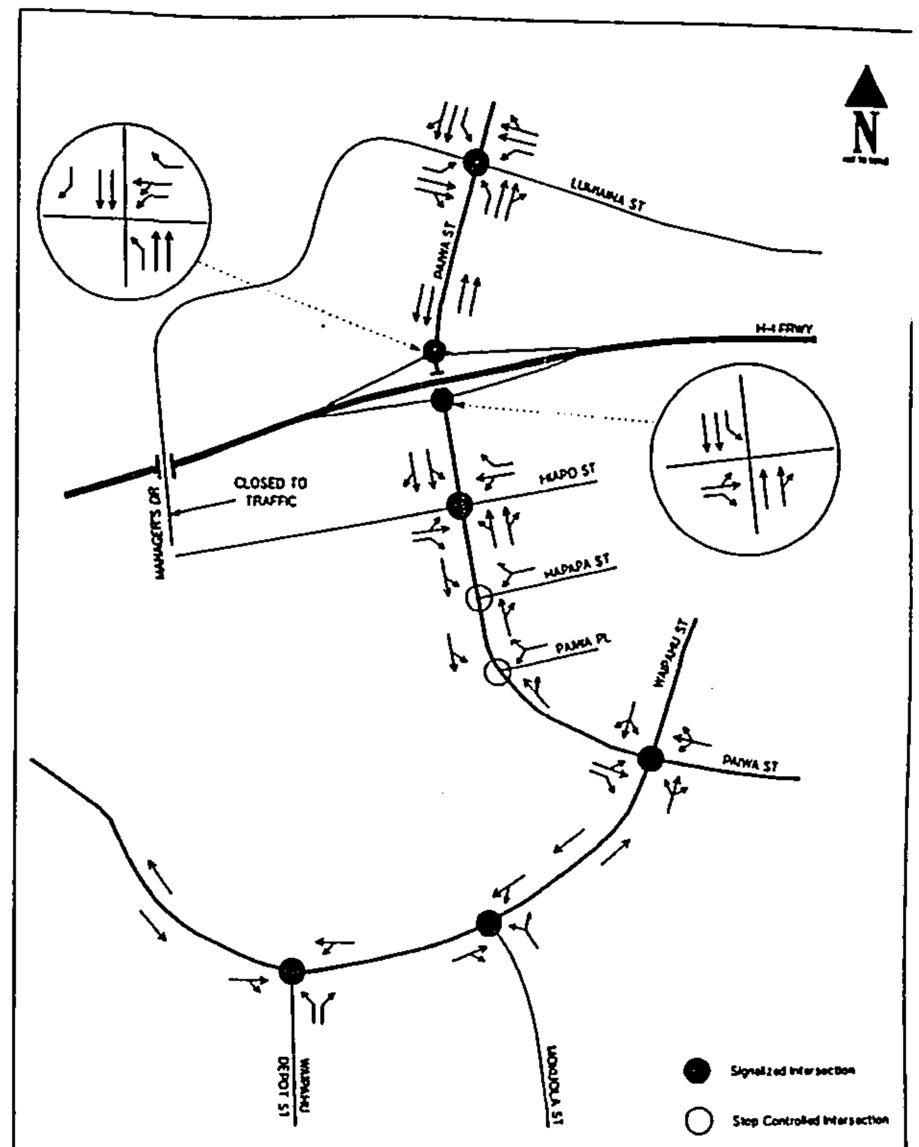
Freeway. It then continues south over and across the H-1 Freeway as Manager's Drive. Between Kamehameha Highway and just east of the Waikele Center/Factory Stores Outlet driveway, Lumiaina Street is four-lane, divided, restricted-access roadway serving both residential uses and the Waikele Shopping Center/Factory Stores Outlet. West of the Waikele Center/Factory Stores Outlet driveway, Lumiaina Street becomes a four-lane undivided roadway. West of Paiwa Street, Lumiaina Street narrows to a 60-foot right-of-way collector road serving residential areas where it connects to Manager's Drive at the H-1 Freeway overpass. At the present time, the Manager's Drive Bridge over the H-1 Freeway is closed to traffic. However, as part of the required traffic improvements for the Waikele Development, Amfac will widen the existing narrow bridge and construct Manager's Drive to Hiapo Street as a four-lane undivided road (60-foot collector road).

- Paiwa Place - Paiwa Place is an east-west local street with no outlet, serving only residential uses. Currently, construction is underway to extend Paiwa Place west of Paiwa Street as a 60-foot collector road to serve the future Waikele Center Employee Parking Lot as well as a portion of the Oahu Sugar Company light industrial subdivision. Installation of traffic signals is currently underway at this intersection and is expected to be in operation by April 1996.

Figure 4 shows the intersection configurations of the nine existing analyzed intersections.

EXISTING TRAFFIC VOLUMES

Weekday AM and PM peak period traffic counts were conducted by ATA as part of this study at eight of the nine existing intersections. Due to the fact that Paiwa Place is a dead-end street serving a fixed number of residential units, previous peak hour manual traffic counts into and out of Paiwa Place are used for this study. Previous counts taken at the Paiwa Street and Paiwa Place intersection were obtained from the May 1994, "Traffic Impact Report For The Proposed Amfac Industrial Subdivision" prepared by ATA. The results of the traffic counts are provided in Appendix A. Manual turning movement counts were conducted during the morning and evening



AMFAC/JMB HAWAII INC.
OAHU SUGAR COMPANY PROPERTY

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS • SURVEYORS

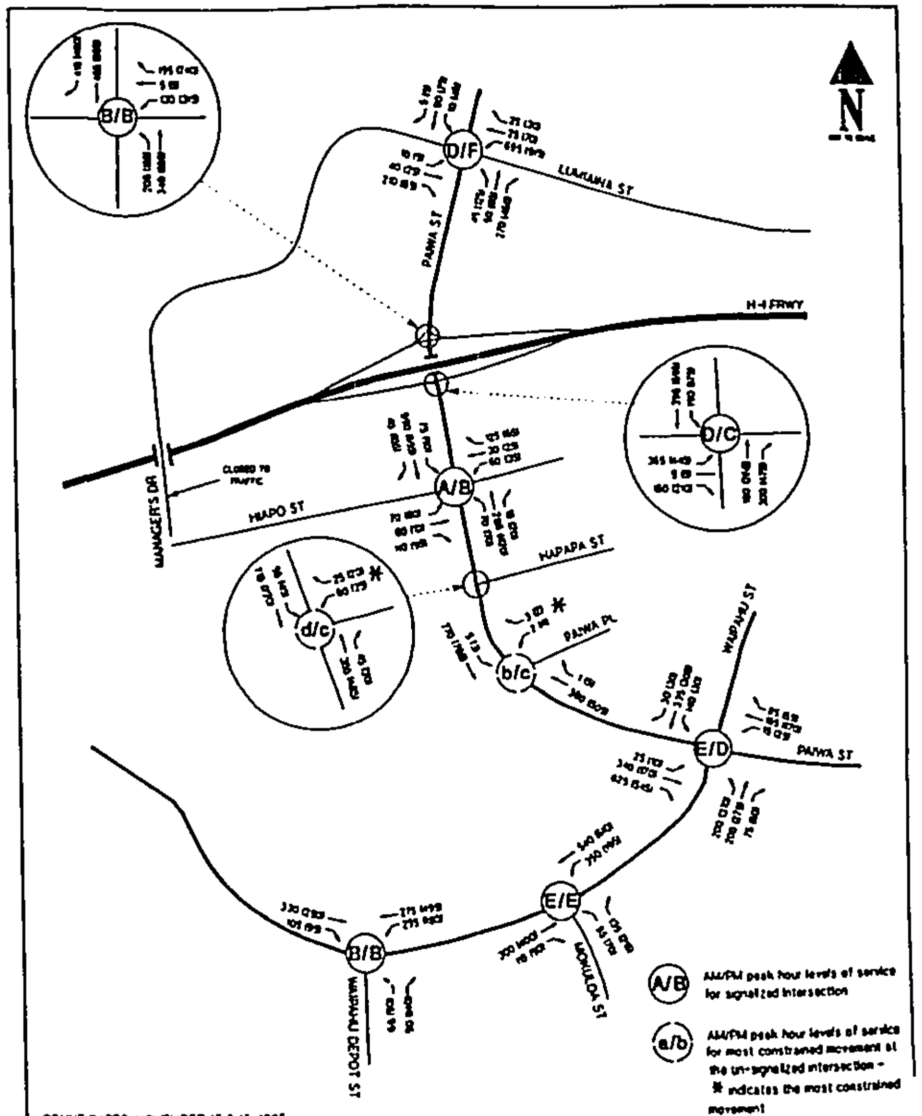
EXISTING INTERSECTION CONFIGURATIONS

FIGURE 4

peak periods of traffic on November 15 and 16, 1995, (Wednesday and Thursday), respectively. Twenty-four hour machine counts were conducted on the H-1 Eastbound and Westbound Ramps at Paiwa Interchange and also on Paiwa Street south of Hiapo Street to provide an indication of typical daily traffic volumes. The twenty-four hour machine count data at the Paiwa Interchange Ramps were used to derive turning movement counts at the two H-1 Freeway Ramp Intersections (Intersections 7 and 8) at Paiwa Street. Figure 5 summarizes the peak hour traffic counts at the nine existing analyzed intersections.

Based on the AM peak period traffic count data and visual observations during the morning peak period, traffic within the study area appears to flow well without any major congestion. At the intersection of Paiwa Street and Waipahu Street, traffic is relatively heavy compared to the other intersections, although most vehicles clear the intersection within one cycle. It was also observed that, at the intersection of Paiwa Street and Lumiaina Street, there is a heavy westbound left-turn demand from Lumiaina Street to southbound Paiwa Street (695 vehicles during the AM peak hour). The majority of these vehicles were observed to be destined for the westbound H-1 Freeway.

Based on the PM peak period traffic count data and visual observations during the afternoon peak period, traffic within the study area generally flows well, with the exception of the intersection of Paiwa Street and Lumiaina Street. The traffic count data shows that, during the PM peak hour, 915 vehicles were observed turning left from westbound Lumiaina Street to southbound Paiwa Street. The westbound left-turn queue was observed to extend to the main entrance to the Waikele Shopping Center/Factory Outlet Stores. Traffic on Waipahu Street at the intersection of Waipahu Street and Paiwa Street experiences more delay relative to the other intersections.



COUNT DATES: NOVEMBER 15 & 16, 1995

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YEAR 1995 EXISTING CONDITIONS

FIGURE 5

EXISTING LEVEL OF SERVICE ANALYSIS

Level of service (LOS) is a qualitative measure used to describe the condition of traffic flow, ranging from free-flow conditions at LOS A to congested conditions at LOS F. The 1994 Highway Capacity Manual - Special Report 209 methods for calculating volume to capacity ratios, delays and corresponding levels of service were utilized in this study. Level of service definitions for signalized and unsignalized intersections are provided in Tables 1 and 2, respectively. Figure 5 also shows the levels of service at the nine existing intersections. Level of service calculations are provided in Appendix B.

A summary of the existing Year 1995 level of service results is shown in Table 3. During the AM peak hour, results show that two of the existing nine intersections are operating at unacceptable levels of service (LOS E or F). The two intersections are:

- Waipahu Street and Paiwa Street - Although the delay and corresponding level of service indicate that the intersection is operating at LOS D, the volume to capacity ratio (V/C) indicates that the demand is nearing the intersection's capacity (V/C = 0.97). This means that the calculated average delay of 31.7 seconds per vehicle is probably less than what is actually occurring. Field observations during the traffic counts verify that the operating level of the intersection during the AM peak period is more in the LOS E range rather than LOS D as calculated.

- Waipahu Street and Mokuola Street - The V/C indicates that the intersection's demand is nearing capacity (V/C = 0.96). The calculated average delay (32.4 seconds) and corresponding level of service (LOS D) may be better than what is actually occurring. Based on field observation, the intersection is operating on the borderline between LOS D and LOS E. Cause of the high V/C is primarily due to Waipahu Street being a narrow, two-lane roadway where the through traffic on Waipahu Street can be significantly delayed due to high turning volumes.

The results also show that during the PM peak hour, two of the nine analyzed intersections are operating at unacceptable levels of service (LOS E or F). The two intersections are:

TABLE 1
LEVEL OF SERVICE DEFINITIONS FOR SIGNALIZED INTERSECTION

LEVEL OF SERVICE	DELAY (SECONDS/VEHICLE)	DESCRIPTION
A	0.0 - 5.0	Little or no delay
B	5.1 - 15.0	Short traffic delay
C	15.1 - 25.0	Moderate traffic delay
D	25.1 - 40.0	Long traffic delay
E	40.1 - 60.0	Very long traffic delay
F	> 60.0	Failure - extreme congestion

SOURCE: "Highway Capacity Manual", Transportation Research Board, 1994.

TABLE 2
LEVEL OF SERVICE DEFINITIONS FOR UNSIGNALIZED INTERSECTION

LEVEL OF SERVICE	DELAY (SECONDS/VEHICLE)	DESCRIPTION
A	0.0 - 5.0	Little or no delay
B	5.1 - 10.0	Short traffic delay
C	10.1 - 20.0	Moderate traffic delay
D	20.1 - 30.0	Long traffic delay
E	30.1 - 45.0	Very long traffic delay
F	> 45.0	Failure - extreme congestion

SOURCE: "Highway Capacity Manual", Transportation Research Board, 1994.

TABLE 3
EXISTING 1995 INTERSECTION LEVEL OF SERVICE SUMMARY

INTERSECTIONS	AM PEAK HOUR			PM PEAK HOUR		
	V/C	DELAY	LOS	V/C	DELAY	LOS
1. WAIPAHU ST & DEPOT RD	0.63	8.1	B	0.68	11.5	B
2. WAIPAHU ST & MOKUOLA ST	0.96	31.7	E [b]	0.95	33.5	E [b]
3. WAIPAHU ST & PAIWA ST	0.97	32.4	E [b]	0.84	29.9	D
4. PAIWA ST & PAIWA PL [a]						
- SB LEFT-TURN	-	3.1	A	-	3.7	A
- WB APPROACH	-	10.0	B	-	12.2	C
5. PAIWA ST & HAPAPA ST [a]						
SB LEFT-TURN	-	3.4	A	-	3.8	A
WB APPROACH	-	25.2	D	-	17.0	C
6. PAIWA ST & HIAPO ST	0.30	4.2	A	0.49	11.9	B
7. PAIWA ST & H-1 EB RAMPS	0.52	25.7	D	0.68	24.0	C
8. PAIWA ST & H-1 WB RAMPS	0.26	9.7	B	0.36	9.4	B
9. PAIWA ST & LUMIAINA ST	0.61	38.0	D	0.94	62.1	F

[a] Stop-controlled intersection.
[b] Level of service based on V/C.

- Waipahu Street and Mokuola Street - The V/C indicates that the intersection's demand is nearing capacity (V/C = 0.95). The calculated average delay of 33.5 seconds and corresponding LOS D is probably better than what is actually occurring. Field observations during the traffic counts verify that the operating level of the intersection during the PM peak period is more in the LOS E range rather than LOS D.

- Paiwa Street and Lumiaina Street - The level of service results indicate that the intersection is operating at LOS F during the PM peak hour. The poor operating level of service is mainly due to the extremely heavy westbound demand from Lumiaina Street to Paiwa Street (915 left-turning vehicles during the PM peak hour).

III. FUTURE BASE PROJECTIONS AND ANALYSIS

In order to properly evaluate the potential impact of the Project on local traffic conditions, it is first necessary to develop forecasts of future traffic volumes in the study area under conditions without the proposed Project generated traffic. The forecasts for Year 2000 Base traffic without the proposed Project are based on yearly growth of existing traffic volumes and other known developments expected to be completed by the Year 2000 which could contribute traffic to the roadways within the study area. The following describes the methodology used in forecasting and the results of the Year 2000 Base traffic conditions.

BACKGROUND TRAFFIC GROWTH

The background growth rate, which was applied to existing traffic volumes to estimate Year 2000 Base conditions, is based on historical counts in the vicinity of the proposed Project site. Based on historical traffic counts, a 2.5% per year growth rate, or a factor of 1.125, was applied to the existing traffic counts to estimate Year 2000 Base traffic volumes.

OTHER DEVELOPMENT GENERATED TRAFFIC

Future developments (other than the Project) within the vicinity of the study area which could directly contribute traffic to the analyzed intersections are included in this study. The following summarizes the other developments assumed to be completed by the Year 2000:

- Waikele residential subdivision - currently there are approximately 375 single-family units and 552 multi-family units yet to be built and/or occupied. For the purpose of the traffic analysis, these units are expected to be occupied by the Year 2000.

- Waikele Center employee parking lot - the parking lot is located at the northwest quadrant of the Paiwa Street and Paiwa Place intersection. The parking lot is expected to provide 400 parking stalls. Access to and from the parking lot will be via the extension of Paiwa Place west of Paiwa Street.

- Church/Preschool - approximately 1,750 square-foot church/preschool, which will be located on the south-east corner of Waipahu Street and Mokuola Street, is expected to be constructed and occupied by the Year 2000.

- Waikele Elementary School - a 750-student elementary school located near Waikele residential area #15 is expected to be constructed and occupied by the Year 2000.

Figure 6 shows the locations of the other known developments in the vicinity of the Project. Table 4 summarizes the trip generation rates and the estimated trip generation from the known developments. The assignment of related project trips to specific streets and intersections was based on the available access into and out of the site and the availability of local routes to access the regional highway system. The trip assignment of the Waikele residential units is based on general commuter patterns with the majority accessing the eastbound H-1 Freeway. The church/preschool traffic assignment is based on the local residential distribution near the vicinity of the study area.

Roadway improvements which will be completed within the study area are traffic signals at the intersections of Paiwa Street/Hapapa Street and Paiwa Street/Paiwa Place which will be in operation by April 1996. Paiwa Street will be restriped to provide four lanes between Hiapo Street and Waipahu Street when the traffic signals are placed in operation.

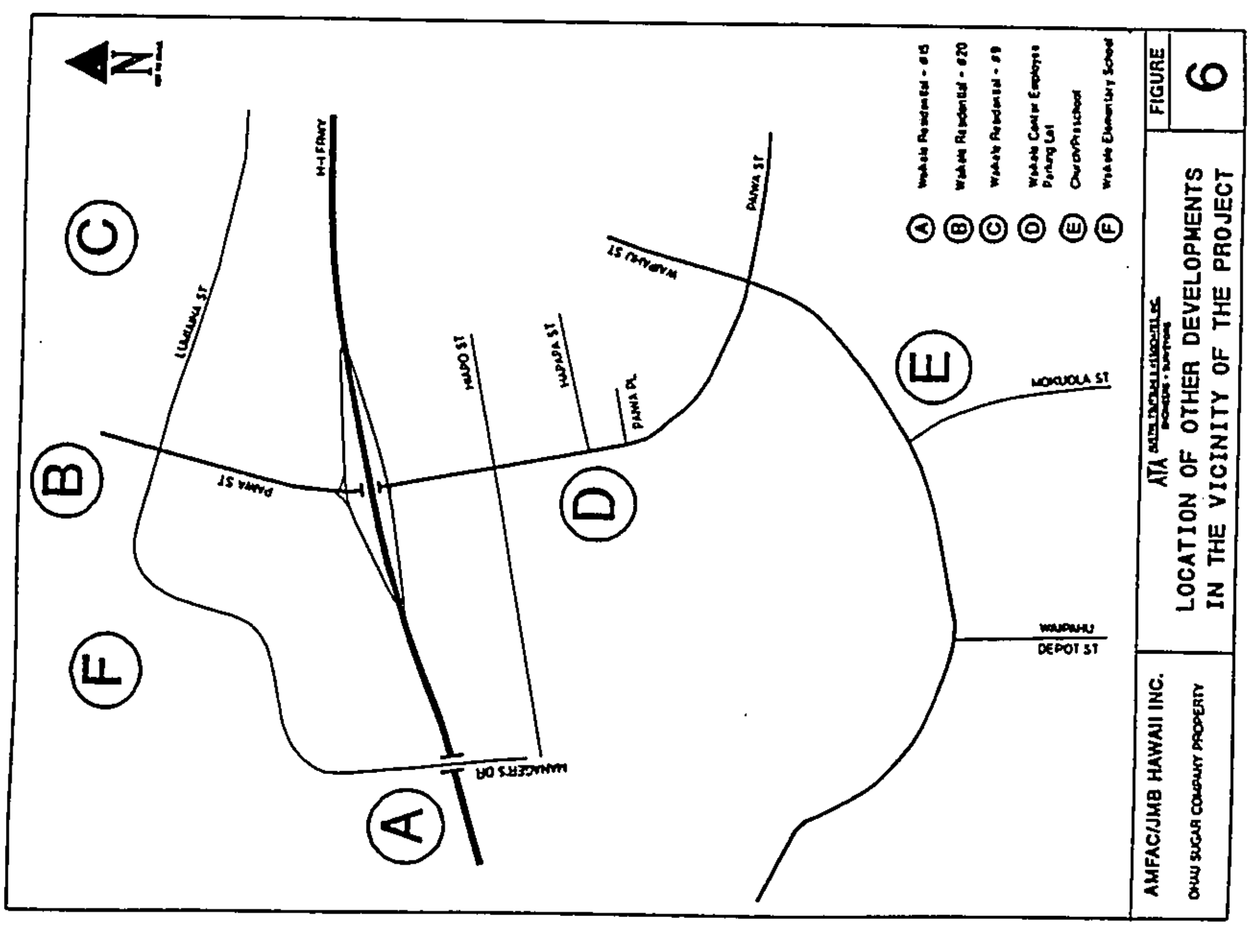
FUTURE BASE TRAFFIC VOLUMES AND LEVEL OF SERVICE ANALYSIS

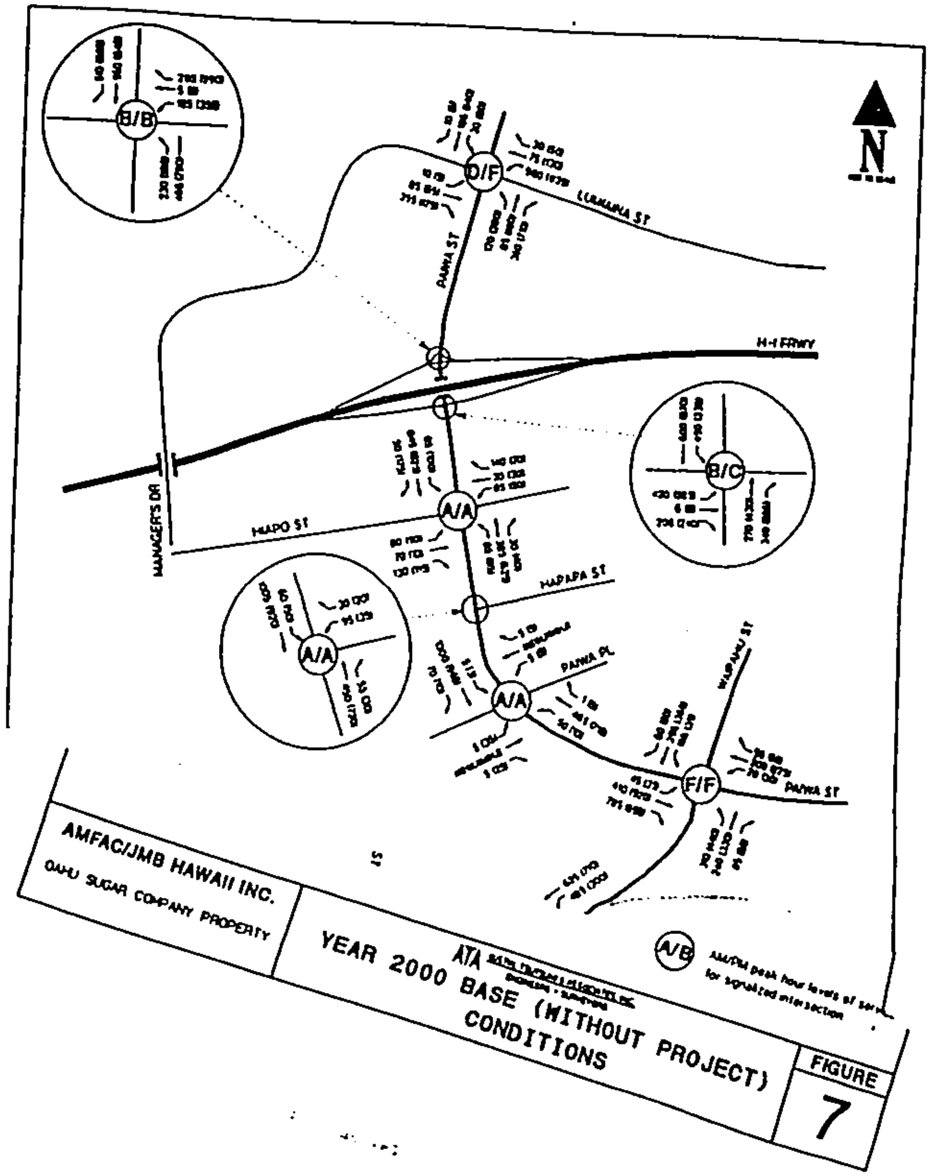
Based on the forecast parameters described above, Year 2000 Base (without project) traffic volumes are estimated. Figure 7 shows the projected Year 2000 Base traffic volumes at the nine

TABLE 4
RELATED PROJECT TRIP GENERATION RATES AND TRIP GENERATION

LAND USE	UNITS	DAILY	AM PEAK HOUR			PM PEAK HOUR		
			IN	OUT	TOTAL	IN	OUT	TOTAL
TRIP GENERATION RATES								
SINGLE FAMILY RESIDENTIAL	dwelling units	9.55	26%	74%	0.74	65%	35%	1.01
MULTI FAMILY RESIDENTIAL	dwelling units	5.86	17%	83%	0.44	66%	34%	0.55
DAY CARE CENTER	1,000 sf	79.26	54%	46%	15.17	46%	54%	15.56
ELEMENTARY SCHOOL	students	1.09	60%	40%	0.30	56%	44%	0.25
TRIP GENERATION								
WAIKELE RESIDENTIAL AREA								
SF RESIDENTIAL - PARCEL 9	180 DU	1,719	35	99	133	118	64	182
MF RESIDENTIAL - PARCEL 9	282 DU	1,653	21	103	124	102	53	155
MF RESIDENTIAL - PARCEL 15	270 DU	1,582	20	99	119	98	50	149
SF RESIDENTIAL - PARCEL 20	195 DU	1,862	38	107	144	128	69	197
CHURCH/PRESCHOOL (CORNER OF WAIPAHU ST/MOKUOLA ST)	17.6 KSF	1,395	144	123	267	126	148	274
WAIKELE CENTER EMPLOYEE PARKING LOT [a]	400 stalls	800	120	0	120	20	60	80
WAIKELE ELEMENTARY SCHOOL	750 std	818	135	90	225	105	82	188

[a] From June 1994 "Traffic Impact Report For The Amfac Industrial Subdivision", prepared by ATA.





analyzed intersections. Figure 7 also shows the resulting levels of service at the nine analyzed intersections.

Based on the Year 2000 base traffic forecast and analysis, it is projected that three of the nine analyzed intersections will be operating at undesirable levels of service (LOS E or LOS F) during either the AM or PM peak hour, or both. The three intersections are:

- Waipahu Street and Mokuola Street - both AM and PM peak hours
- Waipahu Street and Paiwa Street - both AM and PM peak hours
- Paiwa Street and Lumiaina Street - PM peak hour only

The three intersections that are operating at undesirable levels of service under future base conditions (without Project) are the same three intersections that are currently operating at undesirable levels of service. Table 5 summarizes the V/C, delay and level of service results of the Year 2000 Base conditions.

RECOMMENDED BASE IMPROVEMENTS

The following are recommended Year 2000 "base improvements" to mitigate the poor operating conditions at the three intersections previously identified:

Waipahu Street and Mokuola Street

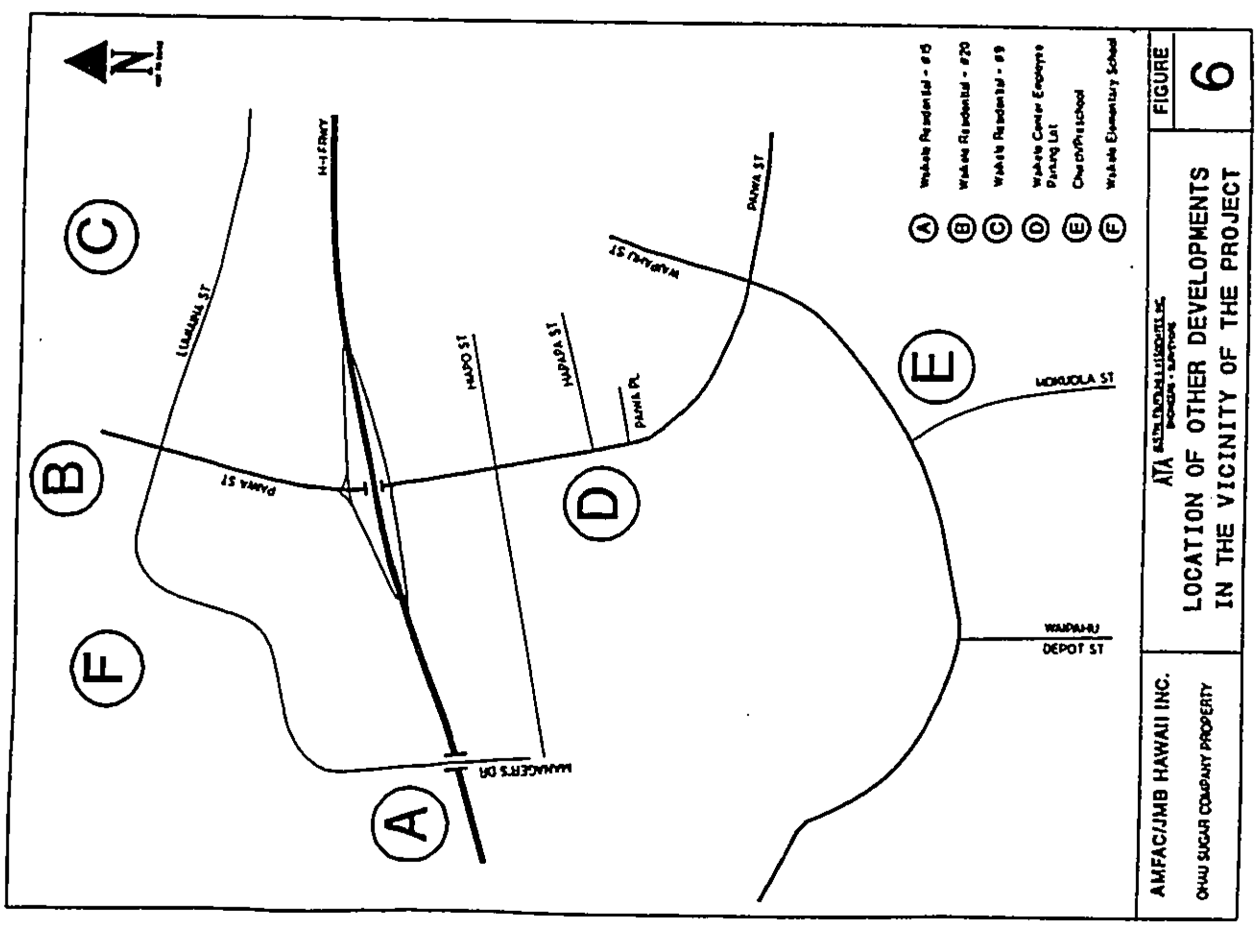
- Provide the westbound approach with an exclusive left-turn lane and one through lane.
- Provide the northbound approach with one exclusive left-turn lane and one exclusive right-turn lane.

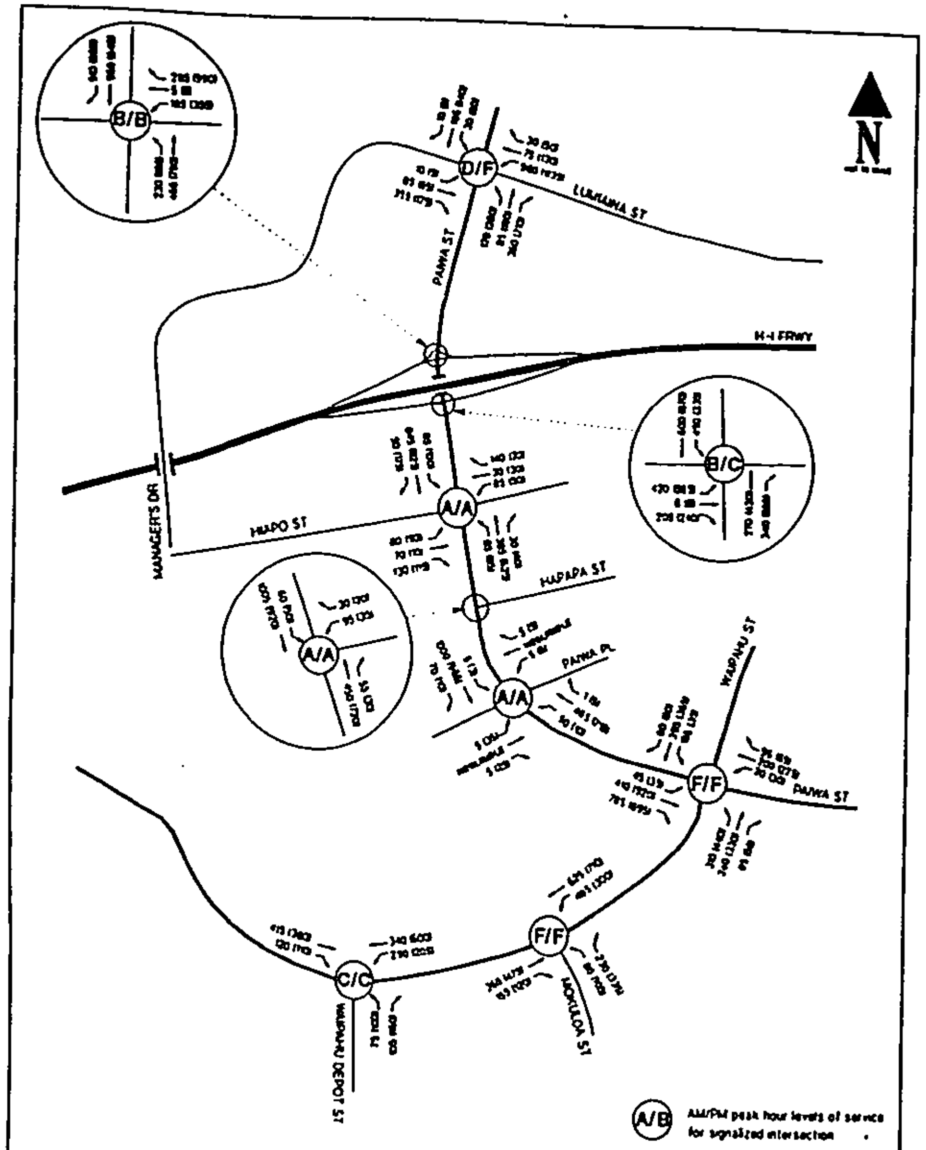
With the recommended improvements, the intersection will operate at LOS B during both the AM and PM peak hours.

TABLE 4
RELATED PROJECT TRIP GENERATION RATES AND TRIP GENERATION

LAND USE	UNITS	DAILY	AM PEAK HOUR			PM PEAK HOUR		
			IN	OUT	TOTAL	IN	OUT	TOTAL
TRIP GENERATION RATES								
SINGLE FAMILY RESIDENTIAL	dwelling units	9.55	26%	74%	0.74	65%	35%	1.01
MULTI FAMILY RESIDENTIAL	dwelling units	5.86	17%	83%	0.44	66%	34%	0.55
DAY CARE CENTER	1,000 sf	79.26	54%	46%	15.17	46%	54%	15.56
ELEMENTARY SCHOOL	students	1.09	60%	40%	0.30	56%	44%	0.25
TRIP GENERATION								
WAIKELE RESIDENTIAL AREA								
SF RESIDENTIAL - PARCEL 9	180 DU	1,719	35	99	133	118	64	182
MF RESIDENTIAL - PARCEL 9	282 DU	1,653	21	103	124	102	53	155
MF RESIDENTIAL - PARCEL 15	270 DU	1,582	20	99	119	98	50	149
SF RESIDENTIAL - PARCEL 20	195 DU	1,862	38	107	144	128	69	197
CHURCH/PRESCHOOL (CORNER OF WAIPAHU ST/MOKUOLA ST)	17.6 KSF	1,395	144	123	267	126	148	274
WAIKELE CENTER EMPLOYEE PARKING LOT [a]	400 stalls	800	120	0	120	20	60	80
WAIKELE ELEMENTARY SCHOOL	750 std	818	135	90	225	106	82	188

[a] From June 1994 "Traffic Impact Report For The Amfac Industrial Subdivision", prepared by ATA.





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YEAR 2000 BASE (WITHOUT PROJECT) CONDITIONS

FIGURE 7

analyzed intersections. Figure 7 also shows the resulting levels of service at the nine analyzed intersections.

Based on the Year 2000 base traffic forecast and analysis, it is projected that three of the nine analyzed intersections will be operating at undesirable levels of service (LOS E or LOS F) during either the AM or PM peak hour, or both. The three intersections are:

- Waipahu Street and Mokuola Street - both AM and PM peak hours
- Waipahu Street and Paiwa Street - both AM and PM peak hours
- Paiwa Street and Lumiaina Street - PM peak hour only

The three intersections that are operating at undesirable levels of service under future base conditions (without Project) are the same three intersections that are currently operating at undesirable levels of service. Table 5 summarizes the V/C, delay and level of service results of the Year 2000 Base conditions.

RECOMMENDED BASE IMPROVEMENTS

The following are recommended Year 2000 "base improvements" to mitigate the poor operating conditions at the three intersections previously identified:

Waipahu Street and Mokuola Street

- Provide the westbound approach with an exclusive left-turn lane and one through lane.
- Provide the northbound approach with one exclusive left-turn lane and one exclusive right-turn lane.

With the recommended improvements, the intersection will operate at LOS B during both the AM and PM peak hours.

TABLE 5
YEAR 2000 BASE – WITHOUT PROJECT
INTERSECTION LEVEL OF SERVICE SUMMARY

INTERSECTION	EXISTING YEAR [illegible]						YEAR 2000 BASE					
	AM PEAK HOUR			PM PEAK HOUR			AM PEAK HOUR			PM PEAK HOUR		
	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS
1. WAIPAHU ST & DEPOT RD	0.83	8.1	B	0.80	11.5	B	0.80	24.8	C	0.77	26.7	D
2. WAIPAHU ST & MOKUOLA ST	0.90	31.7	E [a]	0.96	33.9	E [a]	1.16	22.8	F [a]	1.22	41.6	F [a]
3. WAIPAHU ST & PAIWA ST	0.87	32.4	E [a]	0.84	38.8	D	1.03	72.2	F	1.34	36.1	F [a]
4. PAIWA ST & PAIWA PL [b]							0.42	2.7	A	0.30	2.1	A
- SB LEFT-TURN	-	3.1	A	-	2.7	A						
- WB APPROACH	-	10.8	B	-	12.2	C						
5. PAIWA ST & HAPAPA ST [b]												
- SB LEFT-TURN	-	3.4	A	-	3.0	A	0.40	4.8	A	0.40	2.0	A
- WB APPROACH	-	23.2	D	-	17.6	C						
6. PAIWA ST & HIAPO ST	0.30	4.2	A	0.40	11.9	B	0.43	4.8	A	0.53	3.5	A
7. PAIWA ST & H-1 EB RAMPS	0.53	25.7	D	0.80	24.8	C	0.86	14.5	B [c]	0.70	20.8	C [c]
8. PAIWA ST & H-1 WB RAMPS	0.30	9.7	B	0.30	8.4	B	0.40	7.8	B	0.47	7.4	B
9. PAIWA ST & LUMIAINA ST	0.81	38.8	D	0.94	62.1	F	0.87	31.8	D	1.41	48.8	F [a]

[a] LOS E or F based on volume to capacity ratio.
[b] Existing stop-controlled intersection analyzed as signalized intersection under future base conditions.
[c] Level of service improved from existing due to signal optimization.

<u>Waipahu Street and Paiwa Street</u>

- Provide the southbound approach with an exclusive left-turn lane, one through lane and one exclusive right-turn lane.
- Provide the northbound, eastbound and westbound approaches with one exclusive left-turn lane and one shared through and right-turn lane

With the recommended intersection improvements, the intersection will operate at LOS B during both the AM and PM peak hours.

<u>Paiwa Street and Lumiaina Street</u>

- Provide the northbound approach with one exclusive left-turn lane, two through lanes and one exclusive right-turn lane.
- Restripe to provide the westbound approach with one exclusive left-turn lane, one shared through and left-turn lane and one shared through and right-turn lane.

With the recommended intersection improvements, the intersection will operate at LOS B and D during the AM and PM peak hours, respectively. Table 6 summarizes the level of service results.

TABLE 6
YEAR 2000 BASE WITH BASE IMPROVEMENTS
INTERSECTION LEVEL OF SERVICE SUMMARY

INTERSECTION	EXISTING YEAR 1996						YEAR 2000 BASE						YEAR 2000 BASE WITH BASE IMPROVEMENTS					
	AM PEAK HOUR			PM PEAK HOUR			AM PEAK HOUR			PM PEAK HOUR			AM PEAK HOUR			PM PEAK HOUR		
	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS
1. WAIPAHU ST & DEPOT RD	0.63	8.1	B	0.66	11.5	B	0.90	24.6	C	0.77	20.7	C						
2. WAIPAHU ST & MOKUOLA ST	0.96	31.7	E [a]	0.96	33.6	E [a]	1.16	33.6	F [a]	1.32	41.5	F [a]	0.61	8.2	B	0.84	7.9	B
3. WAIPAHU ST & PAIWA ST	0.97	32.4	E [a]	0.84	26.9	D	1.63	72.7	F	1.34	36.1	F [a]	0.63	10.6	B	0.62	11.2	B
4. PAIWA ST & PAIWA PL [b]							0.42	2.7	A	0.30	3.1	A						
- SB LEFT-TURN	-	3.1	A	-	3.7	A												
- WB APPROACH	-	10.9	B	-	12.2	C												
5. PAIWA ST & HAPAPA ST [b]							0.40	4.6	A	0.40	2.6	A						
- SB LEFT-TURN	-	3.4	A	-	3.5	A												
- WB APPROACH	-	25.2	D	-	17.6	C												
6. PAIWA ST & HIAPO ST	0.30	4.2	A	0.40	11.0	B	0.43	4.9	A	0.53	3.6	A						
7. PAIWA ST & H-1 EB RAMPS	0.62	25.7	D	0.86	24.0	C	0.86	14.5	B [c]	0.78	20.0	C [c]						
8. PAIWA ST & H-1 WB RAMPS	0.30	9.7	B	0.30	8.4	B	0.46	7.9	B	0.47	7.6	B						
9. PAIWA ST & LUMIAINA ST	0.61	34.9	D	0.94	62.1	F	0.57	31.6	D	1.41	46.0	F [a]	0.63	13.7	B	0.66	26.2	D

* [a] LOS E or F based on volume to capacity ratio.
[b] Existing stop-controlled intersection analyzed as signalized intersection under Year 2000 base conditions.
[c] Level of service improved from existing due to signal optimization.

IV. PROJECT GENERATED TRAFFIC VOLUMES

The development of traffic projections for the proposed Project involves traffic generation, trip distribution, and traffic assignment. A description of each process follows:

PROJECT GENERATED TRAFFIC

Trip generation estimates for the proposed project are developed by applying appropriate trip generation rates to the land use densities of the proposed Project. The trip generation rates are summarized in Table 7. These trip generation rates are based upon data from "Trip Generation" 5th Edition, Institute of Transportation Engineers (ITE), 1991. The projected vehicular trips expected to be generated by the project are also summarized in Table 7.

Phase I of the Project (industrial park) plus the community facilities and the Hans L'Orange Park expansion, are estimated to generate approximately 2,751 daily vehicular trips; 339 AM peak hour trips (with 264 trips entering and 75 trips exiting the Project site) and 377 PM peak hour trips (with 63 trips entering and 314 trips exiting the Project site).

Phase II of the Project (the commercial center) is estimated to generate approximately 7,338 daily vehicle trips; 168 AM peak hour trips (with 106 trips entering and 62 trips exiting the Project site) and 682 PM peak hour trips (with 341 trips entering and 341 trips exiting the Project site).

The total Project (Phases I and II) is estimated to generate approximately 10,089 daily vehicle trips; 507 AM peak hour trips (with 370 trips entering and 137 trips exiting the Project site) and 1,060 PM peak hour trips (with 404 trips entering and 655 trips exiting the Project site).

TABLE 7
PROJECT TRIP GENERATION RATES AND TRIP GENERATION

LAND USE	UNITS	DAILY	AM PEAK HOUR IN	AM PEAK HOUR OUT	AM PEAK HOUR TOTAL	PM PEAK HOUR IN	PM PEAK HOUR OUT	PM PEAK HOUR TOTAL
TRIP GENERATION RATES								
LIGHT INDUSTRIAL	1,000 sf	6.97	83%	17%	0.92	12%	88%	0.98
SHOPPING CENTER	1,000 sf	[a]	63%	37%	[b]	-	-	-
< 600 KSF		-	-	-	-	50%	50%	[c]
> 600 KSF		-	-	-	-	50%	50%	[d]
COMMUNITY CENTER	1,000 sf	10.40	62%	38%	1.08	28%	72%	1.38
CITY PARK	ACRES	30.00	72%	28%	2.87	35%	65%	3.14
TRIP GENERATION								
PHASE I								
LIGHT INDUSTRIAL - 1	178.3 KSF	1,243	136	28	164	21	154	175
LIGHT INDUSTRIAL - 2	86.7 KSF	604	66	14	80	10	75	85
LIGHT INDUSTRIAL - 3	6.5 KSF	45	5	1	6	1	5	6
LIGHT INDUSTRIAL - 4	2.5 KSF	17	2	0	2	0	2	2
COMMUNITY CENTER	71.7 KSF	746	48	29	77	28	71	99
PARK	3.2 AC	96	7	3	9	4	7	10
TOTAL PHASE I		2,751	264	75	339	63	314	378
PHASE II								
COMMERCIAL CENTER	106.2 KSF	7,338	106	62	168	341	341	682
TOTAL PHASE I AND II	-	10,089	370	137	507	404	655	1,060

[a] Daily: Ln(T)=[illegible]
[b] AM: Ln(T)=0.589Ln(x)+2.378
[c] PM: Ln(T)=0.637Ln(x)+3.553
[d] Daily: Ln(T)=0.725Ln(x)+2.9875

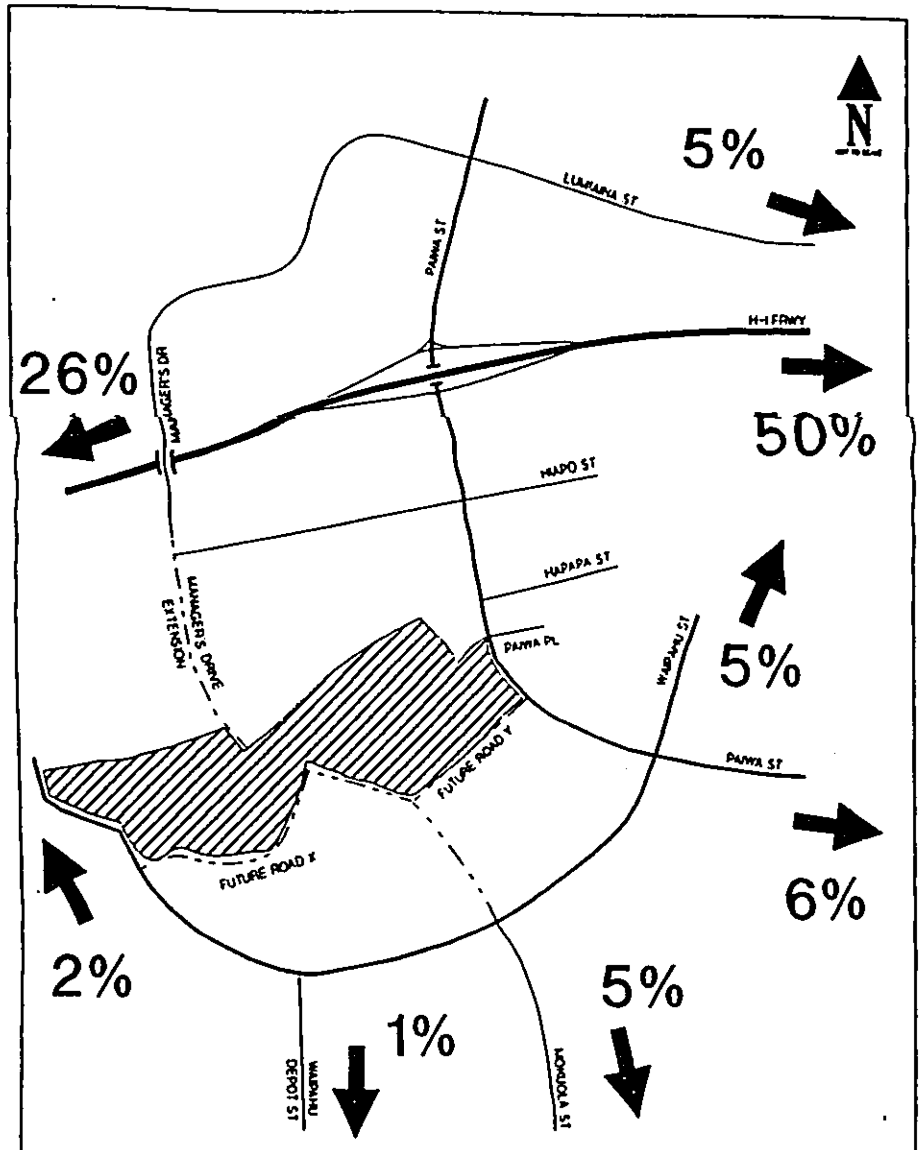
Where:
Ln = Natural Logarithm
T = Two-way volume of traffic of total trip ends
x = area in 1,000 gross square feet of leasable area

PROJECT TRAFFIC DISTRIBUTION

The directional distribution pattern developed for the proposed industrial park is based on the general residential distribution of the island with emphasis on the Central and Ewa region. This distribution pattern reflects the likely work commute pattern to and from the industrial park during the AM and PM peak hours. The distribution pattern is shown on Figure 8. The distribution pattern used for the distribution of commercial trips is shown on Figure 9. The distribution pattern for commercial trips is based primarily on residents in the Waikele community (about 50%) and the East Waipahu area (about 31%).

PROJECT TRAFFIC ASSIGNMENT

The trip distribution patterns identified in the previous section were used to assign the Project generated traffic to the street network. The assignment to specific streets and intersections was based on the available access into and out of the site and the availability of local routes to access the regional highway system. The resulting estimated Project generated peak hour traffic volumes, at each of the thirteen analyzed intersections for Phase I, are shown on Figure 10. Phases I and II generated traffic volumes are shown in Figure 11.



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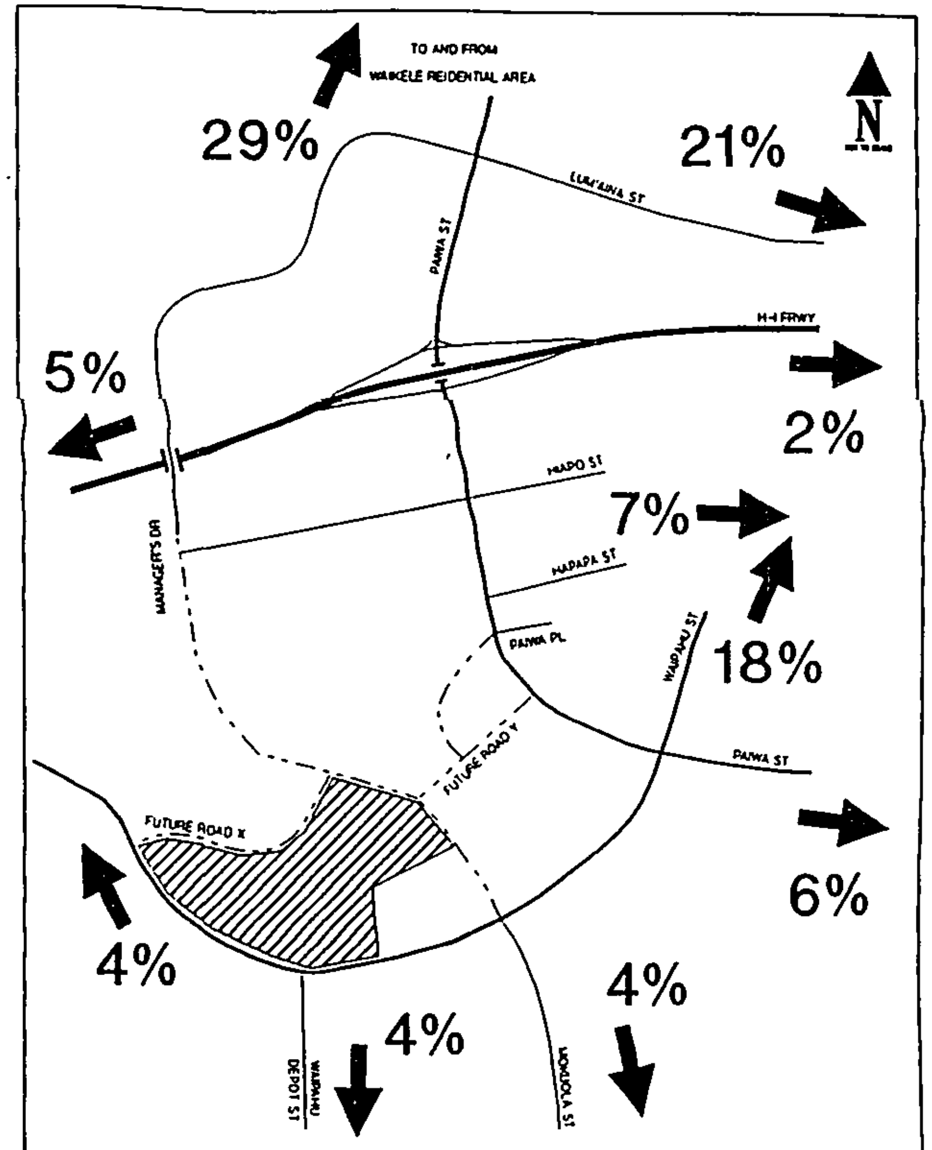
GENERAL DISTRIBUTION PATTERN FOR INDUSTRIAL USE

FIGURE 8



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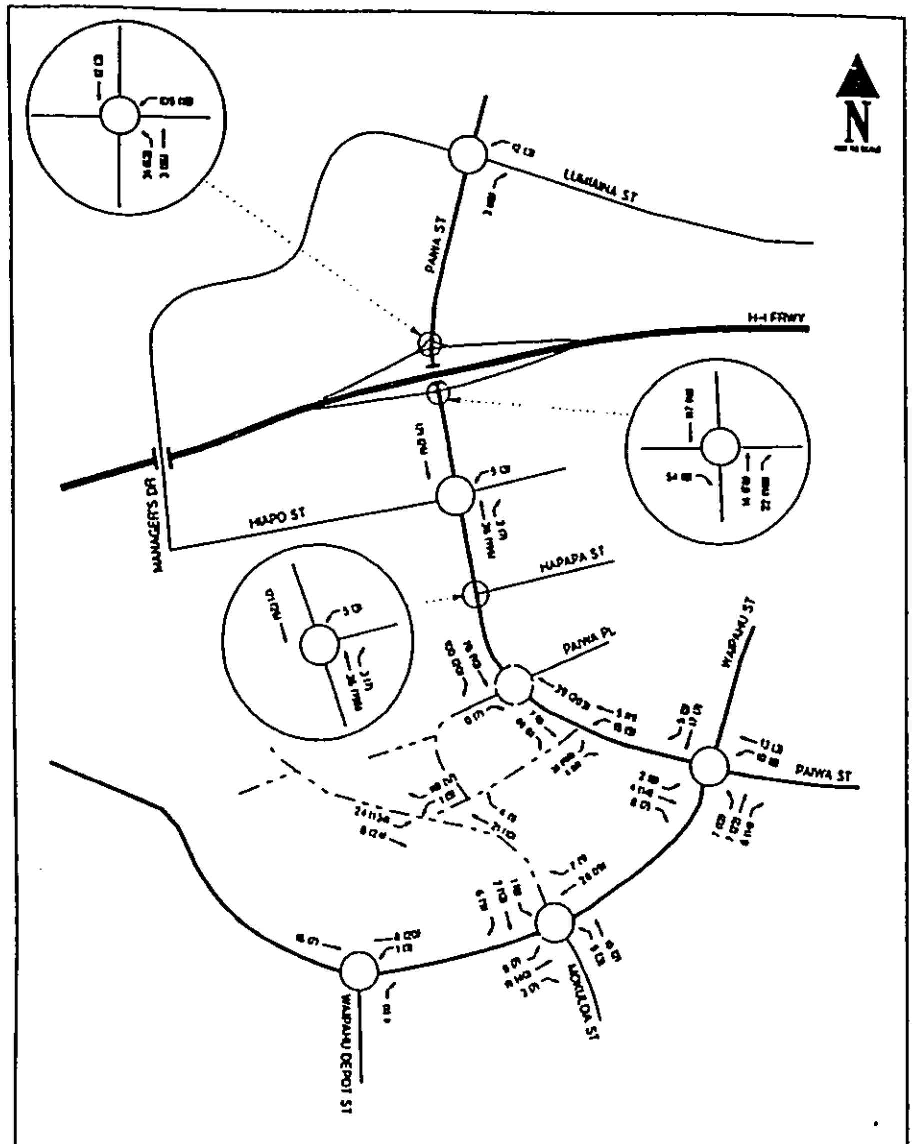
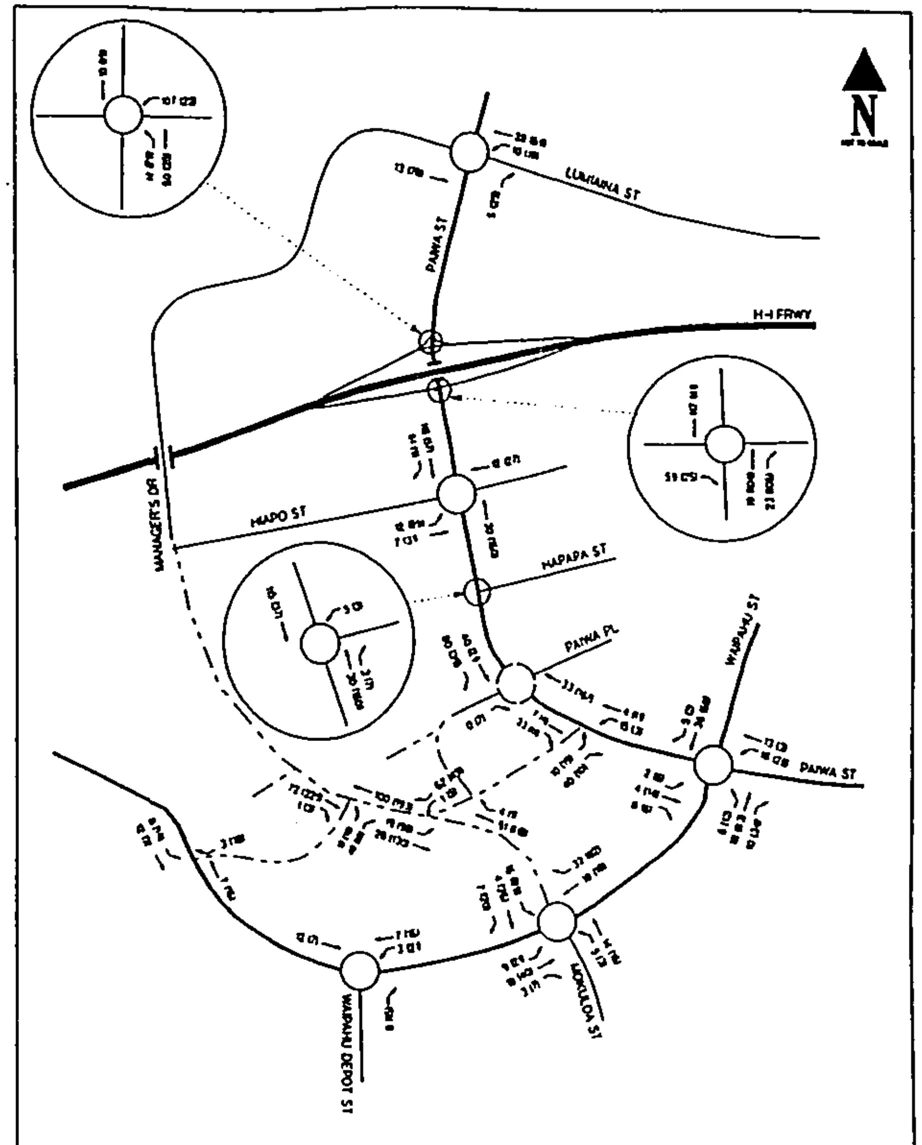
GENERAL DISTRIBUTION PATTERN FOR COMMERCIAL USE

FIGURE 9



AMFAC/JMB HAWAII INC. OAHU SUGAR COMPANY PROPERTY	ATA PHASE I ONLY TRAFFIC VOLUMES	FIGURE 10



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V. FUTURE WITH PROJECT ANALYSES

This section describes future operating conditions with the addition of project generated traffic to the future base traffic conditions.

PROJECT RELATED ROADWAY IMPROVEMENTS

Under future with Project conditions, roadway improvements associated with the proposed project are included in the analysis. The following summarizes the roadway improvements that are anticipated to be implemented in conjunction with the proposed Project:

- Manager's Drive Extension - from the Project's makai boundary at Waipahu Street, Mokuola Street will be extended mauka to the mauka Project boundary in alignment with the future extension of Manager's Drive from Hiapo Street. This improvement will be in conjunction with Phase I of the Project.

- Waipahu Street and Mokuola Street/Manager's Drive Intersection - along with the extension of Manager's Drive, the southbound approach will provide one exclusive left-turn lane and one shared through and right-turn lane. The eastbound approach will be improved to provide one exclusive left-turn lane and one shared through and right-turn lane. This improvement will be in conjunction with Phase I of the Project.

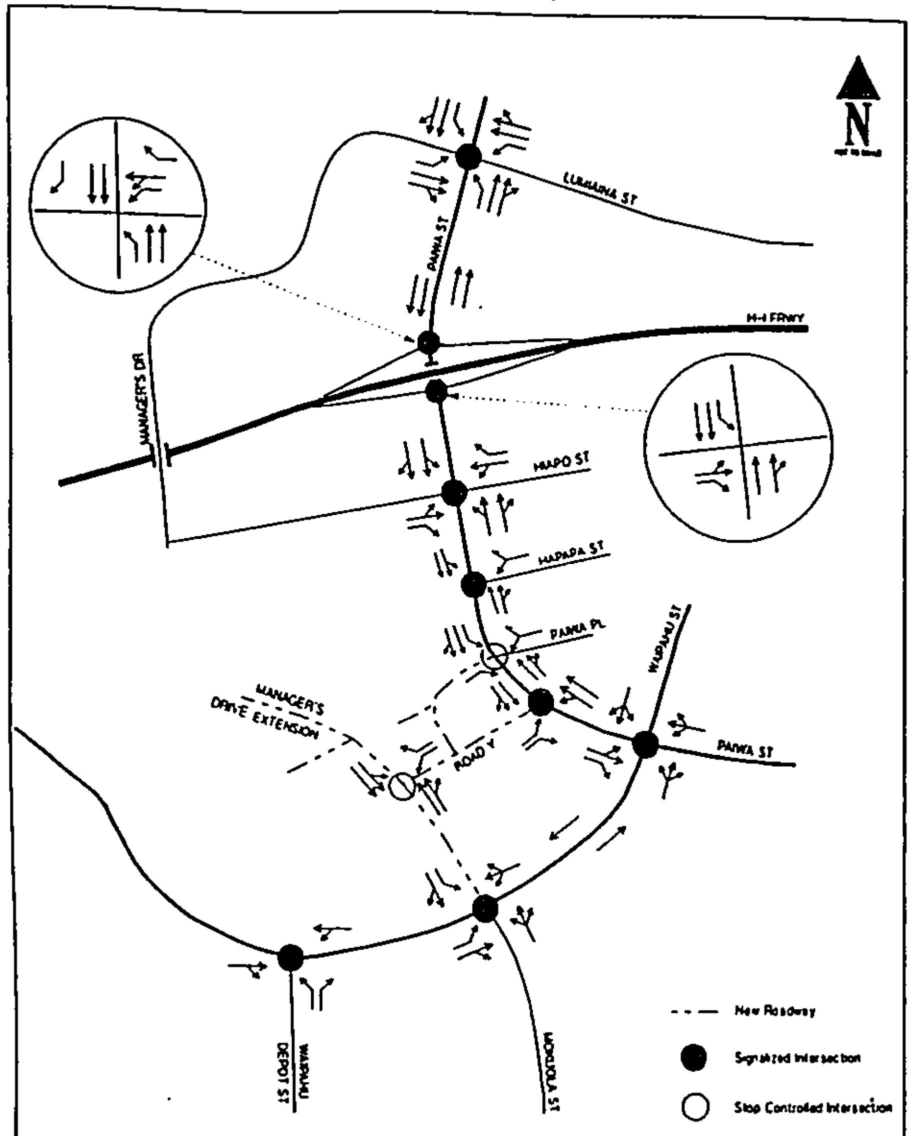
- Road Y - to conform to the current Waipahu Special Area Plan, a new 60-foot right-of-way east-west road will be constructed from Manager's Drive (just south of its intersection with Road X) to Paiwa Street (south of its intersection with Paiwa Place). The intersection of Road Y and Paiwa Street will be signalized. Along with the signalization of the Road Y/Paiwa Street intersection, the traffic signal system at

Paiwa Street and Paiwa Place will be removed and the west leg of the intersection will be restricted to right-turn in and right-turn out movements only. Egress from the proposed Project and the Waikele employee parking area will be shifted to the new intersection of Road Y and Paiwa Street. The intersection of Road Y and Manager's Drive will be controlled by stop-signs until such time as the intersection meets traffic signal warrants. This roadway will be constructed in conjunction with Phase I of the Project.

- Paiwa Street and Paiwa Place - with the proposed Road Y connection at Paiwa Street, the traffic signal system at Paiwa Street and Paiwa Place will be removed and the west-leg of Paiwa Place will be restricted to a right-turn in and right-turn out movements only. Traffic from the east-leg of Paiwa Place will continue to be allowed left and right-turns out of and into Paiwa Place. The intersection improvements currently being completed in conjunction with the Waikele Center employee parking lot creates exclusive left-turn lanes in the northbound and southbound direction on Paiwa Street. However, when Road Y eventually connects to Paiwa Street, the northbound left-turn into Paiwa Place will be restricted and the northbound exclusive left-turn lane will provide a sheltered area for westbound left-turning traffic out of the east-leg of Paiwa Place.

- Road X - to conform to the current Waipahu Special Area Plan, a new 60-foot right-of-way east-west road will be constructed between Waipahu Street (near the existing Auaili Street/Waipahu Street intersection) to the future extended Manager's Drive. The intersection of Waipahu Street and Road X is assumed to be signalized in this analysis. Road X's intersection with Manager's Drive will be controlled by stop-signs. This roadway will be constructed in conjunction with Phase II of the Project.

Figure 12 shows the proposed roadways under the Year 2000 with Phase I conditions.



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YEAR 2000 WITH PHASE I INTERSECTION CONFIGURATIONS

FIGURE 12

FUTURE WITH PHASE I CONDITIONS

The proposed Phase I Project generated traffic volumes were added to Year 2000 Base traffic volumes and redistributed based on the new roadways described previously. Figure 12 shows the intersection configurations under the Year 2000 with Phase I. The resulting Year 2000 with Phase I traffic volumes are shown on Figure 13.

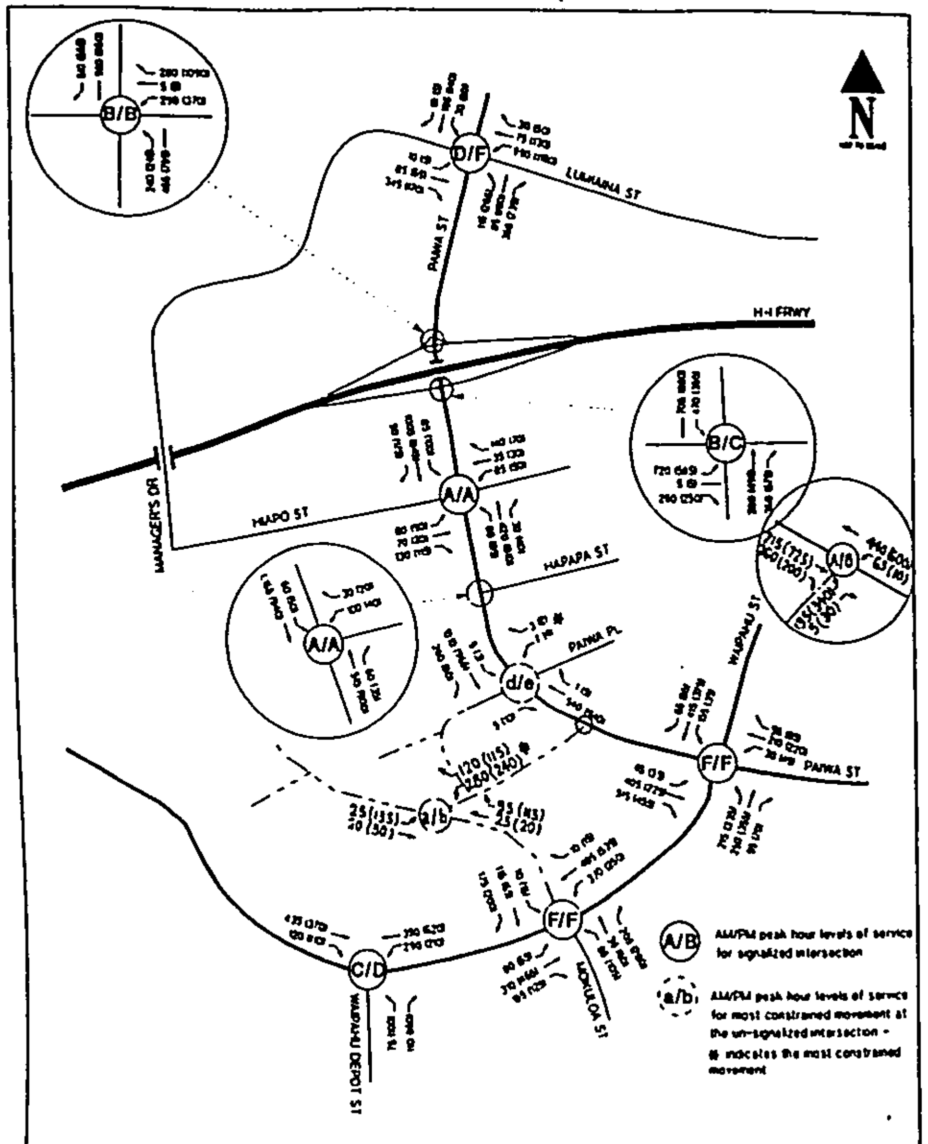
The Year 2000 With Phase I scenario was analyzed to determine the potential effect of the proposed Phase I Project on the roadway system. As also shown on Figure 13, the results indicate that four of the eleven analyzed intersections (intersections Waipahu Street/Road X and Manager's Drive/Road X do not exist under Phase I) will be operating at undesirable levels of service (LOS E or F). The remaining seven intersections are all operating at LOS D or better during both the AM and PM peak hours. The four intersections that are projected to operate at undesirable levels of service are:

- Waipahu Street and Mokuola Street - both AM and PM peak hours
- Waipahu Street and Paiwa Street - both AM and PM peak hours
- Paiwa Street and Lumiaina Street - PM peak hour only
- Paiwa Street and Paiwa Place - westbound approach during the PM peak hour only

Except for the intersection of Paiwa Street and Paiwa Place, all the intersections listed are the same intersections that were projected to operate at undesirable levels of service under Year 2000 Base conditions.

Analysis also shows that, with the recommended base improvements which were described in the Section III, the three intersections that are projected to operate at LOS E or F will improve to LOS D or better under the Year 2000 with Phase I of the proposed Project.

Although it is projected that traffic on the westbound approach from Paiwa Place to Paiwa Street will experience delays during the PM peak hour, it should be noted that a relatively low amount of vehicles is projected to be affected. Westbound left-turning vehicles from Paiwa Place will be offered a sheltered area (the northbound left-turn lane which will not be used when the west-leg



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YEAR 2000 WITH PHASE 1
TRAFFIC CONDITIONS

FIGURE 13

of Paiwa Place will be restricted to right-turn in and right-turn out) before merging into the southbound through traffic. No improvement to this intersection is recommended.

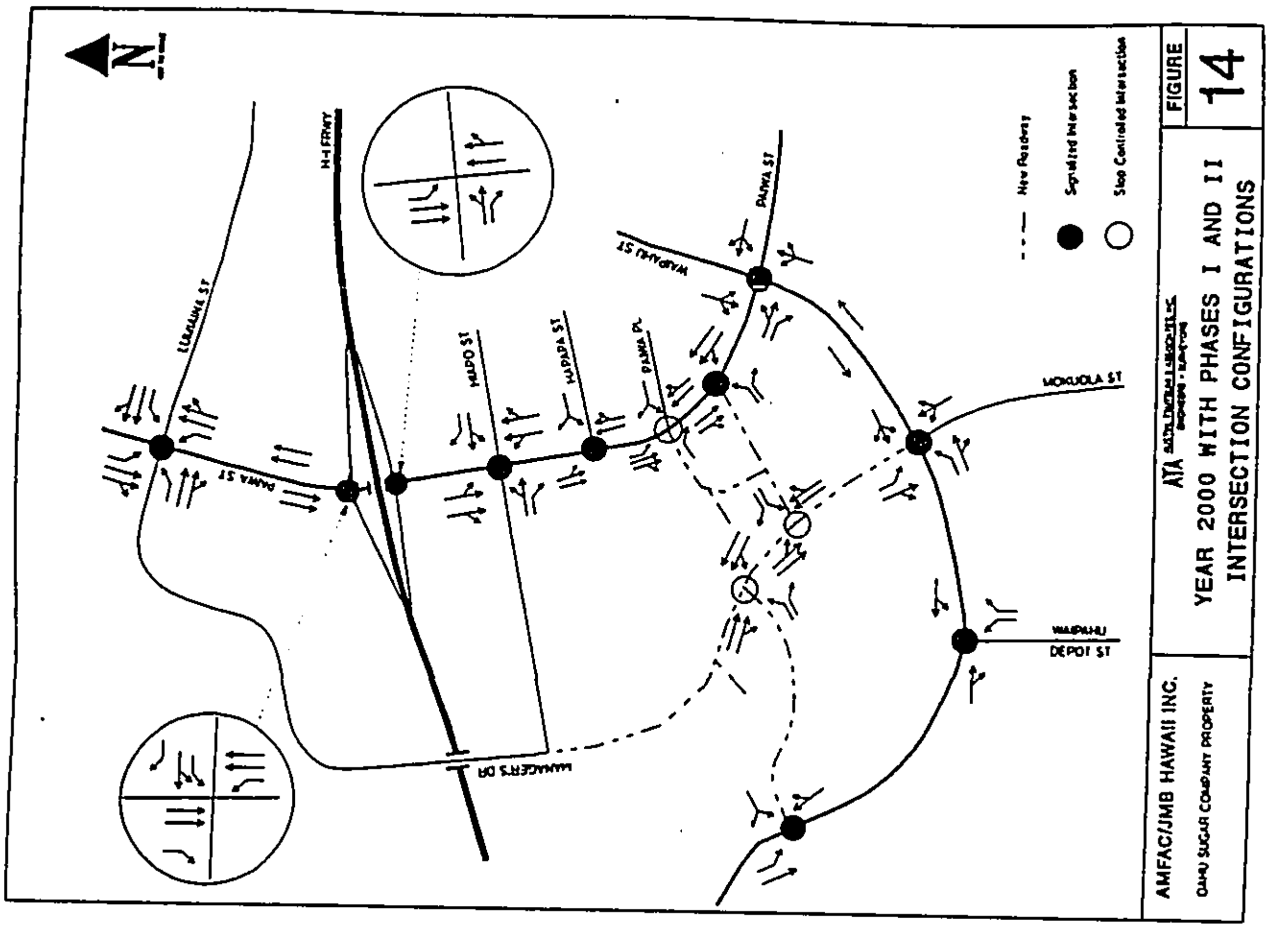
Table 8 summarizes the level of service results.

FUTURE WITH PHASES I AND II AND CITY'S MANAGER'S SITE CONDITIONS

Traffic operations for the Year 2000 with Phases I and II of the proposed Project and the City's Manager's Drive Site scenario were analyzed to determine the potential effect of the total buildout of the subject area on the roadway system. For the purpose of analyzing the full potential impacts due to the buildout of the subject area, the City's residential site, located west of the intersection of Manager's Drive and Hiapo Street is also included in this analysis along with the completion of the Manager's Drive extension between Hiapo Street and the proposed Project's northern property line (thus completing Manager's Drive extension from H-1 Freeway to Waipahu Street). For the purpose of this traffic analysis, it is assumed that the City's Manager's Drive Site will contain 225 single-family residential dwelling units. The site is estimated to generate 2,149 daily trips with 167 AM peak hour trips and 227 PM peak hour trips. Figure 14 shows the layout of the roadway network under this scenario. Figure 15 shows the projected traffic volumes and level of service results. The results indicate that four of the thirteen analyzed intersections will be operating at undesirable levels of service (LOS E or F). The four intersections are:

- Waipahu Street and Mokuola Street - both AM and PM peak hours
- Waipahu Street and Paiwa Street - both AM and PM peak hours
- Paiwa Street and Lumiaina Street - PM peak hour only
- Paiwa Street and Paiwa Place - westbound approach during the PM peak hour only

Except for the intersection of Paiwa Street and Paiwa Place, all the intersections listed are the same intersections that were projected to operate at undesirable levels of service under Year 2000 Base conditions.



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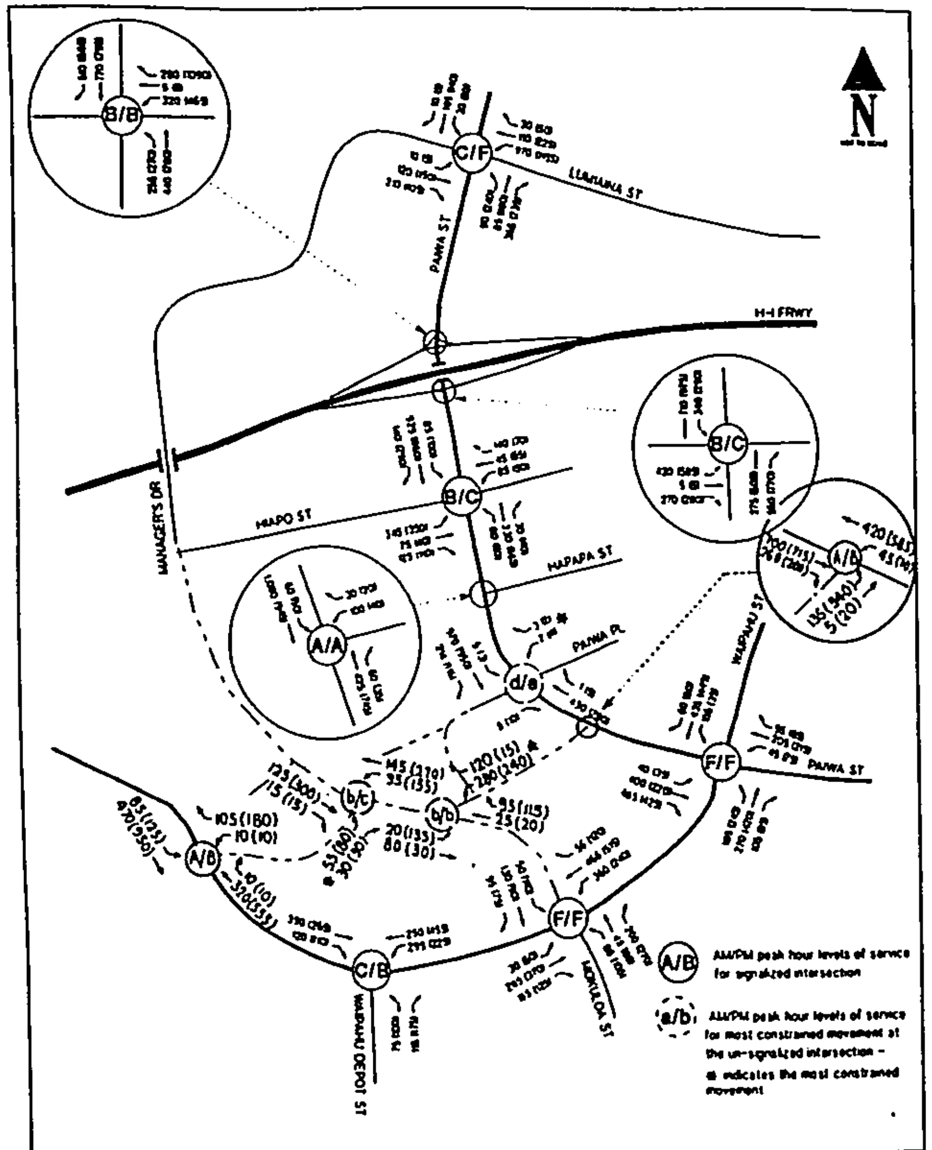
YEAR 2000 WITH PHASES I AND II
INTERSECTION CONFIGURATIONS

FIGURE 14

TABLE 8
YEAR 2000 WITH PHASE I – INTERSECTION LEVEL OF SERVICE SUMMARY

INTERSECTION	EXISTING YEAR [illegible]						YEAR 2000 BASE (W/O PROJECT)						YEAR 2000 WITH PHASE I						YEAR 2000 WITH PHASE I AND BASE IMPROVEMENTS					
	AM PEAK HOUR			PM PEAK HOUR			AM PEAK HOUR			PM PEAK HOUR			AM PEAK HOUR			PM PEAK HOUR			AM PEAK HOUR			PM PEAK HOUR		
	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS
1. WAIPAHU ST & DEPOT RD	[illegible]	[illegible]	B	[illegible]	11.5	B	[illegible]	[illegible]	C	0.77	[illegible]	C	[illegible]	[illegible]	C	0.79	[illegible]	D						
2. WAIPAHU ST & MOKUOLA ST	0.90	31.7	E (a)	[illegible]	[illegible]	E (a)	1.16	[illegible]	F (a)	1.27	[illegible]	F (a)	1.13	[illegible]	F (a)	1.21	31.2	F (a)	[illegible]	[illegible]	B	[illegible]	[illegible]	B
3. WAIPAHU ST & PAIWA ST	0.87	[illegible]	E (a)	[illegible]	[illegible]	D	[illegible]	[illegible]	F	[illegible]	[illegible]	F (a)	[illegible]	[illegible]	F	1.14	[illegible]	F (a)	[illegible]	[illegible]	B	[illegible]	[illegible]	B
4. PAIWA ST & PAIWA PL (b)							[illegible]	2.7	A	[illegible]	3.1	A							NO IMPROVEMENTS RECOMMENDED					
– SB LEFT-TURN	–	3.1	A	–	3.7	A							–	4.1	A	–	[illegible]	B						
– WB APPROACH	–	10.0	B	–	[illegible]	C							–	27.7	D	–	[illegible]	E						
– EB RIGHT-TURN	–	–	–	–	–	–							–	[illegible]	A	–	[illegible]	B						
5. PAIWA ST & NAPAPA ST (b)							[illegible]	[illegible]	A	[illegible]	[illegible]	A	[illegible]	[illegible]	A	[illegible]	2.7	A						
– SB LEFT-TURN	–	[illegible]	A	–	[illegible]	A																		
– WB APPROACH	–	[illegible]	D	–	17.0	C																		
6. PAIWA ST & HAPO ST	[illegible]	4.2	A	[illegible]	[illegible]	B	[illegible]	4.0	A	[illegible]	[illegible]	A	[illegible]	4.0	A	[illegible]	4.1	A						
7. PAIWA ST & H-1 EB RAMPS	[illegible]	[illegible]	D	[illegible]	[illegible]	C	[illegible]	[illegible]	B (c)	0.70	[illegible]	C (c)	[illegible]	[illegible]	B	[illegible]	[illegible]	C						
8. PAIWA ST & H-1 WB RAMPS	[illegible]	6.7	B	[illegible]	[illegible]	B	[illegible]	7.0	B	0.47	[illegible]	B	[illegible]	[illegible]	B	[illegible]	[illegible]	B						
9. PAIWA ST & LUMIAINA ST	0.61	[illegible]	D	[illegible]	[illegible]	F	[illegible]	31.0	D	1.41	[illegible]	F (a)	[illegible]	[illegible]	D	[illegible]	[illegible]	F (a)	[illegible]	14.2	B	[illegible]	[illegible]	D
10. WAIPAHU ST & ROAD X	N/A			N/A			N/A			N/A			N/A			N/A								
11. MANAGER'S DR & ROAD X	N/A			N/A			N/A			N/A			N/A			N/A								
– WB LEFT-TURN																								
– EB APPROACH																								
12. MANAGER'S DR & ROAD Y	N/A			N/A			N/A			N/A														
– SB LEFT-TURN													–	[illegible]	A	–	[illegible]	A						
– WB APPROACH													–	[illegible]	A	–	[illegible]	B						
13. PAIWA ST & ROAD Y	N/A			N/A			N/A			N/A			[illegible]	[illegible]	A	[illegible]	[illegible]	B						

(a) LOS E or F based on volume to capacity ratio.
(b) Existing stop-controlled intersection analyzed as signalized intersection under Year 2000 base conditions.
(c) Level of service improved from existing due to signal optimization.



AMFAC/JMB HAWAII INC.	ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS • SURVEYORS	FIGURE
OAHU SUGAR COMPANY PROPERTY	YEAR 2000 WITH PHASES I AND II TRAFFIC CONDITIONS	15

Analysis also shows that with the recommended base improvements which were described in Section III, with the exception of the Paiwa Street and Paiwa Place intersection, all intersections that are projected to operate at LOS E or F will improve to LOS D or better under the Year 2000 with Phase I and II of the proposed Project.

Although it is projected that the westbound approach from Paiwa Place to Paiwa Street will experience delays during the PM peak hour, it should be noted that a relatively low amount of vehicles is projected to be affected.

Table 9 summarizes the level of service results and Figure 16 shows the recommended base improvements along with the Year 2000 with Phases I and II intersection configurations.

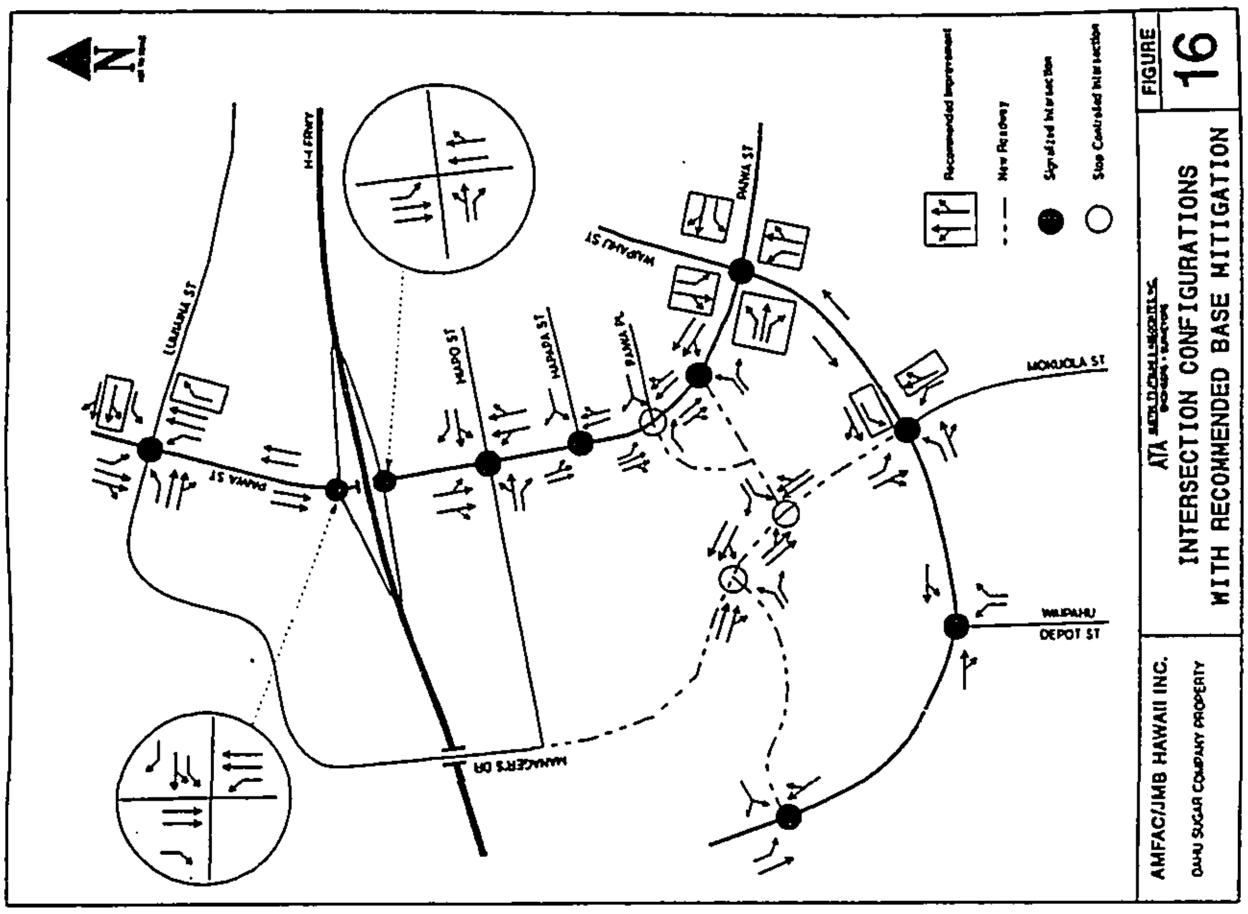


TABLE 9
YEAR 2000 WITH PHASES I AND II – INTERSECTION LEVEL OF SERVICE SUMMARY

INTERSECTION	EXISTING YEAR [illegible]						YEAR 2000 BASE (W/O PROJECT)						YEAR 2000 WITH PHASE I AND II						YEAR 2000 WITH PHASE I AND II WITH BASE IMPROVEMENTS					
	AM PEAK HOUR			PM PEAK HOUR			AM PEAK HOUR			PM PEAK HOUR			AM PEAK HOUR			PM PEAK HOUR			AM PEAK HOUR			PM PEAK HOUR		
	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS
1. WAIPAHU ST & DEPOT RD	[illegible]	8.1	B	[illegible]	11.5	B	[illegible]	[illegible]	C	0.77	[illegible]	C	0.79	[illegible]	C	[illegible]	[illegible]	B						
2. WAIPAHU ST & MOKUOLA ST	[illegible]	[illegible]	E [a]	[illegible]	[illegible]	E [a]	1.10	[illegible]	F [a]	1.38	41.[illegible]	F [a]	1.16	[illegible]	F[a]	1.12	[illegible]	F[a]	[illegible]	[illegible]	B	0.70	[illegible]	B
3. WAIPAHU ST & PAIWA ST	0.87	[illegible]	E [a]	[illegible]	[illegible]	D	1.[illegible]	72.2	F	1.34	[illegible]	F [a]	1.37	[illegible]	F	1.11	[illegible]	F [a]	[illegible]	[illegible]	B	[illegible]	[illegible]	B
4. PAIWA ST & PAIWA PL [b]							0.40	2.7	A	0.30	3.1	A							NO IMPROVEMENTS RECOMMENDED					
– SB LEFT-TURN	-	3.1	A	-	2.7	A							-	3.[illegible]	A	-	[illegible]	B						
– WB APPROACH	-	[illegible]	B	-	12.[illegible]	C							-	21.[illegible]	D	-	[illegible]	E						
– EB RIGHT-TURN	-	-	-	-	-	-							-	[illegible]	B	-	4.[illegible]	A						
5. PAIWA ST & HAPAPA ST [b]							0.40	4.0	A	0.40	[illegible]	A	0.40	4.7	A	0.42	[illegible]	A						
– SB LEFT-TURN	-	3.4	A	-	3.6	A																		
– WB APPROACH	-	[illegible]	D	-	17.[illegible]	C																		
6. PAIWA ST & HIAPO ST	[illegible]	4.2	A	[illegible]	11.[illegible]	B	0.40	4.[illegible]	A	[illegible]	[illegible]	A	0.79	11.[illegible]	B	[illegible]	[illegible]	C						
7. PAIWA ST & H-1 EB RAMPS	[illegible]	[illegible]	D	[illegible]	[illegible]	C	[illegible]	14.[illegible]	B [c]	0.76	[illegible]	C [c]	0.87	14.[illegible]	B	[illegible]	21.1	C						
8. PAIWA ST & H-1 WB RAMPS	[illegible]	[illegible]	B	[illegible]	[illegible]	B	0.40	7.[illegible]	B	0.47	7.[illegible]	B	[illegible]	[illegible]	B	[illegible]	[illegible]	B						
9. PAIWA ST & LUMIAINA ST	0.81	[illegible]	D	[illegible]	[illegible]	F	0.87	[illegible]	D	1.41	4[illegible]	F [a]	[illegible]	[illegible]	C	1.14	[illegible]	F [a]	[illegible]	1[illegible]	B	[illegible]	[illegible]	B
10. WAIPAHU ST & ROAD X		N/A			N/A			N/A			N/A		[illegible]	3.7	A	[illegible]	[illegible]	B						
11. MANAGER'S DR & ROAD X		N/A			N/A			N/A			N/A													
– NB LEFT-TURN													-	2.7	A	-	3.[illegible]	A						
– EB APPROACH													-	[illegible]	B	-	1[illegible]	C						
12. MANAGER'S DR & ROAD Y		N/A			N/A			N/A			N/A													
– SB LEFT-TURN													-	2.[illegible]	A	-	[illegible]	A						
– WB APPROACH													-	[illegible]	B	-	7.[illegible]	B						
13. PAIWA ST & ROAD Y		N/A			N/A			N/A			N/A		[illegible]	[illegible]	A	[illegible]	[illegible]	B						

[a] LOS E or F based on volume to capacity ratio.
[b] Existing stop-controlled intersection analyzed as signalized intersection under Year 2000 base conditions.
[c] Level of service improved from existing due to signal optimization.

V. SUMMARY OF FINDINGS AND RECOMMENDATIONS

This study was undertaken to analyze the potential traffic impacts of the Oahu Sugar Mill Industrial/Commercial Center. The following is the summary and recommendations of the study.

SUMMARY OF FINDINGS

- The proposed project will include thirty-seven acres of industrial use, twenty acres of commercial use (including a community center, YMCA, a historical park/museum and the expansion of the Hans L'Orange Park).

- Under existing conditions, the flowing three intersections are operating at undesirable levels of service (LOS E and F) during either the AM or PM peak hour, or both:

    1. Waipahu Street and Mokuola Street
    2. Waipahu Street and Paiwa Street
    3. Paiwa Street and Lumiaina Street

- Under the Year 2000 base (without Project) conditions, the same three intersections which are operating at undesirable levels of service under existing conditions will continue to operate at undesirable levels of service (LOS E or F).

- Phase I of the proposed Project (the industrial park) plus the community center with the YMCA and museum, and the Hans L'Orange Park expansion, is estimated to generate

2,751 daily vehicle trips, 339 AM peak hour vehicle trips and 378 PM peak hour vehicle trips.

- Under the Year 2000 with Phase I of the Project, with the exception of Paiwa Street and Paiwa Place, all the intersections that were projected to operate at undesirable levels of service under the Year 2000 Base conditions will also be operating at undesirable levels of service (LOS E or F). The four intersections are:

    1. Waipahu Street and Mokuola Street (both AM and PM peak hours)
    2. Waipahu Street and Paiwa Street (both AM and PM peak hours)
    3. Paiwa Street and Lumiaina Street (PM peak hour only)
    4. Paiwa Street and Paiwa Place (westbound approach during the PM peak hour only)

- Phase II of the proposed Project (commercial center) is estimated to generate 7,338 daily vehicle trips, 168 AM peak hour vehicle trips and 682 PM peak hour vehicle trips.

- Under the Year 2000 with Phases I and II and the City's Manager's Drive Site, with the exception of Paiwa Street and Paiwa Place, all the intersections that were projected to operate at LOS E or F under the Year 2000 Base conditions (without geometric improvements) will also be operating at undesirable levels of service (LOS E or F). The four intersections are:

    1. Waipahu Street and Mokuola Street (both AM and PM peak hours)
    2. Waipahu Street and Paiwa Street (both AM and PM peak hours)
    3. Paiwa Street and Lumiaina Street (PM peak hour only)
    4. Paiwa Street and Paiwa Place (westbound approach during the PM peak hour only)

- It is projected that traffic on the westbound approach from Paiwa Place to Paiwa Street will experience delays during the PM peak hour under the Year 2000 with Phase I and the Year 2000 with Phases I and II conditions. It should be noted that a relatively low amount of vehicles are projected to be affected. Westbound left-turning vehicles from Paiwa Place will be offered a sheltered area before merging into the southbound through traffic.

RECOMMENDATIONS

- The following are the recommended "base improvements" to mitigate the undesirable operating conditions identified under the Year 2000 Base conditions (without Project):

  Waipahu Street and Mokuola Street
  - Provide the westbound approach with an exclusive left-turn lane and one through lane.
  - Provide the northbound approach with one exclusive left-turn lane and one exclusive right-turn lane.

  With the recommended geometric improvements, the intersection will operate at LOS B during both the AM and PM peak hours.

  Waipahu Street and Paiwa Street
  - Provide the southbound approach with an exclusive left-turn lane, one through lane and one exclusive right-turn lane.
  - Provide the northbound, eastbound and westbound approaches with one exclusive left-turn lane and one shared through and right-turn lane

  With the recommended geometric improvements, the intersection will operate at LOS B during both the AM and PM peak hours.

  Paiwa Street and Lumiaina Street
  - Provide the northbound approach with one exclusive left-turn lane, two through lanes and one exclusive right-turn lane.
  - Restripe to provide the westbound approach with one exclusive left-turn lane, one shared through and left-turn lane and one shared through and right-turn lane.

  With the recommended intersection improvements, the intersection will operate at LOS B and D during the AM and PM peak hours, respectively.

- The following are roadways that will be constructed in connection with the proposed Project that will also help overall traffic circulation in Waipahu:

  Road X - to conform to the current Waipahu Special Area Plan, a new 60-foot right-of-way east-west road will be constructed between Waipahu Street (near the existing Auaili Street/Waipahu Street intersection) to the future extended Manager's Drive. The intersection of Waipahu Street and Road X is assumed to be signalized in this analysis. Road X's intersection with Manager's Drive will be controlled by stop-signs. This roadway will be constructed in conjunction with Phase II of the Project.

  Road Y - to conform to the current Waipahu Special Area Plan, a new 60-foot right-of-way east-west road will be constructed from Manager's Drive (just south of its intersection with Road X) to Paiwa Street (south of its intersection with Paiwa Place). The intersection of Road Y and Paiwa Street will be signalized. Along with the signalization of the Road Y/Paiwa Street intersection, the traffic signal system at Paiwa Street and Paiwa Place will be removed and the west leg of the intersection will be restricted to right-turn in and right-turn out movements only. Egress from the proposed Project and the Waikele employee parking area will be shifted to the new intersection of Road Y and Paiwa Street. The intersection of Road Y and Manager's Drive will be controlled by stop signs until such time as the intersection meets traffic signal warrants. This roadway will be constructed in conjunction with Phase I of the Project.

  Manager's Drive Extension - From the Project's makai boundary at Waipahu Street, Mokuola Street will be extended mauka to the mauka Project boundary in alignment with the future extension of Manager's Drive from Hiapo Street. This improvement will be in conjunction with Phase I of the Project.

- In addition to the above roadways, the following intersection modifications will be required in connection with the proposed Project:

  1. Based on the roadway layout of the current Waipahu Special Area Plan, the traffic signal at the intersection of Paiwa Street and Paiwa Place is to be relocated to the

future intersection of Road Y at Paiwa Street. Therefore it is recommended that access to and from the Paiwa Place extension be restricted to right-turn in and right-turn out only.

2. Based on the projected traffic volumes at the intersection of Paiwa Street and the future Road Y intersection, the intersection will be required to be signalized and its northbound approach to provide one shared left-turn and two through lanes. The southbound approach to provide one through lane and one shared through and right-turn lane. The eastbound approach to provide one exclusive left-turn lane and one exclusive right-turn lane. Based on the analysis, an exclusive northbound left-turn lane and an exclusive southbound right-turn lane will not be required.

3. Based on the projected traffic volumes at the intersection of Waipahu Street and the future Road X, the intersection will be required to be signalized and provide one through lane and one exclusive right-turn lane in the northbound approach. The southbound approach to provide one exclusive left-turn lane and one through lane. The westbound approach to provide one shared left-turn and right-turn lane.

4. Based on the projected traffic volumes at the intersection of Waipahu Street and Mokuola Street/Manager's Drive Extension, the eastbound and southbound approaches will need to provide an exclusive left-turn lane and a shared through and right-turn lane.

5. Based on the projected traffic volumes on the future Manager's Drive extension at both the Road X and Road Y intersections, stop-signs controlling the approaches on Road X and Road Y will be sufficient until future traffic volumes warrant the installation of traffic signals. Provisions should be made to include conduits for possible future traffic signal installation should it be needed.

- With the recommended "base improvements" and roadway/intersection improvements related to the proposed Project, the intersections of Waipahu Street/Mokuola Street, Waipahu Street/Paiwa Street and Paiwa Street/Lumiaina Street will all be operating at LOS

D or better for both the AM and PM peak hours under the Year 2000 with Phase I and the Year 2000 with Phases I and II conditions.

REFERENCES

- Institute of Transportation Engineers, Trip Generation, 5th Edition, 1991.
- Transportation Research Board, Access Management Guidelines for Activity Centers - NCHRP Report 348, 1992.
- American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets, 1990.
- Austin, Tsutsumi & Associates, Inc. Traffic Impact Report For The Proposed Amfac Industrial Subdivision, May 1994.

APPENDICES

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

APPENDIX A

TRAFFIC COUNTS

Austin, Tsutsumi & Associates Inc.

24-Hour Machine Count
WAIPAHU TRAFFIC STUDY

Location: PAIWA ST SOUTH OF HAPO ST
Weather: CLEAR
Counter: [illegible]

Site: [illegible]
Date: [illegible]
File: NONE

Interval Begin	Ch 1 AM		Ch 1 PM		Ch 2 AM		Ch 2 PM		COMBINED AM		COMBINED PM		Day Wednesday
1200	16	57	134	543	16	36	165	487	36	96	236	980	
1215	15		143		9		142		23		245		
1230	10		130		11		150		36		238		
1245	8		135		7		88		15		231		
100	11	35	135	504	7	26	144	431	18	60	239	935	
115	14		137		6		98		19		239		
130	8		127		4		114		12		241		
145	8		145		6		135		14		280		
200	7	29	140	534	8	16	150	452	15	55	288	876	
215	3		130		3		130		4		269		
230	6		134		8		101		11		238		
245	4		114		0		118		6		232		
300	3	16	144	601	3	19	114	479	6	35	258	1,148	
315	4		175		3		114		6		289		
330	5		148		0		135		7		284		
345	16		200		4		138		14		337		
400	13	53	158	730	2	37	111	463	12	89	270	1,193	
415	7		177		2		140		14		277		
430	14		168		10		124		28		312		
445	21		215		15		116		34		330		
500	18	231	157	669	16	130	107	443	36	361	264	1,112	
515	40		168		37		95		77		267		
530	61		176		36		116		94		316		
545	132		173		42		141		164		273		
600	166	619	165	668	51	263	116	443	237	1,170	285	1,101	
615	227		168		80		113		308		284		
630	272		154		60		106		332		260		
645	230		137		70		116		300		252		
700	230	1,080	140	418	110	70	95	321	240	1,136	238	739	
715	214		127		65		82		280		208		
730	266		70		11		60		267		148		
745	230		66		10		71		240		138		
800	160	464	98	313	111	316	80	279	270	630	157	592	
815	115		76		75		65		160		148		
830	80		74		73		73		171		147		
845	121		60		58		52		180		110		
900	164	416	66	232	88	323	76	250	172	739	114	481	
915	110		83		60		80		208		113		
930	91		60		94		67		145		151		
945	97		47		73		60		170		115		
1000	130	460	40	160	77	357	80	177	208	817	108	343	
1015	117		46		58		47		210		87		
1030	130		42		54		61		200		83		
1045	110		41		88		30		202		71		
1100	136	479	30	118	88	371	16	76	214	850	46	191	
1115	130		31		99		30		231		57		
1130	101		35		97		20		132		46		
1145	115		30		98		12		213		40		
Total	4,263		2,630		1,948		4,210		6,211		8,040		
Split	60%		57%		31%		43%						
Day totals		6,893				6,158				13,051			
Day Splits		52%				38%							

Printed [illegible]

ATA INC. 15-Nov-95

INTERSECTION COUNT SURVEY SUMMARY

North/South Street : WAIPAHU DEPOT ST
East/West Street : WAIPAHU ST
Weather : CLEAR

Period: AM
Date: 11-15-95
Day : WEDNESDAY

15 MINUTE PERIOD	WAIPAHU DEPOT ST NORTHBOUND LEFT	THRU	RGHT	SOUTHBOUND LEFT	THRU	RGHT	WAIPAHU ST EASTBOUND LEFT	THRU	RGHT	WESTBOUND LEFT	THRU	RGHT	TOTAL VOLUME 15 MIN	HOURLY
630 - 645	10	0	21	0	0	0	0	81	21	28	47	0	208	
645 - 700	12	0	10	0	0	0	0	73	13	49	51	0	207	
700 - 715	11	0	21	0	0	0	0	73	30	56	52	0	243	
715 - 730	15	0	25	0	0	0	0	81	27	67	84	0	299	957
730 - 745	25	0	28	0	0	0	0	92	27	77	63	0	312	1,061
745 - 800	14	0	17	0	0	0	0	84	23	55	76	0	269	1,123
800 - 815	14	0	17	0	0	0	0	50	21	58	82	0	242	1,122
815 - 830	10	0	19	0	0	0	0	39	26	41	43	0	178	1,001
PEAK 15 MINUTE PERIOD: 730 - 745	25	0	28	0	0	0	0	92	27	77	63	0	312	--
PEAK HOUR PERIOD: 700 - 800	65	0	91	0	0	0	0	330	107	255	275	0	--	1123
PEAK HOUR FACTOR: 700 - 800	0.65	-	0.81	-	-	-	-	0.90	0.89	0.83	0.82	-		
		0.74			-			0.92			0.88			

PEAK HOUR TURNING MOVEMENT DIAGRAM

```
                                              N
                                              |
                                           W--+--E
                                              |
                                              S

      330 ----->              <----- 275     WAIPAHU ST
      107 ---                    --- 255
           \                    /
            v                  v
              <           >
               \         /
                |       |

                65      91

              WAIPAHU DEPOT ST
```

ATA INC. 16-Nov-95

INTERSECTION COUNT SURVEY SUMMARY

North/South Street : WAIPAHU DEPOT ST
East/West Street : WAIPAHU ST
Weather : CLEAR

Period: PM
Date: 11-15-95
Day : WEDNESDAY

15 MINUTE PERIOD	WAIPAHU DEPOT ST NORTHBOUND LEFT	THRU	RGHT	SOUTHBOUND LEFT	THRU	RGHT	WAIPAHU ST EASTBOUND LEFT	THRU	RGHT	WESTBOUND LEFT	THRU	RGHT	TOTAL VOLUME 15 MIN	HOURLY
330 - 345	20	0	23	0	0	0	0	63	26	37	89	0	258	
345 - 400	25	0	31	0	0	0	0	61	16	48	127	0	308	
400 - 415	21	0	27	0	0	0	0	67	22	47	91	0	275	
415 - 430	17	0	38	0	0	0	0	69	25	53	107	0	309	1,150
430 - 445	30	0	37	0	0	0	0	72	25	47	130	0	341	1,233
445 - 500	26	0	38	0	0	0	0	71	19	41	142	0	337	1,262
500 - 515	17	0	27	0	0	0	0	76	27	37	117	0	301	1,288
515 - 530	26	0	30	0	0	0	0	60	29	38	119	0	302	1,281
PEAK 15 MINUTE PERIOD: 430 - 445	30	0	37	0	0	0	0	72	25	47	130	0	341	--
PEAK HOUR PERIOD: 415 - 515	90	0	140	0	0	0	0	288	96	178	496	0	--	1288
PEAK HOUR FACTOR: 415 - 515	0.75	-	0.92	-	-	-	-	0.95	0.89	0.84	0.87	-		
		0.86			-			0.93			0.92			

PEAK HOUR TURNING MOVEMENT DIAGRAM

```
                                              N
                                              |
                                           W--+--E
                                              |
                                              S

      288 ----->              <----- 496     WAIPAHU ST
       96 ---                    --- 178
           \                    /
            v                  v
              <           >
               \         /
                |       |

                90      140

              WAIPAHU DEPOT ST
```

ATA INC. 15-Nov-95

INTERSECTION COUNT SURVEY SUMMARY

North/South Street : MOKUOLA ST
East/West Street : WAIPAHU ST
Weather : CLEAR

Period: AM
Date: 11-15-95
Day : WEDNESDAY

15 MINUTE PERIOD	MOKUOLA ST NORTHBOUND LEFT	THRU	RGHT	MOKUOLA ST SOUTHBOUND LEFT	THRU	RGHT	WAIPAHU ST EASTBOUND LEFT	THRU	RGHT	WAIPAHU ST WESTBOUND LEFT	THRU	RGHT	TOTAL VOLUME 15 MIN	HOURLY
630 - 645	6	0	24	0	0	0	0	76	27	68	90	0	291	
645 - 700	8	0	28	0	0	0	0	59	30	61	88	0	274	
700 - 715	9	0	30	0	0	0	0	71	22	66	113	0	311	
715 - 730	15	0	27	0	0	0	0	83	27	74	150	0	376	1,252
730 - 745	4	0	45	0	0	0	0	84	42	94	139	0	408	1,369
745 - 800	24	0	35	0	0	0	0	66	32	115	109	0	381	1,476
800 - 815	10	0	30	0	0	0	0	66	15	67	142	0	330	1,495
815 - 830	5	0	30	0	0	0	0	43	17	48	83	0	226	1,345
PEAK 15 MINUTE PERIOD: 730 - 745	4	0	45	0	0	0	0	84	42	94	139	0	408	--
PEAK HOUR PERIOD: 715 - 815	53	0	137	0	0	0	0	299	116	350	540	0	--	1495
PEAK HOUR FACTOR: 715 - 815	0.55	-	0.76	-	-	-	-	0.89	0.69	0.76	0.90	-		
		0.81			-			0.82			0.95			

PEAK HOUR TURNING MOVEMENT DIAGRAM

N
|
W--+--E
|
S

299 ---->
116 ---

<---- 540 WAIPAHU ST
--- 350

53 137

MOKUOLA ST

ATA INC. 16-Nov-95

INTERSECTION COUNT SURVEY SUMMARY

North/South Street : MOKUOLA ST
East/West Street : WAIPAHU ST
Weather : CLEAR

Period: PM
Date: 11-15-95
Day : WEDNESDAY

15 MINUTE PERIOD	MOKUOLA ST NORTHBOUND LEFT	THRU	RGHT	MOKUOLA ST SOUTHBOUND LEFT	THRU	RGHT	WAIPAHU ST EASTBOUND LEFT	THRU	RGHT	WAIPAHU ST WESTBOUND LEFT	THRU	RGHT	TOTAL VOLUME 15 MIN	HOURLY
330 - 345	17	0	74	0	0	0	0	83	26	36	133	0	369	
345 - 400	23	0	48	0	0	0	0	95	20	42	159	0	387	
400 - 415	9	0	64	0	0	0	0	67	19	37	132	0	328	
415 - 430	17	0	43	0	0	0	0	95	25	48	151	0	379	1,463
430 - 445	18	0	48	0	0	0	0	99	22	46	156	0	389	1,483
445 - 500	18	0	58	0	0	0	0	105	18	50	170	0	419	1,515
500 - 515	19	0	68	0	0	0	0	102	23	53	134	0	399	1,586
515 - 530	16	0	75	0	0	0	0	60	14	46	163	0	374	1,581
PEAK 15 MINUTE PERIOD: 445 - 500	18	0	58	0	0	0	0	105	18	50	170	0	419	--
PEAK HOUR PERIOD: 415 - 515	72	0	217	0	0	0	0	401	88	197	611	0	--	1586
PEAK HOUR FACTOR: 415 - 515	0.95	-	0.80	-	-	-	-	0.95	0.88	0.93	0.90	-		
		0.83			-			0.98			0.92			

PEAK HOUR TURNING MOVEMENT DIAGRAM

N
|
W--+--E
|
S

401 ---->
88 ---

<---- 611 WAIPAHU ST
--- 197

72 217

MOKUOLA ST

RTA INC. 15-Nov-95

INTERSECTION COUNT SURVEY SUMMARY

North/South Street : PAIVA ST
East/West Street : WAIPAHU ST
Weather : CLEAR

Period: AM
Date: 11-15-95
Day : WEDNESDAY

15 MINUTE PERIOD	PAIVA ST NORTHBOUND LEFT	THRU	RGHT	PAIVA ST SOUTHBOUND LEFT	THRU	RGHT	WAIPAHU ST EASTBOUND LEFT	THRU	RGHT	WAIPAHU ST WESTBOUND LEFT	THRU	RGHT	TOTAL VOLUME 15 MIN	HOURLY
630 - 645	2	32	8	11	119	109	44	19	29	15	36	6	438	
645 - 700	6	22	10	4	123	103	43	37	23	28	42	3	436	
700 - 715	2	39	14	3	126	118	39	39	16	36	45	7	484	
715 - 730	4	39	34	3	92	149	42	50	26	37	76	8	558	1,910
730 - 745	4	36	25	6	86	171	56	57	24	39	73	7	584	2,056
745 - 800	5	33	18	7	95	161	46	47	14	41	101	6	574	2,196
800 - 815	3	48	6	7	65	142	56	44	10	21	83	7	494	2,210
815 - 830	8	25	4	4	21	86	41	32	32	4	31	5	271	1,923
PEAK 15 MINUTE PERIOD: 730 - 745	4	36	25	6	86	171	56	57	24	39	73	7	584	--
PEAK HOUR PERIOD: 715 - 815	16	156	83	23	339	623	200	198	74	138	333	28	--	2210
PEAK HOUR FACTOR: 715 - 815	0.80	0.81	0.83	0.82	0.89	0.91	0.89	0.87	0.77	0.84	0.82	0.88		
		0.83			0.94			0.86			0.84			

PEAK HOUR TURNING MOVEMENT DIAGRAM

```
                  623   338   23
                   |     |     |
  200 ---                          --- 28
  198 ----->                    <----- 333     WAIPAHU ST
   74 ---                          --- 138
                   |     |     |
                  16    156   83
                       PAIVA ST

        N
        |
     W--+--E
        |
        S
```

RTA INC. 16-Nov-95

INTERSECTION COUNT SURVEY SUMMARY

North/South Street : PAIVA ST
East/West Street : WAIPAHU ST
Weather : CLEAR

Period: PM
Date: 11-15-95
Day : WEDNESDAY

15 MINUTE PERIOD	PAIVA ST NORTHBOUND LEFT	THRU	RGHT	PAIVA ST SOUTHBOUND LEFT	THRU	RGHT	WAIPAHU ST EASTBOUND LEFT	THRU	RGHT	WAIPAHU ST WESTBOUND LEFT	THRU	RGHT	TOTAL VOLUME 15 MIN	HOURLY
330 - 345	5	51	14	2	39	115	93	50	8	8	56	13	454	
345 - 400	4	58	9	2	56	151	95	53	9	9	82	2	530	
400 - 415	11	33	12	3	34	116	88	45	7	7	54	5	407	
415 - 430	7	37	13	2	45	127	78	59	13	8	92	7	479	1,870
430 - 445	6	47	16	3	37	146	77	70	8	9	88	9	518	1,924
445 - 500	6	47	15	5	45	135	74	63	15	7	57	10	499	1,893
500 - 515	7	40	13	2	44	115	89	84	12	5	78	4	493	1,979
515 - 530	10	29	7	5	33	118	67	73	6	9	78	5	440	1,940
PEAK 15 MINUTE PERIOD: 345 - 400	4	58	9	2	56	151	95	53	9	9	82	2	530	--
PEAK HOUR PERIOD: 415 - 515	26	171	57	12	171	543	318	275	48	29	307	30	--	1979
PEAK HOUR FACTOR: 415 - 515	0.93	0.91	0.89	0.60	0.95	0.88	0.87	0.82	0.80	0.81	0.83	0.75		
		0.92			0.89			0.85			0.86			

PEAK HOUR TURNING MOVEMENT DIAGRAM

```
                  543   171   12
                   |     |     |
  318 ---                          --- 30
  275 ----->                    <----- 307     WAIPAHU ST
   48 ---                          --- 29
                   |     |     |
                  26    171   57
                       PAIVA ST

        N
        |
     W--+--E
        |
        S
```

ATA INC. 16-Nov-95

INTERSECTION COUNT SURVEY SUMMARY

North/South Street : PAIWA ST
East/West Street : HAPAPA ST
Weather : CLEAR

Period: AM
Date: 11-16-95
Day : THURSDAY

15 MINUTE PERIOD	PAIWA ST NORTHBOUND LEFT	THRU	RGHT	SOUTHBOUND LEFT	THRU	RGHT	HAPAPA ST EASTBOUND LEFT	THRU	RGHT	WESTBOUND LEFT	THRU	RGHT	TOTAL VOLUME 15 MIN	HOURLY
630 - 645	0	82	1	4	156	0	0	0	0	6	0	5	254	
645 - 700	0	73	6	9	107	0	0	0	0	4	0	2	201	
700 - 715	0	77	4	7	156	0	0	0	0	15	0	3	262	
715 - 730	0	78	18	13	186	0	0	0	0	22	0	4	321	1,038
730 - 745	0	95	18	17	212	0	0	0	0	30	0	10	382	1,166
745 - 800	0	104	5	16	162	0	0	0	0	13	0	10	310	1,275
800 - 815	0	104	3	3	102	0	0	0	0	6	0	3	221	1,234
815 - 830	0	80	4	4	105	0	0	0	0	5	0	1	199	1,112
PEAK 15 MINUTE PERIOD: 730 - 745	0	95	18	17	212	0	0	0	0	30	0	10	382	--
PEAK HOUR PERIOD: 700 - 800	0	356	45	53	716	0	0	0	0	80	0	27	--	1275
PEAK HOUR FACTOR: 700 - 800	-	0.85	0.63	0.78	0.84	-	-	-	-	0.67	-	0.68		
		0.88			0.84			-			0.67			

PEAK HOUR TURNING MOVEMENT DIAGRAM

```
            716   53                         N
             |    |                          |
             |    \                       W--+--E
             |     >                         |
             v      .                        S
                     \
                      ---  27
                                 HAPAPA ST
                      ---  80
                     /
             .      v
             |     >
             |    /
             |    |
            356   45

           PAIWA ST
```

ATA INC. 17-Nov-95

INTERSECTION COUNT SURVEY SUMMARY

North/South Street : PAIWA ST
East/West Street : HAPAPA ST
Weather : CLEAR

Period: PM
Date: 11-16-95
Day : THURSDAY

15 MINUTE PERIOD	PAIWA ST NORTHBOUND LEFT	THRU	RGHT	SOUTHBOUND LEFT	THRU	RGHT	HAPAPA ST EASTBOUND LEFT	THRU	RGHT	WESTBOUND LEFT	THRU	RGHT	TOTAL VOLUME 15 MIN	HOURLY
330 - 345	0	120	6	10	156	0	0	0	0	3	0	0	295	
345 - 400	0	110	7	11	204	0	0	0	0	9	0	7	348	
400 - 415	0	134	5	11	169	0	0	0	0	8	0	0	327	
415 - 430	0	118	3	9	179	0	0	0	0	3	0	7	319	1,289
430 - 445	0	122	5	12	168	0	0	0	0	7	0	4	318	1,312
445 - 500	0	123	6	9	177	0	0	0	0	9	0	5	329	1,293
500 - 515	0	119	6	9	184	0	0	0	0	7	0	2	327	1,293
515 - 530	0	111	7	9	163	0	0	0	0	7	0	6	303	1,277
PEAK 15 MINUTE PERIOD: 345 - 400	0	110	7	11	204	0	0	0	0	9	0	7	348	--
PEAK HOUR PERIOD: 345 - 445	0	484	20	43	720	0	0	0	0	27	0	18	--	1312
PEAK HOUR FACTOR: 345 - 445	-	0.90	0.71	0.98	0.88	-	-	-	-	0.75	-	0.64		
		0.91			0.89			-			0.70			

PEAK HOUR TURNING MOVEMENT DIAGRAM

```
            720   43                         N
             |    |                          |
             |    \                       W--+--E
             |     >                         |
             v      .                        S
                     \
                      ---  18
                                 HAPAPA ST
                      ---  27
                     /
             .      v
             |     >
             |    /
             |    |
            484   20

           PAIWA ST
```

ATA INC. 16-Nov-95

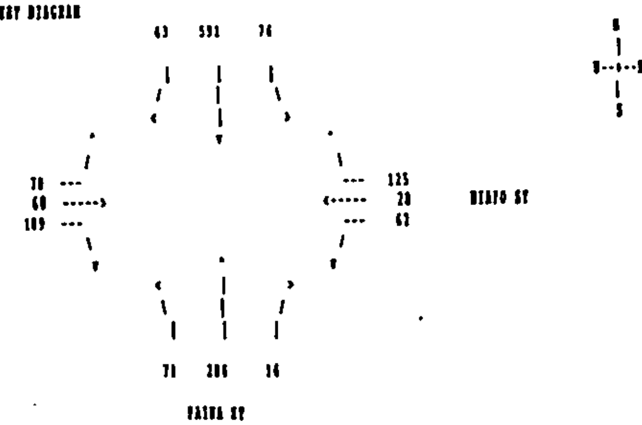
INTERSECTION COUNT SURVEY SUMMARY

North/South Street : PAIWA ST
East/West Street : HIAPO ST
Weather : CLEAR

Period: AM
Date: 11-16-95
Day : THURSDAY

	PAIWA ST						HIAPO ST						TOTAL VOLUME	
15 MINUTE	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND				
PERIOD	LEFT	THRU	RGHT	LEFT	THRU	RGHT	LEFT	THRU	RGHT	LEFT	THRU	RGHT	15 MIN	HOURLY
630 - 645	5	81	1	10	192	18	15	5	14	5	1	37	392	
645 - 700	12	65	3	14	155	9	16	8	29	5	2	20	338	
700 - 715	15	57	1	25	135	7	15	10	26	7	3	30	331	
715 - 730	16	67	6	22	162	9	15	16	29	15	5	40	401	1,462
730 - 745	16	81	5	16	140	16	20	28	44	31	6	30	449	1,519
745 - 800	26	79	2	12	146	11	12	6	10	9	14	25	359	1,531
800 - 815	19	73	3	15	82	19	13	2	13	5	16	17	283	1,483
815 - 830	10	50	5	11	56	10	8	4	10	2	5	8	227	1,309
830 - 845	0	0	0	0	0	0	0	0	0	0	1	0	1	861
PEAK 15 MINUTE PERIOD:														
730 - 745	16	81	5	16	140	16	20	28	44	31	6	30	449	--
PEAK HOUR PERIOD:														
700 - 800	71	286	14	76	591	43	78	60	109	62	28	125	--	1531
PEAK HOUR FACTOR:														
700 - 800	0.70	0.88	0.58	0.74	0.91	0.67	0.63	0.54	0.62	0.50	0.50	0.78		
		0.88			0.92			0.60			0.88			

PEAK HOUR TURNING MOVEMENT DIAGRAM



ATA INC. 17-Nov-95

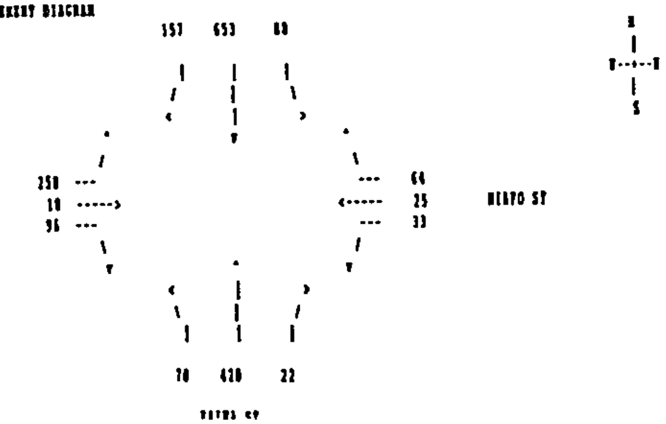
INTERSECTION COUNT SURVEY SUMMARY

North/South Street : PAIWA ST
East/West Street : HIAPO ST
Weather : CLEAR

Period: PM
Date: 11-16-95
Day : THURSDAY

	PAIWA ST						HIAPO ST						TOTAL VOLUME	
15 MINUTE	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND				
PERIOD	LEFT	THRU	RGHT	LEFT	THRU	RGHT	LEFT	THRU	RGHT	LEFT	THRU	RGHT	15 MIN	HOURLY
330 - 345	15	59	4	16	150	33	22	2	14	2	7	14	378	
345 - 400	15	105	4	20	184	43	18	3	22	6	5	20	445	
400 - 415	21	120	4	21	139	42	196	3	35	11	8	15	615	
415 - 430	19	92	6	20	160	40	20	4	10	10	7	16	416	1,854
430 - 445	15	103	8	27	162	32	26	0	25	6	5	13	420	1,896
445 - 500	25	92	4	10	163	45	27	3	24	8	3	16	428	1,879
500 - 515	20	91	3	17	161	22	33	1	26	7	8	15	405	1,661
515 - 530	21	82	4	16	143	23	19	6	21	8	5	21	373	1,618
PEAK 15 MINUTE PERIOD:														
400 - 415	21	120	4	21	139	42	196	3	35	11	8	15	615	--
PEAK HOUR PERIOD:														
345 - 445	70	420	22	88	653	157	258	10	96	33	25	64	--	1896
PEAK HOUR FACTOR:														
345 - 445	0.83	0.88	0.69	0.81	0.89	0.91	0.33	0.63	0.69	0.75	0.78	0.80		
		0.88			0.91			0.39			0.99			

PEAK HOUR TURNING MOVEMENT DIAGRAM



INTERSECTION COUNT SURVEY SUMMARY

North/South Street : PAIWA ST
East/West Street : LUMIAINA ST
Weather : CLEAR

Period: AM
Date: 11-16-95
Day : THURSDAY

15 MINUTE PERIOD	PAIWA ST NORTHBOUND LEFT	THRU	RGHT	PAIWA ST SOUTHBOUND LEFT	THRU	RGHT	LUMIAINA ST EASTBOUND LEFT	THRU	RGHT	LUMIAINA ST WESTBOUND LEFT	THRU	RGHT	TOTAL VOLUME 15 MIN	HOURLY
630 - 645	10	13	50	1	13	1	1	6	33	169	12	5	318	
645 - 700	21	16	69	1	20	3	4	14	62	213	9	7	439	
700 - 715	5	9	52	3	23	2	3	11	52	169	11	3	343	
715 - 730	10	8	69	4	26	2	1	7	56	172	1	5	361	1,461
730 - 745	10	19	80	4	22	0	0	6	41	141	4	11	338	1,481
745 - 800	22	22	51	4	15	0	1	4	29	123	6	10	287	1,329
800 - 815	20	10	55	3	16	3	2	6	17	103	9	5	255	1,241
815 - 830	14	9	57	9	17	0	1	3	22	90	5	2	233	1,113
PEAK 15 MINUTE PERIOD: 645 - 700	21	16	69	1	20	3	4	14	62	213	9	7	439	--
PEAK HOUR PERIOD: 645 - 745	46	52	270	12	91	7	8	38	211	695	25	26	--	1481
PEAK HOUR FACTOR: 645 - 745	0.55	0.68	0.84	0.75	0.88	0.58	0.50	0.68	0.85	0.82	0.57	0.59		
		0.86			0.86			0.80			0.81			

PEAK HOUR TURNING MOVEMENT DIAGRAM

```
                 7    91    12
                 |    |     |
                /     |      \
               <      |       >
                      v
          .                        .
         /                          \
   8 ---                             ---  26
  38 ----->                     <-----    25    LUMIAINA ST
 211 ---                             ---  695
         \                          /
          v                        v
               <      .       >
                \     |      /
                 |    |     |
                46    52    270
                   PAIWA ST

                                          N
                                          |
                                       W--+--E
                                          |
                                          S
```


INTERSECTION COUNT SURVEY SUMMARY

North/South Street : PAIWA ST
East/West Street : LUMIAINA ST
Weather : CLEAR

Period: PM
Date: 11-16-95
Day : THURSDAY

15 MINUTE PERIOD	PAIWA ST NORTHBOUND LEFT	THRU	RGHT	PAIWA ST SOUTHBOUND LEFT	THRU	RGHT	LUMIAINA ST EASTBOUND LEFT	THRU	RGHT	LUMIAINA ST WESTBOUND LEFT	THRU	RGHT	TOTAL VOLUME 15 MIN	HOURLY
330 - 345	24	25	115	17	36	3	0	7	23	226	26	8	510	
345 - 400	34	21	113	3	13	0	0	7	21	231	18	7	468	
400 - 415	28	17	117	8	14	1	1	4	20	239	13	5	467	
415 - 430	38	22	115	16	13	0	0	6	19	219	13	8	469	1,914
430 - 445	39	29	112	13	15	2	0	10	26	206	14	7	473	1,877
445 - 500	40	19	108	6	8	1	0	8	17	194	21	7	429	1,838
500 - 515	43	26	123	15	6	0	0	10	25	230	16	7	503	1,874
515 - 530	35	19	88	7	7	1	2	8	25	123	14	10	335	1,740
PEAK 15 MINUTE PERIOD: 330 - 345	24	25	115	17	36	3	0	7	23	226	26	8	510	--
PEAK HOUR PERIOD: 330 - 430	124	85	460	44	76	4	1	24	83	915	70	28	--	1914
PEAK HOUR FACTOR: 330 - 430	0.82	0.85	0.98	0.65	0.53	0.33	0.25	0.86	0.90	0.96	0.67	0.88		
		0.96			0.55			0.90			0.97			

PEAK HOUR TURNING MOVEMENT DIAGRAM

```
                 4    76    44
                 |    |     |
                /     |      \
               <      |       >
                      v
          .                        .
         /                          \
   1 ---                             ---  28
  24 ----->                     <-----    70    LUMIAINA ST
  83 ---                             ---  915
         \                          /
          v                        v
               <      .       >
                \     |      /
                 |    |     |
                124   85    460
                   PAIWA ST

                                          N
                                          |
                                       W--+--E
                                          |
                                          S
```

Austin, Tsutsumi & Associates Inc.

24-Hour Machine Count
WAIPAHU TRAFFIC STUDY

Location: HI/PAIWA WB-OFF
Weather : CLEAR
Counter : 18

Site: 1=WSB 2=WNB
Date: 11/15/95
File: (none)

Interval Begin	Ch 1 AM		Ch 1 PM		Ch 2 AM		Ch 2 PM		COMBINED AM		COMBINED PM		Day : Wednesday
12:00	14	59	32	116	12	28	150	588	26	87	182	704	
12:15	17		22		4		136		21		158		
12:30	19		20		7		159		26		179		
12:45	9		42		5		143		14		185		
1:00	5	22	40	140	1	13	128	587	6	35	168	727	
1:15	8		42		8		148		16		190		
1:30	2		30		2		166		4		196		
1:45	7		28		2		145		9		173		
2:00	6	13	47	179	4	21	137	572	10	34	184	751	
2:15	0		28		5		145		5		173		
2:30	4		58		9		130		13		188		
2:45	3		46		3		160		6		206		
3:00	0	6	44	216	2	15	164	723	2	21	208	939	
3:15	4		52		5		178		9		230		
3:30	1		58		4		200		5		258		
3:45	1		62		4		181		5		243		
4:00	4	20	110	332	3	10	152	685	7	30	262	1,017	
4:15	4		62		1		159		5		221		
4:30	4		78		3		206		7		284		
4:45	8		82		3		168		11		250		
5:00	4	26	56	271	9	71	166	760	13	97	222	1,031	
5:15	3		72		15		172		18		244		
5:30	5		87		23		197		28		284		
5:45	14		56		24		225		38		281		
6:00	20	81	57	223	18	162	181	685	38	243	238	908	
6:15	17		76		36		165		53		241		
6:30	22		43		48		169		70		212		
6:45	22		47		60		170		82		217		
7:00	20	154	36	96	60	246	158	547	80	400	194	643	
7:15	44		20		64		140		108		160		
7:30	50		21		50		148		100		169		
7:45	40		19		72		101		112		120		
8:00	23	80	30	118	81	343	95	322	104	423	125	440	
8:15	16		24		87		101		103		125		
8:30	16		36		82		64		98		100		
8:45	25		28		93		62		118		90		
9:00	16	95	28	84	99	431	68	245	115	526	94	329	
9:15	26		19		96		71		122		90		
9:30	25		19		122		46		147		65		
9:45	28		18		114		60		142		78		
10:00	36	106	13	91	127	573	33	98	163	679	46	189	
10:15	32		26		152		36		184		62		
10:30	19		28		165		16		184		44		
10:45	19		24		129		13		148		37		
11:00	22	122	16	88	150	574	22	83	172	696	38	171	
11:15	41		20		133		14		174		34		
11:30	27		22		152		16		179		38		
11:45	32		30		139		31		171		61		
Totals	784		1,954		2,487		5,895		3,271		7,849		
Split %	24.0		24.9		76.0		75.1						
Day Totals		2,738				8,382				11,120			
Day Splits		24.6				75.4							
Peak Hour	7:15		4:00		10:15		5:15		11:00		5:15		
Volume	157		332		596		775		696		1,047		
Factor	0.79		0.75		0.90		0.86		0.97		0.92		

Austin, Tsutsumi & Associates Inc.

24-Hour Machine Count
WAIPAHU TRAFFIC STUDY

Location: HI/PAIWA WB-OFF
Weather : CLEAR
Counter : 18

Site: 1=WSB 2=WNB
Date: 11/16/95
File: (none)

Interval Begin	Ch 1 AM		Ch 1 PM		Ch 2 AM		Ch 2 PM		COMBINED AM		COMBINED PM		Day : Thursday
12:00	13	43	40	128	15	33	140	580	28	76	180	708	
12:15	12		32		9		142		21		174		
12:30	12		28		6		154		18		182		
12:45	6		28		3		144		9		172		
1:00	8	27	35	151	7	28	147	574	15	55	182	725	
1:15	8		48		10		130		18		178		
1:30	6		38		7		142		13		180		
1:45	5		30		4		155		9		185		
2:00	4	15	28	190	10	19	142	542	14	34	170	732	
2:15	6		34		6		130		12		164		
2:30	4		56		2		132		6		188		
2:45	1		72		1		138		2		210		
3:00	2	10	49	272	3	7	167	696	5	17	216	968	
3:15	4		63		1		167		5		230		
3:30	2		68		2		183		4		251		
3:45	2		92		1		179		3		271		
4:00	5	14	58	292	4	22	171	750	9	36	229	1,042	
4:15	3		90		8		194		11		284		
4:30	2		74		4		195		6		269		
4:45	4		70		6		190		10		260		
5:00	8	31	60	271	6	57	164	707	14	88	224	978	
5:15	6		92		6		162		12		254		
5:30	4		72		20		196		24		268		
5:45	13		47		25		185		38		232		
6:00	18	69	68	240	27	173	138	601	45	242	206	841	
6:15	8		70		46		156		54		226		
6:30	26		52		51		181		77		233		
6:45	17		50		49		126		66		176		
7:00	34	132	36	99	31	197	142	526	65	329	178	625	
7:15	34		24		39		129		73		153		
7:30	30		11		58		141		88		152		
7:45	34		28		69		114		103		142		
8:00	23	96	46	121	93	349	93	320	116	445	139	441	
8:15	32		26		76		79		108		105		
8:30	20		28		74		84		94		112		
8:45	21		21		106		64		127		85		
9:00	18	89	34	116	86	421	53	227	104	510	87	343	
9:15	21		20		107		62		128		82		
9:30	16		34		106		70		122		104		
9:45	34		28		122		42		156		70		
10:00	19	86	20	74	127	634	50	161	146	720	70	235	
10:15	33		20		159		46		192		66		
10:30	20		10		154		43		174		53		
10:45	14		24		194		22		208		46		
11:00	32	122	22	82	162	620	21	105	194	742	43	187	
11:15	32		16		146		27		178		43		
11:30	30		22		144		30		174		52		
11:45	28		22		168		27		196		49		
Totals	734		2,036		2,560		5,789		3,294		7,825		
Split %	22.3		26.0		77.7		74.0						
Day Totals		2,770				8,349				11,119			
Day Splits		24.9				75.1							
Peak Hour	7:00		3:45		10:15		4:00		10:15		3:45		
Volume	132		314		669		750		768		1,053		
Factor	0.97		0.85		0.86		0.96		0.92		0.93		

Austin, Tsutsumi & Associates Inc.

Location: H-1/PAIWA WB-ON RAMP
Weather : CLEAR
Counter : 28

24-Hour Machine Count
WAIPAHU TRAFFIC STUDY

Site: 1=SUB 2=HUB
Date: 11/15/95
File: [none]

Day : Wednesday

Interval Begin	Ch 1 AM		Ch 1 PM		Ch 2 AM		Ch 2 PM		Combined AM		Combined PM	
12:00	7	29	90	422	6	32	36	124	13	61	126	546
12:15	7		111		7		24		14		135	
12:30	6		104		12		36		18		140	
12:45	9		117		7		28		16		145	
1:00	4	15	91	427	5	13	34	165	9	28	125	592
1:15	5		106		3		37		8		143	
1:30	2		110		1		52		3		162	
1:45	4		120		4		42		8		162	
2:00	3	8	98	422	2	5	48	164	5	13	146	586
2:15	0		102		1		44		1		146	
2:30	2		104		2		38		4		142	
2:45	3		118		0		34		3		152	
3:00	1	10	97	427	6	18	38	164	7	28	135	611
3:15	1		88		1		32		2		120	
3:30	4		107		5		54		9		161	
3:45	4		135		6		60		10		195	
4:00	7	40	116	424	3	22	32	144	10	62	148	568
4:15	8		90		7		44		15		134	
4:30	13		91		10		36		23		127	
4:45	12		127		2		32		14		159	
5:00	18	131	133	496	12	66	29	159	30	197	162	655
5:15	24		133		16		42		40		175	
5:30	36		107		16		41		52		148	
5:45	53		123		22		47		75		170	
6:00	80	500	123	452	34	233	35	167	114	733	158	619
6:15	142		130		96		44		238		174	
6:30	140		103		68		39		208		142	
6:45	138		96		35		49		173		145	
7:00	122	413	96	388	64	220	46	160	186	633	142	548
7:15	106		111		50		42		156		153	
7:30	98		90		54		38		152		128	
7:45	87		91		52		34		139		125	
8:00	84	294	102	393	45	133	30	155	129	427	132	548
8:15	66		108		36		47		102		155	
8:30	76		85		26		48		102		133	
8:45	68		98		26		30		94		128	
9:00	54	244	88	346	38	106	30	146	92	350	118	492
9:15	55		79		18		40		73		119	
9:30	62		80		32		46		94		126	
9:45	73		99		18		30		91		129	
10:00	70	280	44	161	22	98	30	98	92	378	74	259
10:15	60		27		22		27		82		54	
10:30	70		52		32		20		102		72	
10:45	80		38		22		21		102		59	
11:00	83	330	17	59	30	117	9	45	113	447	26	104
11:15	83		14		26		12		109		26	
11:30	69		12		23		14		92		26	
11:45	95		16		38		10		133		26	
Totals	2,294		4,417		1,063		1,711		3,357		6,128	
Split %	68.3		72.1		31.7		27.9					
Day Totals		6,711				2,774				9,485		
Day Splits		70.8				29.2						
Peak Hour	6:15		4:45		6:15		3:30		6:15		5:00	
Volume	542		500		263		190		805		655	
Factor	0.95		0.94		0.68		0.79		0.85		0.94	

JAMUS Raw Data File: WB-ON   Printed: 11-17-1995   Page

Austin, Tsutsumi & Associates Inc.

Location: H-1/PAIWA WB-ON RAMP
Weather : CLEAR
Counter : 28

24-Hour Machine Count
WAIPAHU TRAFFIC STUDY

Site: 1=SUB 2=HUB
Date: 11/16/95
File: [none]

Day : Thursday

Interval Begin	Ch 1 AM		Ch 1 PM		Ch 2 AM		Ch 2 PM		Combined AM		Combined PM	
12:00	9	23	91	397	10	34	24	114	19	57	115	511
12:15	7		104		12		32		19		136	
12:30	4		96		6		30		10		126	
12:45	3		106		6		28		9		134	
1:00	7	14	102	414	2	15	34	132	9	29	136	546
1:15	2		117		5		34		7		151	
1:30	1		96		4		28		5		124	
1:45	4		99		4		36		8		135	
2:00	3	19	88	397	1	4	34	176	4	23	122	573
2:15	5		95		2		44		7		139	
2:30	5		106		0		54		5		160	
2:45	6		108		1		44		7		152	
3:00	5	23	98	430	4	17	50	172	9	40	148	602
3:15	2		77		5		38		7		115	
3:30	6		136		2		44		8		180	
3:45	10		119		6		40		16		159	
4:00	3	38	116	452	2	22	54	161	5	60	170	613
4:15	6		115		1		36		7		151	
4:30	12		130		13		24		25		154	
4:45	17		91		6		47		23		138	
5:00	16	127	96	463	19	78	34	170	35	205	130	633
5:15	26		136		17		38		43		174	
5:30	31		116		20		49		51		165	
5:45	54		115		22		49		76		164	
6:00	94	505	114	462	46	247	34	150	140	752	148	612
6:15	100		112		68		42		168		154	
6:30	145		124		75		44		220		168	
6:45	166		112		58		30		224		142	
7:00	113	415	98	358	64	204	26	118	177	619	124	476
7:15	126		97		41		30		167		127	
7:30	82		81		46		30		128		111	
7:45	94		82		53		32		147		114	
8:00	71	267	99	314	42	144	22	104	113	411	121	418
8:15	62		72		42		24		104		96	
8:30	64		63		26		29		90		92	
8:45	70		80		34		29		104		109	
9:00	60	252	91	312	25	86	30	142	85	338	121	454
9:15	58		54		12		36		70		90	
9:30	68		98		14		40		82		138	
9:45	66		69		35		36		101		105	
10:00	62	292	58	191	20	88	28	100	82	380	86	291
10:15	55		58		28		32		83		90	
10:30	86		41		26		18		112		59	
10:45	89		34		14		22		103		56	
11:00	68	320	14	57	31	80	17	55	99	400	31	112
11:15	87		19		13		14		100		33	
11:30	86		6		16		8		102		14	
11:45	79		18		20		16		99		34	
Totals	2,295		4,247		1,019		1,594		3,314		5,841	
Split %	69.3		72.7		30.7		27.3					
Day Totals		6,542				2,613				9,155		
Day Splits		71.5				28.5						
Peak Hour	6:30		3:30		6:15		2:15		6:15		3:30	
Volume	550		486		265		192		789		660	
Factor	0.83		0.89		0.88		0.89		0.88		0.92	

JAMUS Raw Data File: WB-ON   Printed: 11-17-1995   Page

Austin, Tsutsumi & Associates Inc.

24-Hour Machine Count
WAIPAHU TRAFFIC STUDY

Location: H1/PAIWA EB-OFF
Weather : CLEAR
Counter : 48

Site: 1=EXB 2=ESB
Date: 11/15/95
File: (none)

Day : Wednesday

Interval Begin	Ch 1 AM		Ch 1 PM		Ch 2 AM		Ch 2 PM		COMBINED AM		COMBINED PM	
12:00	6	12	80	356	4	9	34	210	10	21	114	566
12:15	2		84		0		56		2		140	
12:30	4		98		4		56		8		154	
12:45	0		94		1		64		1		158	
1:00	0	2	108	429	2	7	50	214	2	9	158	643
1:15	1		98		3		40		4		138	
1:30	1		115		0		56		1		171	
1:45	0		108		2		68		2		176	
2:00	0	22	130	537	4	22	90	350	4	44	220	887
2:15	4		146		6		108		10		254	
2:30	8		142		6		74		14		216	
2:45	10		119		6		78		16		197	
3:00	12	76	116	441	4	53	60	258	16	129	176	699
3:15	10		130		8		88		18		218	
3:30	20		97		15		52		35		149	
3:45	34		98		26		58		60		156	
4:00	34	366	115	489	28	365	67	295	62	731	182	784
4:15	70		126		60		72		130		198	
4:30	86		132		120		72		206		204	
4:45	176		116		157		84		333		200	
5:00	176	519	122	430	183	569	68	239	359	1,088	190	669
5:15	126		104		122		52		248		156	
5:30	87		128		114		65		201		193	
5:45	130		76		150		54		280		130	
6:00	134	424	108	330	216	506	42	159	350	930	150	489
6:15	138		80		196		36		334		116	
6:30	75		66		54		43		129		109	
6:45	77		76		40		38		117		114	
7:00	81	353	66	231	46	174	33	121	127	527	99	352
7:15	92		51		56		28		148		79	
7:30	80		64		29		20		109		84	
7:45	100		50		43		40		143		90	
8:00	74	349	30	142	22	141	24	100	96	490	54	242
8:15	114		44		32		28		146		72	
8:30	56		32		42		30		98		62	
8:45	105		36		45		18		150		54	
9:00	113	434	26	72	32	150	31	84	145	584	57	156
9:15	112		15		34		17		146		32	
9:30	102		16		40		20		142		36	
9:45	107		15		44		16		151		31	
10:00	105	395	20	47	40	153	9	44	145	548	29	91
10:15	104		8		40		14		144		22	
10:30	90		4		37		12		127		16	
10:45	96		15		36		9		132		24	
11:00	96	381	3	17	49	171	6	20	145	552	9	37
11:15	92		8		36		2		128		10	
11:30	93		3		42		6		135		9	
11:45	100		3		44		6		144		9	
Totals	3,333		3,521		2,320		2,094		5,653		5,615	
Split %	59.0		62.7		41.0		37.3					
Day Totals		6,854				4,414				11,268		
Day Splits		60.8				39.2						
Peak Hour	4:45		2:00		5:30		2:00		5:30		2:00	
Volume	565		537		676		350		1,165		887	
Factor	0.80		0.92		0.78		0.81		0.83		0.87	

JAMUS Raw Data File: EB-OFF Printed: 11-17-1995 Page

Austin, Tsutsumi & Associates Inc.

24-Hour Machine Count
WAIPAHU TRAFFIC STUDY

Location: H1/PAIWA EB-OFF
Weather : CLEAR
Counter : 48

Site: 1=EXB 2=ESB
Date: 11/16/95
File: (none)

Day : Thursda

Interval Begin	Ch 1 AM		Ch 1 PM		Ch 2 AM		Ch 2 PM		COMBINED AM		COMBINED PM	
12:00	4	20	103	403	0	10	42	180	4	30	145	583
12:15	2		128		4		48		6		176	
12:30	7		74		2		46		9		120	
12:45	7		98		4		44		11		142	
1:00	0	4	80	418	2	9	54	247	2	13	134	665
1:15	2		98		6		50		8		148	
1:30	2		128		1		74		3		202	
1:45	0		112		0		69		0		181	
2:00	2	22	129	478	4	18	78	298	6	40	207	776
2:15	4		114		3		110		7		224	
2:30	9		120		0		56		9		176	
2:45	7		115		11		54		18		169	
3:00	7	68	105	458	6	45	71	250	13	113	176	708
3:15	18		124		7		66		25		190	
3:30	20		122		12		60		32		182	
3:45	23		107		20		53		43		160	
4:00	31	435	98	429	28	388	48	220	59	823	146	649
4:15	110		120		108		58		218		178	
4:30	120		118		112		52		232		170	
4:45	174		93		140		62		314		155	
5:00	124	350	100	363	118	364	70	220	242	714	170	583
5:15	80		100		70		47		150		147	
5:30	60		105		96		64		156		169	
5:45	86		58		80		39		166		97	
6:00	82	348	66	214	90	284	34	126	172	632	100	340
6:15	84		53		92		36		176		89	
6:30	92		56		50		30		142		86	
6:45	90		39		52		26		142		65	
7:00	70	365	53	171	40	161	38	138	110	526	91	309
7:15	102		36		47		24		149		60	
7:30	112		34		40		44		152		78	
7:45	81		48		34		32		115		80	
8:00	86	416	48	124	28	134	31	116	114	550	79	240
8:15	128		30		33		30		161		60	
8:30	104		24		34		26		138		50	
8:45	98		22		39		29		137		51	
9:00	108	443	26	73	46	148	21	65	154	591	47	138
9:15	98		24		42		12		140		36	
9:30	133		10		30		20		163		30	
9:45	104		13		30		12		134		25	
10:00	103	412	18	46	40	146	15	37	143	558	33	83
10:15	105		6		42		8		147		14	
10:30	110		10		32		8		142		18	
10:45	94		12		32		6		126		18	
11:00	85	391	5	13	34	150	4	23	119	541	9	36
11:15	128		2		34		9		162		11	
11:30	88		2		37		4		125		6	
11:45	90		4		45		6		135		10	
Totals	3,274		3,190		1,857		1,920		5,131		5,110	
Split %	63.8		62.4		36.2		37.6					
Day Totals		6,464				3,777				10,241		
Day Splits		63.1				36.9						
Peak Hour	4:15		1:30		4:15		1:30		4:15		1:30	
Volume	528		483		478		331		1,006		814	
Factor	0.76		0.94		0.85		0.75		0.80		0.91	

JAMUS Raw Data File: EB-OFF Printed: 11-17-1995 Pa

Austin, Tsutsumi & Associates Inc.

24-Hour Machine Count

WAIPAHU TRAFFIC STUDY

Location: [illegible] ON-RAMP
Weather: CLEAR
Counter: LEOPOLD-STEVENS

Site: [illegible]
Date: [illegible]
File: NONE

Day: Wednesday

Interval Begin	Ch 1 AM	Ch 1 PM	Ch 2 AM	Ch 2 PM	Combined AM	Combined PM
1200	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1215	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1230	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1245	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Split	100%	100%	0%	0%		
Day totals	[illegible]		[illegible]		[illegible]	
Day Splits	100%		0%			

Printed [illegible]

Page 2

Austin, Tsutsumi & Associates Inc.

24-Hour Machine Count

WAIPAHU TRAFFIC STUDY

Location: [illegible] ON-RAMP
Weather: CLEAR
Counter: LEOPOLD-STEVENS

Site: [illegible]
Date: [illegible]
File: NONE

Day: Thursday

Interval Begin	Ch 1 AM	Ch 1 PM	Ch 2 AM	Ch 2 PM	Combined AM	Combined PM
1200	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1215	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1230	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1245	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Split	100%	100%	0%	0%		
Day totals	[illegible]		[illegible]		[illegible]	
Day Splits	100%		0%			

Printed [illegible]

Page 3

Austin, Tsutsumi & Associates Inc.

24-Hour Machine Count
WAIPAHU TRAFFIC STUDY

Location: [illegible] ST SOUTH OF [illegible] ST
Weather: CLEAR
Counter: [illegible]

Site: [illegible]
Date: [illegible]
File: NONE

Interval Begin	Ch 1 AM		Ch 1 PM		Ch 2 AM		Ch 2 PM		COMBINED AM		COMBINED PM		Day Thursday
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
Total	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		
Split	[illegible]		[illegible]		[illegible]		[illegible]						
Day totals		[illegible]				[illegible]				[illegible]			
Day Splits		[illegible]				[illegible]							

Printed [illegible] Page 1

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

APPENDIX B

• EXISTING LOS CALCULATIONS

AMFAC - WAIPAHU TRAFFIC STUDY 12/08/95
1995 - EXISTING CONDITIONS 10:15:27
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 1 - WAIPAHU ST & WAIPAHU DEPOT ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	3.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	91	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	0	0	0	275	255	91	0	65	107	330	0
WIDTHS	.0	.0	.0	.0	12.0	.0	11.0	.0	11.0	.0	12.0	.0
LANES	0	0	0	0	1	0	1	0	1	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	NO	NO
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	0	0	0	1065	0	1172	0	1465	0	1572	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	17.00	37.00					
YELLOWTIMES	3.00	3.00					
CRITICALS	0	0					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY 12/08
1995 - EXISTING CONDITIONS 10:15
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 1 - WAIPAHU ST & WAIPAHU DEPOT ST
Degree of Saturation (v/c) .63 Vehicle Delay 8.1 Level of Service

```
        -------------------------
Sq 11  |  Phase 1  |  Phase 2  |
**/**  -------------------------
       |           |           |
  .    |           |           |
 /|\   |           |      <++++|
  |    |           |       ++++|
  |    |           |       v   |
North  |   <+    +>|++++>      |
  |    |    +    + |++++       |
       |    +    + |  v        |
       -------------------------
       | G/C= .283 | G/C= .617 |
       | G=  17.0" | G=  37.0" |
       | Y+R= 3.0" | Y+R= 3.0" |
       | OFF=  .0% | OFF=33.3% |
       -------------------------
       C= 60 sec   G= 54.0 sec = 90.0%  Y= 6.0 sec = 10.0%  Ped= .0 sec =
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Ma Queue
NB Approach								10.0	B+	
RT	11/1	.003	.300	300	352	1	.003	9.5	B+	25 f
LT	11/1	.073	.300	305	440	68	.155	10.0	B+	40 f
WB Approach								11.3	B	
LT+TH	12/1	.556	.633	647	674	557	.826	11.3	B	172 f
EB Approach								3.9	A	
TH+RT	12/1	.327	.633	977	995	460	.462	3.9	A	142

AMFAC - WAIPAHU TRAFFIC STUDY
1995 - EXISTING CONDITIONS
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

12/08/95
10:18:56

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 1 - WAIPAHU ST & WAIPAHU DEPOT ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	3.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	140	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	0	0	0	496	178	140	0	90	96	288	0
WIDTHS	.0	.0	.0	.0	12.0	.0	11.0	.0	11.0	.0	12.0	.0
LANES	0	0	0	0	1	0	1	0	1	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	NO	NO
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	0	0	0	1238	0	1172	0	1465	0	1570	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	17.00	37.00					
YELLOWTIMES	3.00	3.00					
CRITICALS	0	0					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
1995 - EXISTING CONDITIONS
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

12/08
10:19

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 1 - WAIPAHU ST & WAIPAHU DEPOT ST
Degree of Saturation (v/c) .68 Vehicle Delay 11.5 Level of Servic

```
---------------------------------
Sq 11 | Phase 1  | Phase 2  |
**/** ---------------------------
      |          |          |
  .   |          |          |
 /|\  |          |    <++++|
  |   |          |     ++++|
  |   |          |       v |
North |   <+   +>|++++>     |
  |   |    +   + |++++      |
      |    +   + | v        |
---------------------------------
      | G/C= .283 | G/C= .617 |
      | G=  17.0" | G=  37.0" |
      | Y+R= 3.0" | Y+R= 3.0" |
      | OFF=  .0% | OFF=33.3% |
---------------------------------
      C= 60 sec    G= 54.0 sec = 90.0%   Y= 6.0 sec = 10.0%   Ped= .0 sec =
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Ma Queue
NB Approach								10.2	B	
RT	11/1	.003	.300	300	352	1	.003	9.5	B+	25 f
LT	11/1	.096	.300	385	440	95	.216	10.2	B	56 f
WB Approach								16.1	C+	
LT+TH	12/1	.596	.633	760	784	709	.904	16.1	C+	219 f
EB Approach								3.7	A	
TH+RT	12/1	.293	.633	977	995	404	.406	3.7	A	125 f

AMFAC - WAIPAHU TRAFFIC STUDY
1995 - EXISTING CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

12/08/95
10:40:05

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 2 - WAIPAHU ST & MOKUOLA ST

METROAREA	NONCBD	
LOSTTIME		2.0
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	0	0	0	540	350	137	0	53	116	299	0
WIDTHS	.0	.0	.0	.0	12.0	.0	.0	12.0	.0	.0	12.0	.0
LANES	0	0	0	0	1	0	0	1	0	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	0	0	0	1216	0	0	992	0	0	1562	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	17.52	34.48					
YELLOWTIMES	4.00	4.00					
CRITICALS	8	5					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
1995 - EXISTING CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

12/08
10:40

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 2 - WAIPAHU ST & MOKUOLA ST
Degree of Saturation (v/c) .96 Vehicle Delay 31.7@ Level of Service
@ expect more delay due to extreme v/c's (see EVALUATE)

```
Sq 11 | Phase 1   | Phase 2   |
**/** -------------------------
      |           |           |
  .   |           |           |
 /|\  |           |      <****|
  |   |           |       ****|
  |   |           |       v   |
North |  <*    *>|++++>       |
  |   |   *    * |++++        |
      |   *    * |  v         |
      -------------------------
      | G/C= .292 | G/C= .575 |
      | G=  17.5" | G=  34.5" |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=35.9% |
      -------------------------
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec =

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph) @E		Adj Volume	v/c	HCM Delay	L S	90% Max Queue
NB Approach								13.6	B	
LT+TH+RT	12/1	.252	.325	274	323	200	.619	13.6	*B	114 f
WB Approach								48.3@	E+	
LT+TH	12/1	.776	.608	711	739	936	1.267	48.3@	*E+	309 f
EB Approach								4.4	A	
TH+RT	12/1	.315	.608	928	950	437	.460	4.4	A	144 f

```
AMFAC - WAIPAHU TRAFFIC STUDY                                                12/08/95
1995 - EXISTING CONDITIONS                                                   10:42:01
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

   Intersection Parameters for Int #   2 - WAIPAHU ST & MOKUOLA ST

METROAREA            NONCBD
LOSTTIME                2.0
LEVELOFSERVICE     C      S
NODELOCATION       0      0

   Approach Parameters

APPLABELS              SB               WB               NB               EB
GRADES                 .0               .0              2.0               .0
PEDLEVELS             LOW              LOW              LOW              LOW
PARKINGSIDES         NONE             NONE             BOTH             NONE
PARKVOLUMES            20               20               20               20
BUSVOLUMES              0                5                0                5
RIGHTTURNONREDS         0                0                0                0

   Movement Parameters

MOVLABELS         RT   TH   LT    RT   TH   LT    RT   TH   LT    RT   TH   LT
VOLUMES            0    0    0     0  611  197   217    0   72    88  401    0
WIDTHS            .0   .0   .0    .0 12.0   .0    .0 12.0   .0    .0 12.0   .0
LANES              0    0    0     0    1    0     0    1    0     0    1    0
UTILIZATIONS    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
TRUCKPERCENTS    2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0
PEAKHOURFACTORS  .95  .95  .95   .95  .95  .95   .95  .95  .95   .95  .95  .95
ARRIVALTYPES       3    3    3     3    3    3     3    3    3     3    3    3
ACTUATIONS       YES  YES  YES   YES  YES  YES   YES  YES  YES   YES  YES  YES
REQCLEARANCES    4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0
MINIMUMS         5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0
IDEALSATFLOWS   1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
FACTORS         1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
DELAYFACTORS    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
NSTOPFACTORS    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
GROUPTYPES      NORM NORM NORM  NORM NORM NORM  NORM NORM NORM  NORM NORM NORM
SATURATIONFLOWS    0    0    0     0 1162    0     0  991    0     0 1591    0

   Phasing Parameters

SEQUENCES          11    ALL
PERMISSIVES       YES    YES   YES   YES        LEADLAGS      NONE   NONE
OVERLAPS          YES    YES   YES   YES        OFFSET         .00      1
CYCLES             60    180    10              PEDTIME         .0      0
GREENTIMES      17.52  34.48
YELLOWTIMES      4.00   4.00
CRITICALS           8      5
EXCESS              0
```

```
AMFAC - WAIPAHU TRAFFIC STUDY                                                12/08
1995 - EXISTING CONDITIONS                                                   10:42
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int #   2 - WAIPAHU ST & MOKUOLA ST
      Degree of Saturation (v/c)  .95  Vehicle Delay  33.5@  Level of Servic
         @ expect more delay due to extreme v/c's (see EVALUATE)
        -------------------------
Sq 11 |  Phase 1   |  Phase 2  |
**/** -------------------------
      |            |           |
  .   |            |           |
 /|\  |            |      <****|
  |   |            |       ****|
  |   |            |       v   |
North |   <*     *>|++++>      |
  |   |    *     * |++++       |
      |    *     * |  v        |
      -------------------------
      | G/C= .292  | G/C= .575 |
      | G=  17.5"  | G=  34.5" |
      | Y+R= 4.0"  | Y+R= 4.0" |
      | OFF=   .0% | OFF=35.9% |
      -------------------------
      C= 60 sec    G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped=  .0 sec =  .

-------------------------------------------------------------------------------
| Lane   |Width/|      g/C      | Service Rate|  Adj |        | HCM   | L |90% Ma
| Group  | Lanes| Reqd    Used  | @C (vph) @E |Volume|   v/c  | Delay | S | Queue
-------------------------------------------------------------------------------
NB Approach                                                      38.6   D
===============================================================================
|LT+TH+RT| 12/1 | .356 | .325  |  273 |  322 |  304 | .944  |  38.6 |*D | 173 f
-------------------------------------------------------------------------------
WB Approach                                                      49.0@  E+
===============================================================================
|LT+TH   | 12/1 | .743 | .608  |  678 |  706 |  850 |1.204  |  49.0@|*E+| 281 f
-------------------------------------------------------------------------------
EB Approach                                                       4.9   A
===============================================================================
|   TH+RT| 12/1 | .357 | .608  |  946 |  967 |  515 | .533  |   4.9 | A | 170 f
-------------------------------------------------------------------------------
```

AMFAC - WAIPAHU TRAFFIC STUDY
1995 - EXISTING CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

12/08/95
10:47:36

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 3 - WAIPAHU ST & PAIWA ST

METROAREA	NONCBD	
LOSTTIME		2.0
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	300	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	623	338	23	28	333	138	83	156	16	74	198	200
WIDTHS	11.0	12.0	.0	.0	12.0	.0	.0	12.0	.0	.0	12.0	.0
LANES	1	1	0	0	1	0	0	1	0	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1332	1766	0	0	664	0	0	1160	0	0	1577	0

Phasing Parameters

SEQUENCES	13						
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	22.00	22.00	35.00				
YELLOWTIMES	3.00	3.00	3.00				
CRITICALS	0	0	0				
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
1995 - EXISTING CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

12/08
10:47

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 3 - WAIPAHU ST & PAIWA ST
Degree of Saturation (v/c) .97 Vehicle Delay 32.4@ Level of Service
@ expect more delay due to extreme v/c's (see EVALUATE)

```
-------------------------------------------------
Sq 13 | Phase 1   | Phase 2   | Phase 3    |
**/** -------------------------------------------
      | + + +     | +         |          - |
      | + + +     | +         |       ++++ |
 /|\  |(+ + +)    |(+         |      (++++ |
  |   |  v        |   -       |   -   ++++ |
  |   |       -   |++++       |++++   v    |
North |   (+ + +) |(++++)     |(++++)      |
  |   |     + + + |++++       |++++        |
      |     + + + |   v       |  v         |
      -------------------------------------------
      | G/C= .250 | G/C= .250 | G/C= .398 |
      | G=  22.0" | G=  22.0" | G=  35.0" |
      | Y+R= 3.0" | Y+R= 3.0" | Y+R= 3.0" |
      | OFF=  .0% | OFF=28.4% | OFF=56.8% |
      -------------------------------------------
```

C= 88 sec G= 79.0 sec = 89.8% Y= 9.0 sec = 10.2% Ped= .0 sec =

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% M Queu
SB Approach								18.5	C+	
RT	11/1	.319	.545	674	726	340	.468	8.3	B+	191
LT+TH	12/1	.273	.261	359	462	380	.823	27.6	D+	347
NB Approach								37.7	D	
LT+TH+RT	12/1	.300	.261	221	303	268	.884	37.7	D	245
WB Approach								75.6@	F	
LT+TH+RT	12/1	.824	.409	217	272	525	1.930	75.6@	F	384
EB Approach								4.1	A	
LT+TH+RT	12/1	.368	.693	1071	1093	497	.455	4.1	A	189

AMFAC - WAIPAHU TRAFFIC STUDY
1995 - EXISTING CONDITIONS
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/96
15:41:05

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 3 - WAIPAHU ST & PAIWA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	215	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	543	171	12	30	307	29	57	171	26	48	275	310
WIDTHS	11.0	12.0	.0	.0	12.0	.0	.0	12.0	.0	.0	12.0	.0
LANES	1	1	0	0	1	0	0	1	0	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1332	1790	0	0	1267	0	0	1469	0	0	826	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	16.89	35.11					
YELLOWTIMES	4.00	4.00					
CRITICALS	1	11					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
1995 - EXISTING CONDITIONS
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/0(
15:41

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 3 - WAIPAHU ST & PAIWA ST
Degree of Saturation (v/c) .84 Vehicle Delay 26.9@ Level of Service
@ expect more delay due to extreme v/c's (see EVALUATE)

```
------------------------------
Sq 11 | Phase 1  | Phase 2  |
**/** ------------------------
      | * + +    |      -   |
      | * + +    |     ++++ |
 /|\  |(* + +)   |    (++++ |
  |   |  v       |   -  ++++|
  |   |     -    |****   v  |
North |  (+ + +) |****)     |
  |   |   + + +  |****      |
      |   + + +  |  v       |
      ------------------------
      | G/C= .281 | G/C= .585 |
      | G= 16.9"  | G= 35.1"  |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF= .0%  | OFF=34.8% |
      ------------------------
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec =

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% M Queu
SB Approach								17.1	C+	
RT	11/1	.300	.315	366	419	345	.823	20.9	*C	199
LT+TH	12/1	.140	.315	508	564	193	.342	10.3	B	112
NB Approach								12.4	B	
LT+TH+RT	12/1	.221	.315	409	463	267	.577	12.4	B	154
WB Approach								4.5	A	
LT+TH+RT	12/1	.345	.618	759	784	386	.492	4.5	A	124
EB Approach								53.7@	E	
LT+TH+RT	12/1	.823	.618	480	511	666	1.303	53.7@	*E	214

```
ATA Inc.              STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS              1994 HCM
**********************************************************************************************
Major Street: PAIWA ST                                              Print Date:    04-Jan
Minor Street: PAIWA PL                                                 Analyst:        BC
   Peak Hour:       AM                                               File Name:  PAIPA1-A
    Scenario: EXISTING - NOV 1995                                 Intersection:         4
----------------------------------------------------------------------------------------------
Peak Hour Factor:       1.00 |
--------MAJOR STREET-------- | V2     350 -----------)              (--------- 770     V5
    Num of Lanes - V2:     1 |
   Excl RT - V3 (Y/N):     N | V3      5 -----                           -----   5     V4
 Stop/Yield - V3 (Y/N):    N |               \                          /
       % Grade - V2,V3:    0 |                v                        v     MAJOR STREET:
                             |                                               PAIWA ST
    Num of Lanes - V5:     1 |                      (          )
   Excl LT - V4 (Y/N):     N |                       \        /
       % Grade - V4,V5:    0 |                        |       |
                             |                        |       |
--------MINOR STREET-------- |                         5       5                NORTH---)
 Num of Lanes - V7,V9:     1 |
     Shared Lane (Y/N):    Y |                        V7       V9
       % Grade - V7&V9:    0 |              MINOR STREET: PAIWA PL
----------------------------------------------------------------------------------------------
VOLUME ADJUSTMENTS
 MOVEMENT NO.              2         3          4           5          7          9
 VOLUME, V (vph)         350         5          5         770          5          5
 VOLUME, v (pcph)        356         6          6         778          6          6
----------------------------------------------------------------------------------------------
STEP 1: RT FROM MINOR STREET - V9
  Conflicting Flows:    \ Vc,9 = 1/2*V3+V2 =          3  +   350       =        353  vph
  Potential Capacity:   | Cp,9 =                                                918  pcph
  Movement Capacity:    | Cm,9 = Cp,9 =                                         918  pcph
----------------------------------------------------------------------------------------------
STEP 2: LT FROM MAJOR STREET - V4
  Conflicting Flows:            | Vc,4 = V3+V2 =          5  +   350  =         355  vph
  Potential Capacity:           | Cp,4 =                                       1161  pcph
  Movement Capacity:            | Cm,4 = Cp,4 =                                1161  pcph
  Prob. of Queue-free State:    | po,4 = 1-v4/Cm,4 =                           1.00
  Major Left Shared Lane        |
   Prob. of Queue-free State:   | p*o,4 =                                      0.99
----------------------------------------------------------------------------------------------
STEP 3: LT FROM MINOR STREET - V7
  Conflicting Flows:            | Vc,7 = 1/2V3+V2+V5+V4 =                      1120  vph
  Potential Capacity:           | Cp,7 =                                        235  pcph
  Capacity Adjustment Factor    |
   Due To Impeding Movements:   | f7=po,4=                                     0.99
  Movement Capacity:            | Cm,7 = Cp,7 =                                 233  pcph
----------------------------------------------------------------------------------------------
DELAY AND LEVEL OF SERVICE SUMMARY                          csh    AVG TOTAL
    Movement                 v(vcph)       cm(pcph)      (pcph)    DELAY       LOS
  ------------             -----------     --------      ------    -----     ------
  MINOR LEFT TURN   (7)         6             233         SHRD      SHRD      SHRD
  MINOR RIGHT TURN  (9)         6             918          372      10.0         B
  MAJOR LEFT TURN   (4)         6            1161        ------      3.1         A
----------------------------------------------------------------------------------------------
     AVERAGE MINOR APPROACH DELAY =  10.0 sec/veh  |  AVERAGE TOTAL INTERSECTION DELAY =   0.1 sec/veh
              LEVEL OF SERVICE =     B             |                 LEVEL OF SERVICE =   A
**********************************************************************************************
```

```
ATA Inc.              STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS              1994 HCM
**********************************************************************************************
Major Street: PAIWA ST                                              Print Date:    04-Jan
Minor Street: PAIWA PL                                                 Analyst:        BC
   Peak Hour:       PM                                               File Name:  PAIPA1-P
    Scenario: EXISTING - NOV 1995                                 Intersection:         4
----------------------------------------------------------------------------------------------
Peak Hour Factor:       1.00 |
--------MAJOR STREET-------- | V2     505 -----------)              (--------- 765     V5
    Num of Lanes - V2:     1 |
   Excl RT - V3 (Y/N):     N | V3      5 -----                           -----   5     V4
 Stop/Yield - V3 (Y/N):    N |               \                          /
       % Grade - V2,V3:    0 |                v                        v     MAJOR STREET:
                             |                                               PAIWA ST
    Num of Lanes - V5:     1 |                      (          )
   Excl LT - V4 (Y/N):     N |                       \        /
       % Grade - V4,V5:    0 |                        |       |
                             |                        |       |
--------MINOR STREET-------- |                         5       5                NORTH---)
 Num of Lanes - V7,V9:     1 |
     Shared Lane (Y/N):    Y |                        V7       V9
       % Grade - V7&V9:    0 |              MINOR STREET: PAIWA PL
----------------------------------------------------------------------------------------------
VOLUME ADJUSTMENTS
 MOVEMENT NO.              2         3          4           5          7          9
 VOLUME, V (vph)         505         5          5         765          5          5
 VOLUME, v (pcph)        505         5          6         765          6          6
----------------------------------------------------------------------------------------------
STEP 1: RT FROM MINOR STREET - V9
  Conflicting Flows:    { Vc,9 = 1/2*V3+V2 =          3  +   505       =        508  vph
  Potential Capacity:   | Cp,9 =                                                766  pcph
  Movement Capacity:    | Cm,9 = Cp,9 =                                         766  pcph
----------------------------------------------------------------------------------------------
STEP 2: LT FROM MAJOR STREET - V4
  Conflicting Flows:            | Vc,4 = V3+V2 =          5  +   505  =         510  vph
  Potential Capacity:           | Cp,4 =                                        990  pcph
  Movement Capacity:            | Cm,4 = Cp,4 =                                 990  pcph
  Prob. of Queue-free State:    | po,4 = 1-v4/Cm,4 =                           0.99
  Major Left Shared Lane        |
   Prob. of Queue-free State:   | p*o,4 =                                      0.99
----------------------------------------------------------------------------------------------
STEP 3: LT FROM MINOR STREET - V7
  Conflicting Flows:            | Vc,7 = 1/2V3+V2+V5+V4 =                      1278  vph
  Potential Capacity:           | Cp,7 =                                        193  pcph
  Capacity Adjustment Factor    |
   Due To Impeding Movements:   | f7=po,4=                                     0.99
  Movement Capacity:            | Cm,7 = Cp,7 =                                 191  pcph
----------------------------------------------------------------------------------------------
DELAY AND LEVEL OF SERVICE SUMMARY                          csh    AVG TOTAL
    Movement                 v(vcph)       cm(pcph)      (pcph)    DELAY       LOS
  ------------             -----------     --------      ------    -----     ------
  MINOR LEFT TURN   (7)         6             191         SHRD      SHRD      SHRD
  MINOR RIGHT TURN  (9)         6             766          385      12.2         C
  MAJOR LEFT TURN   (4)         6             990        ------      3.7         A
----------------------------------------------------------------------------------------------
     AVERAGE MINOR APPROACH DELAY =  12.2 sec/veh  |  AVERAGE TOTAL INTERSECTION DELAY =   0.1 sec/veh
              LEVEL OF SERVICE =     C             |                 LEVEL OF SERVICE =   A
**********************************************************************************************
```

```
ATA Inc.          STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS          1994 HCM
*******************************************************************************************
Major Street: PAIWA ST                                              Print Date:   08-Dec
Minor Street:   HAPAPA                                                 Analyst:       BC
   Peak Hour:       AM                                               File Name: PAIKAP-A
   Scenario: EXISTING - 11/16/95                                  Intersection:       #5
-------------------------------------------------------------------------------------------
Peak Hour Factor:        1.00 |
---------MAJOR STREET-------- | V2    354 ----------->          <--------- 716    V5
    Num of Lanes - V2:      1 |
   Excl RT - V3 (Y/N):      N | V3     45 -----                       ----- 53     V4
 Stop/Yield - V3 (Y/N):     N |             \                        /
     % Grade - V2,V3:       0 |              v                      v     MAJOR STREET:
                              |                                           PAIWA ST
    Num of Lanes - V5:      1 |                     <          >
   Excl LT - V4 (Y/N):      N |                      \        /
     % Grade - V4,V5:       0 |                       |      |
                              |                       |      |
---------MINOR STREET-------- |                      80     27              NORTH--->
  Num of Lanes - V7,V9:     1 |
    Shared Lane (Y/N):      Y |                      V7     V9
     % Grade - V7&V9:       0 |               MINOR STREET: HAPAPA
-------------------------------------------------------------------------------------------
VOLUME ADJUSTMENTS
  MOVEMENT NO.                 2       3        4          5       7       9
  VOLUME, V (vph)            354      45       53        716      80      27
  VOLUME, v (pcph)           354      45       58        716      88      30
-------------------------------------------------------------------------------------------
STEP 1: RT FROM MINOR STREET - V9
  Conflicting Flows:     | Vc,9 = 1/2*V3+V2 =       23  +  354      =       377  vph
  Potential Capacity:    | Cp,9 =                                           892  pcph
  Movement Capacity:     | Cm,9 = Cp,9 =                                    892  pcph
-------------------------------------------------------------------------------------------
STEP 2: LT FROM MAJOR STREET - V4
  Conflicting Flows:            | Vc,4 = V3+V2 =         45  +  354  =      399  vph
  Potential Capacity:           | Cp,4 =                                   1107  pcph
  Movement Capacity:            | Cm,4 = Cp,4 =                            1107  pcph
  Prob. of Queue-free State:    | po,4 = 1-v4/Cm,4 =                       0.95
  Major Left Shared Lane        |
   Prob. of Queue-free State:   | p*o,4 =                                  0.90
-------------------------------------------------------------------------------------------
STEP 3: LT FROM MINOR STREET - V7
  Conflicting Flows:            | Vc,7 = 1/2V3+V2+V5+V4 =                  1146  vph
  Potential Capacity:           | Cp,7 =                                    220  pcph
  Capacity Adjustment Factor    |
   Due To Impeding Movements:   | f7=po,4=                                 0.90
  Movement Capacity:            | Cm,7 = Cp,7 =                             200  pcph
-------------------------------------------------------------------------------------------
DELAY AND LEVEL OF SERVICE SUMMARY
                                                       csh    AVG TOTAL
    Movement                 v(vcph)      cm(pcph)   (pcph)     DELAY      LOS
  -----------               ----------    --------   ------     -----     ------
  MINOR LEFT TURN   (7)         88           200      SHRD       SHRD      SHRD
  MINOR RIGHT TURN  (9)         30           892       250       25.2        D
  MAJOR LEFT TURN   (4)         58          1107     ------       3.4        A
-------------------------------------------------------------------------------------------
   AVERAGE MINOR APPROACH DELAY =  25.2 sec/veh  |  AVERAGE TOTAL INTERSECTION DELAY =  2.4 sec/veh
            LEVEL OF SERVICE =     D             |                 LEVEL OF SERVICE =  A
*******************************************************************************************
```

```
ATA Inc.          STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS          1994 HCM
*******************************************************************************************
Major Street: PAIWA ST                                              Print Date:   08-Dec
Minor Street:   HAPAPA                                                 Analyst:       BC
   Peak Hour:       PM                                               File Name: PAIKAP-P
   Scenario: EXISTING - 11/16/95                                  Intersection:       #5
-------------------------------------------------------------------------------------------
Peak Hour Factor:        1.00 |
---------MAJOR STREET-------- | V2    404 ----------->          <--------- 720    V5
    Num of Lanes - V2:      1 |
   Excl RT - V3 (Y/N):      N | V3     20 -----                       ----- 43     V4
 Stop/Yield - V3 (Y/N):     N |             \                        /
     % Grade - V2,V3:       0 |              v                      v     MAJOR STREET:
                              |                                           PAIWA ST
    Num of Lanes - V5:      1 |                     <          >
   Excl LT - V4 (Y/N):      N |                      \        /
     % Grade - V4,V5:       0 |                       |      |
                              |                       |      |
---------MINOR STREET-------- |                      27     18              NORTH--->
  Num of Lanes - V7,V9:     1 |
    Shared Lane (Y/N):      Y |                      V7     V9
     % Grade - V7&V9:       0 |               MINOR STREET: HAPAPA
-------------------------------------------------------------------------------------------
VOLUME ADJUSTMENTS
  MOVEMENT NO.                 2       3        4          5       7       9
  VOLUME, V (vph)            404      20       43        720      27      18
  VOLUME, v (pcph)           404      20       47        720      30      20
-------------------------------------------------------------------------------------------
STEP 1: RT FROM MINOR STREET - V9
  Conflicting Flows:     | Vc,9 = 1/2*V3+V2 =       10  +  404      =       414  vph
  Potential Capacity:    | Cp,9 =                                           770  pcph
  Movement Capacity:     | Cm,9 = Cp,9 =                                    770  pcph
-------------------------------------------------------------------------------------------
STEP 2: LT FROM MAJOR STREET - V4
  Conflicting Flows:            | Vc,4 = V3+V2 =         20  +  404  =      424  vph
  Potential Capacity:           | Cp,4 =                                    906  pcph
  Movement Capacity:            | Cm,4 = Cp,4 =                             906  pcph
  Prob. of Queue-free State:    | po,4 = 1-v4/Cm,4 =                       0.95
  Major Left Shared Lane        |
   Prob. of Queue-free State:   | p*o,4 =                                  0.91
-------------------------------------------------------------------------------------------
STEP 3: LT FROM MINOR STREET - V7
  Conflicting Flows:            | Vc,7 = 1/2V3+V2+V5+V4 =                  1257  vph
  Potential Capacity:           | Cp,7 =                                    198  pcph
  Capacity Adjustment Factor    |
   Due To Impeding Movements:   | f7=po,4=                                 0.91
  Movement Capacity:            | Cm,7 = Cp,7 =                             181  pcph
-------------------------------------------------------------------------------------------
DELAY AND LEVEL OF SERVICE SUMMARY
                                                       csh    AVG TOTAL
    Movement                 v(vcph)      cm(pcph)   (pcph)     DELAY      LOS
  -----------               ----------    --------   ------     -----     ------
  MINOR LEFT TURN   (7)         30           181      SHRD       SHRD      SHRD
  MINOR RIGHT TURN  (9)         20           770       261       17.0        C
  MAJOR LEFT TURN   (4)         47           906     ------       3.8        A
-------------------------------------------------------------------------------------------
   AVERAGE MINOR APPROACH DELAY =  17.0 sec/veh  |  AVERAGE TOTAL INTERSECTION DELAY =  0.8 sec/veh
            LEVEL OF SERVICE =     C             |                 LEVEL OF SERVICE =  A
*******************************************************************************************
```

AMFAC - WAIPAHU TRAFFIC STUDY
1995 - EXISTING CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

12/08/95
10:58:09

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 68 - PAIWA ST & HIAPA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	BOTH	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	74	0	71

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	43	591	74	125	28	62	14	204	71	109	60	70
WIDTHS	.0	24.0	.0	10.0	12.0	.0	.0	24.0	.0	10.0	12.0	.0
LANES	0	2	0	1	1	0	0	2	0	1	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3072	0	1050	1371	0	0	2553	0	1312	1532	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	40.00	10.00					
YELLOWTIMES	3.00	3.00					
CRITICALS	0	0					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
1995 - EXISTING CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

12/0[illegible]
10:5[illegible]

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 68 - PAIWA ST & HIAPA ST
Degree of Saturation (v/c) .30 Vehicle Delay 4.2 Level of Servic

```
        -----------------------
Sq 11 | Phase 1  | Phase 2  |
**/** -----------------------
      | + + +    |       -  |
   .  | + + +    |      ++++|
 /|\  |(+ + +)   |     <++++|
  |   |  v       |   -  ++++|
  |   |      -   |++++  v   |
North |   <+ + +)|++++>     |
  |   |    + + + |++++      |
      |    + + + |  v       |
      -----------------------
      | G/C= .714 | G/C= .179 |
      | G=  40.0" | G=  10.0" |
      | Y+R= 3.0" | Y+R= 3.0" |
      | OFF=  .0% | OFF=76.8% |
      -----------------------
      C= 56 sec   G= 50.0 sec = 89.3%  Y= 6.0 sec = 10.7%  Ped=  .0 sec =
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% M. Queu
SB Approach								1.7	A	
LT+TH+RT	24/2	.262	.732	2249	2249	745	.331	1.7	A	79
NB Approach								1.5	A	
LT+TH+RT	24/2	.178	.732	1869	1869	389	.208	1.5	A	41
WB Approach								12.7	B	
RT	10/1	.082	.196	160	205	54	.262	12.5	B	34
LT+TH	12/1	.099	.196	217	269	94	.349	12.9	B	59
EB Approach								13.3	B	
RT	10/1	.052	.196	207	258	40	.155	12.1	B	25
LT+TH	12/1	.121	.196	247	301	137	.455	13.6	B	87

AMFAC - WAIPAHU TRAFFIC STUDY 12/08/95
1995 - EXISTING CONDITIONS 11:00:34
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 6 - PAIWA ST & HIAPA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	BOTH	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	64	0	70

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	157	653	88	64	25	33	22	420	70	96	10	258
WIDTHS	.0	24.0	.0	10.0	12.0	.0	.0	24.0	.0	10.0	12.0	.0
LANES	0	2	0	1	1	0	0	2	0	1	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	2847	0	1050	1033	0	0	2394	0	1312	1404	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	40.00	10.00					
YELLOWTIMES	3.00	3.00					
CRITICALS	0	0					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY 12/08
1995 - EXISTING CONDITIONS 11:00
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 6 - PAIWA ST & HIAPA ST
Degree of Saturation (v/c) .49 Vehicle Delay 11.9 Level of Servic

```
        ----------------------------
Sq 11  |  Phase 1   |  Phase 2   |
**/**  ----------------------------
       | + + +      |         -  |
   .   | + + +      |      ++++  |
  /|\  |(+ + +)     |     (++++  |
   |   |  v         |   -  ++++  |
   |   |        -   |++++   v    |
North  |     (+ + +)|++++)       |
   |   |      + + + |++++        |
       |      + + + |  v         |
       ----------------------------
       | G/C= .714  | G/C= .179  |
       | G=  40.0"  | G=  10.0"  |
       | Y+R= 3.0"  | Y+R= 3.0"  |
       | OFF=  .0%  | OFF=76.8%  |
       ----------------------------
       C= 56 sec   G= 50.0 sec = 89.3%  Y= 6.0 sec = 10.7%  Ped= .0 sec =
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Ma Queue
SB Approach								2.1	A	
LT+TH+RT	24/2	.348	.732	2085	2085	945	.453	2.1	A	100 f
NB Approach								1.7	A	
LT+TH+RT	24/2	.250	.732	1753	1753	539	.307	1.7	A	57 1
WB Approach								12.7	B	
RT	10/1	.003	.196	160	205	1	.005	11.7	B	25
LT+TH	12/1	.092	.196	157	201	61	.300	12.7	B	39
EB Approach								59.2	E	
RT	10/1	.038	.196	207	258	27	.105	11.9	B	25
LT+TH	12/1	.240	.196	224	276	283	1.025	63.7	F	179

ANFAC WAIPAHU TIAS
EXISTING 1994 CONDITIONS
AM PEAK HOUR

12/13/95
13:00:39

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 7 - PAIWA ST & H-1 EB RAMPS

METROAREA	NONCBD	
LOSTTIME		2.0
LEVELOFSERVICE	C	5
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	-2.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	161

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	395	191	0	0	0	300	161	0	161	5	360
WIDTHS	.0	24.0	12.0	.0	.0	.0	.0	24.0	.0	12.0	12.0	.0
LANES	0	2	1	0	0	0	0	2	0	1	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3600	1770	0	0	0	0	3269	0	1550	1559	0

Phasing Parameters

SEQUENCES	21	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	25.00	30.00	15.00				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	3	8	11				
EXCESS	0						

ANFAC WAIPAHU TIAS
EXISTING 1994 CONDITIONS
AM PEAK HOUR

12/13/95
13:00:52

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 7 - PAIWA ST & H-1 EB RAMPS
Degree of Saturation (v/c) .52 Vehicle Delay 25.70 Level of Service D+
expect more delay due to extreme v/c's (see EVALUATE)

```
        -------------------------------------
Sq 21 | Phase 1  | Phase 2  | Phase 3  |
**/** -------------------------------------
      |  * *     |  *       |          |
  .   |  * *     |  *       |          |
 /|\  |  * *>    |  *       |          |
  |   |  v       |  v       |   *      |
  |   |          |       *  |****      |
North |          |       * *>|*****>   |
  |   |          |       * * |****     |
      |          |       * * |   v     |
        -------------------------------------
      | G/C= .305 | G/C= .366 | G/C= .183 |
      | G=  25.0" | G=  30.0" | G=  15.0" |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=35.4% | OFF=76.8% |
        -------------------------------------
```

C= 82 sec   G= 70.0 sec = 85.4%   Y=12.0 sec = 14.6%   Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								5.7	B+	
TH	24/2	.153	.744	2744	2744	416	.152	2.0	A	61 ft
LT	12/1	.167	.329	580	583	201	.345	13.6	*B	155 ft
NB Approach								11.0	B	
TH+RT	24/2	.195	.390	1203	1203	507	.395	11.0	*B	178 ft
EB Approach								75.00	F	
RT	12/1	.029	.207	234	322	1	.003	16.7	C+	25 ft
LT+TH	12/1	.300	.207	235	323	384	1.189	76.00	*F	351 ft

ARTAC HAIPANE TIAR
EXISTING 1994 CONDITIONS
PM PEAK HOUR

12/13/95
13:06:47

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 7 - PALMA ST & I-1 SB RAMPS

```
METROAREA            NONCBD
LOSTTIME                2.0
LEVELOFSERVICE       C     5
NODELOCATION         0     0
```

Approach Parameters

```
APPLABELS              SB          WB          NB          EB
GRADES                 .0          .0          .0        -2.0
PEDLEVELS             LOW         LOW         LOW         LOW
PARKINGSIDES         NONE        NONE        NONE        NONE
PARKVOLUMES            20          20          20          20
BUSVOLUMES              5           0           5           0
RIGHTTURNONREDS         0           0           0         175
```

Movement Parameters

```
MOVLABELS          RT   TH   LT    RT   TH   LT    RT   TH   LT    RT   TH   LT
VOLUMES             0  695  175     0    0    0   475  267    0   211    5  470
WIDTHS             .0 24.0 12.0    .0   .0   .0    .0 24.0   .0  12.0 12.0   .0
LANES               0    2    1     0    0    0     0    2    0     1    1    0
UTILIZATIONS     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
TRUCKPERCENTS     2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0
PEAKHOURFACTORS   .95  .95  .95   .95  .95  .95   .95  .95  .95   .95  .95  .95
ARRIVALTYPES        3    3    3     3    3    3     3    3    3     3    3    3
ACTUATIONS        YES  YES  YES   YES  YES  YES   YES  YES  YES   YES  YES  YES
REQCLEARANCES     4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0
MINIMUMS          5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0
IDEALSATFLOWS    1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
FACTORS          1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
DELAYFACTORS     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
NSTOPFACTORS     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
GROUPTYPES       NORM NORM NORM  NORM NORM NORM  NORM NORM NORM  NORM NORM NORM
SATURATIONFLOWS     0 3688 1770     0    0    0     0 3274    0  1554 1558    0
```

Phasing Parameters

```
SEQUENCES          21    ALL
PERMISSIVES        NO     NO     NO    NO        LEADLAGS     NONE  NONE
OVERLAPS          YES    YES    YES   YES        OFFSET        .00     1
CYCLES             60    180     10              PEDTIME        .0     0
GREENTIMES      25.00  30.00  15.00
YELLOWTIMES      4.00   4.00   4.00
CRITICALS           3      0     11
EXCESS              0
```

ARTAC HAIPANE TIAR
EXISTING 1994 CONDITIONS
PM PEAK HOUR

12/13/95
13:06:50

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 7 - PALMA ST & I-1 NB RAMPS
Degree of Saturation (v/c) .68 Vehicle Delay 24.80 Level of Service C
expect more delay due to extreme v/c's (see EVALUATE)

```
      ------------------------------------
Sq 21 | Phase 1  | Phase 2  | Phase 3  |
**/** ------------------------------------
      |  + '     |  +       |          |
   .  |  + '     |  +       |          |
  /|\ |  + '>    |  +       |          |
   |  |  v       |  v       |   +      |
   |  |          |       +  |****      |
North |          |     * *> |****>     |
   |  |          |     * *  |****      |
      |          |     * *  |   v      |
      ------------------------------------
      | G/C= .305 | G/C= .366 | G/C= .183 |
      | G=  25.0" | G=  30.0" | G=  15.0" |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=35.4% | OFF=76.8% |
      ------------------------------------
      C= 82 sec   G= 70.0 sec = 85.4%  Y=12.0 sec = 14.6%  Ped= .0 sec = .0%
```

Lane Group	Width/Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								4.4	A	
TH	24/2	.234	.744	2766	2744	732	.267	2.2	A	100 ft
LT	12/1	.157	.329	500	583	184	.316	13.4	*B	142 ft
NB Approach								13.6	B	
TH+RT	24/2	.274	.390	1199	1279	781	.611	13.6	*B	276 ft
EB Approach								71.90	F	
RT	12/1	.064	.207	234	322	30	.110	17.1	C+	35 ft
LT+TH	12/1	.378	.207	235	323	508	1.573	76.00	*F	464 ft

AMFAC WAIPAHU TIAR
EXISTING 1994 CONDITIONS
AM PEAK HOUR

12/13/95
13:08:39

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 7 - PAIWA ST & H-1 WB RAMPS

METROAREA	NONCBD	
LOSTTIME		3.0
LEVELOFSERVICE	C	5
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	-2.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	454	0	0	5	127	0	340	204	0	0	0
WIDTHS	.0	24.0	.0	.0	12.0	12.0	.0	24.0	12.0	.0	.0	.0
LANES	0	2	0	0	1	1	0	2	1	0	0	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	DOPT	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3725	0	0	1577	1556	0	3651	1752	0	0	0

Phasing Parameters

SEQUENCES	31	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	100	10		PEDTIME	.0	0
GREENTIMES	25.00	30.00	15.00				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	9	2	5				
EXCESS	0						

AMFAC WAIPAHU TIAR
EXISTING 1994 CONDITIONS
AM PEAK HOUR

12/13/95
13:08:49

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 7 - PAIWA ST & H-1 WB RAMPS
Degree of Saturation (v/c) .26 Vehicle Delay 9.3 Level of Service B+

```
      -----------------------------------------
Sq 31 |  Phase 1   |  Phase 2   |  Phase 3   |
**/** -----------------------------------------
      |            |    *       |            |
  .   |            |    *       |            |
 /|\  |            |    *       |      <****|
  |   |            |    v       |       ****|
  |   |       *    |       *    |       v    |
North |    <* *    |       *    |            |
  |   |     * *    |       *    |            |
      |     * *    |       *    |            |
      -----------------------------------------
      | G/C= .305 | G/C= .366 | G/C= .183 |
      | G=  25.0" | G=  30.0" | G=  15.0" |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=35.4% | OFF=76.8% |
      -----------------------------------------
```

C= 82 sec G= 70.0 sec = 85.4% Y=12.0 sec = 14.6% Ped= .0 sec = .0%

Lane Group	Width/Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								11.3	B	
TH	24/2	.167	.358	1374	1454	476	.329	11.3	*B	160 ft
NB Approach								6.0	B+	
TH	24/2	.130	.700	2716	2716	358	.132	1.9	A	53 ft
LT	12/1	.177	.329	496	577	215	.373	13.0	*B	166 ft
WB Approach								17.5	C+	
TH	12/1-	.092	.207	238	327	71	.217	17.5	*C+	65 ft
LT	12/1+	.090	.207	234	322	68	.211	17.5	C+	62 ft

AMFAC WAIPAHU TIAR
EXISTING 1994 CONDITIONS
PM PEAK HOUR

12/13/95
13:09:59

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 8 7 - PAIWA ST & H-1 WB RAMPS

METROAREA		NONCBD
LOSTTIME		2.0
LEVELOFSERVICE	C	B
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	-2.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	556	0	0	5	309	0	556	150	0	0	0
WIDTHS	.0	24.0	.0	.0	12.0	12.0	.0	24.0	12.0	.0	.0	.0
LANES	0	2	0	0	1	1	0	2	1	0	0	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NOPT	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3725	0	0	1560	1556	0	3651	1752	0	0	0

Phasing Parameters

SEQUENCES	31						
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	120	10		PEDTIME	.0	0
GREENTIMES	25.00	30.00	15.00				
YELLOWTIMES	2.00	2.00	.00				
CRITICALS	9	5	5				
EXCESS	0						

AMFAC WAIPAHU TIAR
EXISTING 1994 CONDITIONS
PM PEAK HOUR

12/13/95
13:10:08

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 4 5 - PAIWA ST & H-1 WB RAMPS
Degree of Saturation (v/c) .36 Vehicle Delay 9.4 Level of Service B+

```
        ------------------------------------
Sq 31 |  Phase 1  |  Phase 2  |  Phase 3  |
**/** ------------------------------------
      |           |   *       |           |
  .   |           |   *       |           |
 /|\  |           |   *       |      <****|
  |   |           |   v       |       ****|
  |   |       *   |       *   |       v   |
North |     <* *  |       *   |           |
  |   |      * *  |       *   |           |
      |      * *  |       *   |           |
        ------------------------------------
      | G/C= .338 | G/C= .405 | G/C= .203 |
      | G=  25.0" | G=  30.0" | G=  15.0" |
      | Y+R= 2.0" | Y+R= 2.0" | Y+R=  .0" |
      | OFF=  .0% | OFF=36.5% | OFF=79.7% |
        ------------------------------------
      C= 74 sec   G= 70.0 sec = 94.6%  Y= 4.0 sec =  5.4%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								10.1	B	
TH	24/2	.187	.405	1453	1510	585	.387	10.1	B	181 ft
NB Approach								3.7	A	
TH	24/2	.193	.770	2813	2813	585	.208	1.5	A	78 ft
LT	12/1	.136	.338	521	592	162	.274	11.6	*B	112 ft
WB Approach								20.8	C	
TH	12/1-	.150	.176	201	274	169	.615	21.1	*C	165 ft
LT	12/1+	.150	.176	199	272	161	.590	20.5	C	138 ft

AMFAC - WAIPAHU TRAFFIC STUDY
1995 - EXISTING CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

12/08/95
11:21:15

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 9 - PAIWA ST & LUMIAINA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	.0	2.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	7	91	12	26	25	695	270	52	46	211	38	8
WIDTHS	.0	24.0	12.0	.0	24.0	12.0	.0	24.0	12.0	.0	24.0	12.0
LANES	0	2	1	0	2	1	0	2	1	0	2	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REDCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3663	1787	0	3227	1770	0	2901	1752	0	2922	1770

Phasing Parameters

SEQUENCES	45							
PERMISSIVES	NO	NO	NO	NO		LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO		OFFSET	.00	1
CYCLES	60	180	10			PEDTIME	.0	0
GREENTIMES	6.00	38.00	5.00	120.00	28.00			
YELLOWTIMES	2.00	2.00	2.00	2.00	2.00			
CRITICALS	0	0	0	0	0			
EXCESS	0							

AMFAC - WAIPAHU TRAFFIC STUDY
1995 - EXISTING CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

12/08
11:21:

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 9 - PAIWA ST & LUMIAINA ST
Degree of Saturation (v/c) .61 Vehicle Delay 38.0 Level of Servic

```
Sq 45 | Phase 1   | Phase 2   | Phase 3   | Phase 4   | Phase 5   |
**/** ---------------------------------------------------------------
      |    +      | + +       |           |      -    |     -     |
  .   |    +      | + +       |           |     ++++  |    ++++   |
 /|\  |    +>     |(+ +       |           |    <++++  |   <++++   |
  |   |           |    v      |   -  ++++ |     ++++  |           |
  |   |           |        -  |++++   v   |      v    |           |
North |   (+      |       + +>|           |           |++++>      |
  |   |    +      |       + + |           |           |++++       |
      |    +      |       + + |           |           |  v        |
      ---------------------------------------------------------------
      | G/C= .029 | G/C= .184 | G/C= .024 | G/C= .580 | G/C= .135 |
      | G=   6.0" | G=  38.0" | G=   5.0" | G= 120.0" | G=  28.0" |
      | Y+R= 2.0" | Y+R= 2.0" | Y+R= 2.0" | Y+R= 2.0" | Y+R= 2.0" |
      | OFF=  .0% | OFF= 3.9% | OFF=23.2% | OFF=26.6% | OFF=85.5% |
      ---------------------------------------------------------------
      C=207 sec   G=197.0 sec = 95.2%  Y=10.0 sec =  4.8%  Ped=  .0 sec =
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% M Queu
SB Approach								47.9	E+	
TH+RT	24/2	.397	.184	1	573	103	.153	45.9	E+	122
LT	12/1	.391	.029	1	1	13	.250	64.0	F	37
NB Approach								63.1	F	
TH+RT	24/2	.426	.104	1	443	339	.636	52.2	E	403
LT	12/1	.397	.029	1	1	48	.941	139.6	F	136
WB Approach								17.3	C+	
TH+RT	24/2	.394	.725	2251	2339	53	.023	5.2	B+	26
LT	12/1	.553	.614	915	1086	732	.674	18.2	C+	823
EB Approach								58.0	E	
TH+RT	24/2	.417	.135	1	288	262	.663	57.8	E	330
LT	12/1	.390	.024	1	1	8	.186	64.2	F	25

```
AMFAC - WAIPAHU TRAFFIC STUDY                                          12/08/95
1995 - EXISTING CONDITIONS                                             11:22:47
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

   Intersection Parameters for Int # 9a - PAIWA ST & LUMIAINA ST

METROAREA              NONCBD
LOSTTIME                  2.0
LEVELOFSERVICE         C     S
NODELOCATION           0     0

   Approach Parameters

APPLABELS                  SB             WB             NB             EB
GRADES                   -2.0             .0            2.0             .0
PEDLEVELS               MODER          MODER          MODER          MODER
PARKINGSIDES             NONE           NONE           NONE           NONE
PARKVOLUMES                20             20             20             20
BUSVOLUMES                  5              5              5              5
RIGHTTURNONREDS             0              0              0              0

   Movement Parameters

MOVLABELS            RT   TH   LT    RT   TH   LT    RT   TH   LT    RT   TH   LT
VOLUMES               4   76   44    28   70  915   460   85  124    83   24    1
WIDTHS               .0 24.0 12.0    .0 24.0 12.0    .0 24.0 12.0    .0 24.0 12.0
LANES                 0    2    1     0    2    1     0    2    1     0    2    1
UTILIZATIONS       1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
TRUCKPERCENTS       2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0
PEAKHOURFACTORS     .95  .95  .95   .95  .95  .95   .95  .95  .95   .95  .95  .95
ARRIVALTYPES          3    3    3     3    3    3     3    3    3     3    3    3
ACTUATIONS          YES  YES  YES   YES  YES  YES   YES  YES  YES   YES  YES  YES
REQCLEARANCES       4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0
MINIMUMS            5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0
IDEALSATFLOWS      1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
FACTORS            1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
DELAYFACTORS       1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
NSTOPFACTORS       1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
GROUPTYPES         NORM NORM NORM  NORM NORM NORM  NORM NORM NORM  NORM NORM NORM
SATURATIONFLOWS       0 3682 1787     0 3434 1770     0 2895 1752     0 2986 1770

   Phasing Parameters

SEQUENCES            45
PERMISSIVES          NO      NO      NO      NO          LEADLAGS      NONE   NONE
OVERLAPS             NO      NO      NO      NO          OFFSET         .00      1
CYCLES               60     180      10                  PEDTIME         .0      0
GREENTIMES         6.00   38.00    5.00  120.00   28.00
YELLOWTIMES        2.00    2.00    2.00    2.00    2.00
CRITICALS             0       0       0       0       0
EXCESS               .0
```

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AMFAC - WAIPAHU TRAFFIC STUDY                                          12/08
1995 - EXISTING CONDITIONS                                             11:23
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 9a - PAIWA ST & LUMIAINA ST
      Degree of Saturation (v/c)  .94  Vehicle Delay  62.1@ Level of Service
         @ expect more delay due to extreme v/c's (see EVALUATE)
-------------------------------------------------------------------------
Sq 45 |  Phase 1   |  Phase 2   |  Phase 3   |  Phase 4   |  Phase 5   |
**/** -------------------------------------------------------------------
      |     +      | + +        |            |      -     |      -     |
  .   |     +      | + +        |            |       ++++|       ++++|
 /|\  |     +)     |(+ +        |            |      (++++|      (++++|
  |   |            |   v        |  -   . ++++|       ++++|            |
  |   |            |        -   |++++    v   |      v     |            |
North |    (+      |        + +)|            |            |++++)       |
  |   |     +      |        + + |            |            |++++        |
      |     +      |        + + |            |            | v          |
      -------------------------------------------------------------------
      | G/C= .029 | G/C= .184 | G/C= .024 | G/C= .580 | G/C= .135 |
      | G=   6.0" | G=  38.0" | G=   5.0" | G= 120.0" | G=  28.0" |
      | Y+R= 2.0" | Y+R= 2.0" | Y+R= 2.0" | Y+R= 2.0" | Y+R= 2.0" |
      | OFF=  .0% | OFF= 3.9% | OFF=23.2% | OFF=26.6% | OFF=85.5% |
      -------------------------------------------------------------------
      C=207 sec   G=197.0 sec = 95.2%  Y=10.0 sec =  4.8%  Ped=  .0 sec =

-------------------------------------------------------------------------------
| Lane   |Width/|    g/C     | Service Rate| Adj  |       |  HCM   | L |90% M
| Group  |Lanes | Reqd  Used | @C (vph) @E |Volume|  v/c  | Delay  | S | Queu
-------------------------------------------------------------------------------
SB Approach                                                  72.4   F
===============================================================================
|  TH+RT| 24/2 | .396 | .184 |     1 |  576 |   84 | .124 |  45.6 | E+| 100
|  LT   | 12/1 | .396 | .029 |     1 |    1 |   46 | .885 | 121.4 | F | 130
-------------------------------------------------------------------------------

NB Approach                                                 116.2@  F
===============================================================================
|  TH+RT| 24/2 | .454 | .184 |     1 |  441 |  573 |1.079 | 100.3@| F | 681
|  LT   | 12/1 | .412 | .029 |     1 |    1 |  131 |2.569 | 185.6@| F | 370
-------------------------------------------------------------------------------

WB Approach                                                  26.1   D+
===============================================================================
|  TH+RT| 24/2 | .398 | .725 |  2400 | 2488 |  103 | .041 |   5.2 | B+|  41
|  LT   | 12/1 | .631 | .614 |   915 | 1086 |  963 | .887 |  28.4 | D+|1083
-------------------------------------------------------------------------------

EB Approach                                                  52.1   E
===============================================================================
|  TH+RT| 24/2 | .400 | .135 |     1 |  295 |  112 | .277 |  52.0 | E | 141
|  LT   | 12/1 | .389 | .024 |     1 |    1 |    1 | .023 |  63.7 | F |  25
-------------------------------------------------------------------------------
```

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

APPENDIX B

• YEAR 2000 BASE LOS CALCULATIONS

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AMFAC - WAIPAHU TRAFFIC STUDY                                  02/06
2000 - BASE                                                    14:09
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

   Intersection Parameters for Int #   1 - WAIPAHU ST & WAIPAHU DEPOT ST

METROAREA          NONCBD
LOSTTIME              2.0
LEVELOFSERVICE     C    S
NODELOCATION       0    0

   Approach Parameters

APPLABELS              SB          WB          NB          EB
GRADES                 .0          .0         3.0          .0
PEDLEVELS             LOW         LOW         LOW         LOW
PARKINGSIDES         NONE        NONE        BOTH        NONE
PARKVOLUMES            20          20          20          20
BUSVOLUMES              0           5           0           5
RIGHTTURNONREDS         0           0         102           0

   Movement Parameters

MOVLABELS           RT   TH   LT    RT   TH   LT    RT   TH   LT    RT   TH
VOLUMES              0    0    0     0  341  290   105    0   73   120  417
WIDTHS              .0   .0   .0    .0 12.0   .0  11.0   .0 11.0    .0 12.0
LANES                0    0    0     0    1    0     1    0    1     0    1
UTILIZATIONS      1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1
TRUCKPERCENTS      2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0
PEAKHOURFACTORS    .95  .95  .95   .95  .95  .95   .95  .95  .95   .95  .95
ARRIVALTYPES         3    3    3     3    3    3     3    3    3     3    3
ACTUATIONS         YES  YES  YES    NO   NO   NO   YES  YES  YES    NO   NO
REQCLEARANCES      4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0 .
MINIMUMS           5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0 !
IDEALSATFLOWS     1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1!
FACTORS           1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.
DELAYFACTORS      1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1
NSTOPFACTORS      1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.
GROUPTYPES        NORM NORM NORM  NORM NORM NORM  NORM NORM NORM  NORM NORM NI
SATURATIONFLOWS      0    0    0     0 1825    0  1172    0 1465     0 1578

   Phasing Parameters

SEQUENCES            17    ALL
PERMISSIVES         YES    YES    YES    YES         LEADLAGS      NONE   N
OVERLAPS             NO     NO     NO     NO         OFFSET         .00
CYCLES               60    180     10                PEDTIME         .0
GREENTIMES         5.02  21.53  21.44
YELLOWTIMES        4.00   4.00   4.00
CRITICALS             9      5     11
EXCESS                0
```

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/96
14:09:31

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 1 - WAIPAHU ST & WAIPAHU DEPOT ST
Degree of Saturation (v/c) .89 Vehicle Delay 24.0 Level of Service C

```
       -------------------------------------------
Sq 17 | Phase 1   | Phase 2   | Phase 3   |
**/** -------------------------------------------
      |           |           |           |
  .   |           |           |           |
 /|\  |           |  <****|           |
  |   |           |   ****|           |
  |   |           |     v     |           |
North |   <*   +>|           |****>      |
  |   |    *   + |           |****       |
      |    *   + |           |   v       |
       -------------------------------------------
      | G/C= .084 | G/C= .359 | G/C= .357 |
      | G=   5.0" | G=  21.5" | G=  21.4" |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=15.0% | OFF=57.6% |
       -------------------------------------------
```

C= 60 sec G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
NB Approach								17.1	C+	
RT	11/1	.008	.117	94	130	3	.022	16.1	C+	25 ft
LT	11/1	.082	.117	123	166	77	.448	17.2	*C+	57 ft
WB Approach								24.4	C	
LT+TH	12/1	.391	.392	668	716	664	.927	24.4	*C	340 ft
EB Approach								24.5	C	
TH+RT	12/1	.389	.391	568	617	565	.916	24.5	*C	290 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06.
14:13:

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 1 - WAIPAHU ST & WAIPAHU DEPOT ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	3.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	159	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	
VOLUMES	0	0	0	0	698	203	161	0	101	108	362	
WIDTHS	.0	.0	.0	.0	12.0	.0	11.0	.0	11.0	.0	12.0	
LANES	0	0	0	0	1	0	1	0	1	0	1	
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	
ACTUATIONS	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	NO	
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	19
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NO
SATURATIONFLOWS	0	0	0	0	1017	0	1172	0	1465	0	1576	

Phasing Parameters

SEQUENCES	11	ALL				
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE NO
OVERLAPS	NO	NO	NO	NO	OFFSET	.00
CYCLES	60	180	10		PEDTIME	.0
GREENTIMES	5.17	46.83				
YELLOWTIMES	4.00	4.00				
CRITICALS	9	5				
EXCESS	0					

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/96
14:13:39

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 1 - WAIPAHU ST & WAIPAHU DEPOT ST
Degree of Saturation (v/c) .77 Vehicle Delay 20.7 Level of Service C

```
        -----------------------------
Sq 11 |  Phase 1    |   Phase 2    |
**/** -----------------------------
      |             |              |
  .   |             |              |
 /|\  |             |        <****|
  |   |             |         ****|
  |   |             |          v   |
North |    <*    +>|++++>         |
  |   |     *    + |++++          |
      |     *    + |   v          |
        -----------------------------
      | G/C= .086  | G/C= .781   |
      | G=   5.2"  | G=  46.8"   |
      | Y+R= 4.0"  | Y+R= 4.0"   |
      | OFF=  .0%  | OFF=15.3%   |
        -----------------------------
      C= 60 sec    G= 52.0 sec = 86.7%   Y= 8.0 sec = 13.3%   Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L.S	90% Max Queue
NB Approach								20.2	C	
RT	11/1	.006	.119	96	133	2	.014	15.1	C+	25 ft
LT	11/1	.105	.119	125	170	106	.606	20.3	*C	79 ft
WB Approach								32.2	D+	
LT+TH	12/1	.835	.814	819	828	843	1.018	32.2	*D+	132 ft
EB Approach								1.1	A	
TH+RT	12/1	.348	.814	1283	1283	495	.386	1.1	A	78 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/9
14:15:2

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 2 - WAIPAHU ST & MOKUOLA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	0	0	0	625	484	229	0	78	153	363	[illegible]
WIDTHS	.0	.0	.0	.0	12.0	.0	.0	12.0	.0	.0	12.0	.[illegible]
LANES	0	0	0	0	1	0	0	1	0	0	1	[illegible]
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.0[illegible]
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.[illegible]
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.9[illegible]
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	[illegible]
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YE[illegible]
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.[illegible]
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.[illegible]
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	190[illegible]
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.0[illegible]
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.0[illegible]
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.0[illegible]
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NOR[illegible]
SATURATIONFLOWS	0	0	0	0	1691	0	0	991	0	0	1557	[illegible]

Phasing Parameters

SEQUENCES	11	ALL		
PERMISSIVES	YES	YES	YES	YES
OVERLAPS	YES	YES	YES	YES
CYCLES	60	180	10	
GREENTIMES	25.93	26.07		
YELLOWTIMES	4.00	4.00		
CRITICALS	8	11		
EXCESS	0			

LEADLAGS	NONE	NONE
OFFSET	.00	1[illegible]
PEDTIME	.0	[illegible]

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/96
14:15:31

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 2 - WAIPAHU ST & MOKUOLA ST
Degree of Saturation (v/c) 1.16 Vehicle Delay 33.6@ Level of Service D
@ expect more delay due to extreme v/c's (see EVALUATE)

```
        ---------------------------
Sq 11 | Phase 1    | Phase 2   |
**/** ---------------------------
      |            |           |
  .   |            |           |
 /|\  |            |     <++++|
  |   |            |      ++++|
  |   |            |        v |
North |   (*   *)|****)       |
  |   |    *   * |****        |
      |    *   * |    v       |
      ---------------------------
      | G/C= .432  | G/C= .434 |
      | G=  25.9"  | G=  26.1" |
      | Y+R= 4.0"  | Y+R= 4.0" |
      | OFF=  .0%  | OFF=49.9% |
      ---------------------------
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
NB Approach								11.5	B	
LT+TH+RT	12/1	.374	.466	419	461	323	.701	11.5	*B	146 ft
WB Approach								50.1@	E	
LT+TH	12/1	.693	.468	752	791	1167	1.475	50.1@	E	524 ft
EB Approach								11.4	B	
TH+RT	12/1	.381	.468	688	728	543	.746	11.4	*B	244 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/96
14:17:02

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 2 - WAIPAHU ST & MOKUOLA ST

METROAREA	NONCBD	
LOSTTIME		2.0
LEVELOFSERVICE	C	S
MODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	0	0	0	708	302	337	0	103	118	473	0
WIDTHS	.0	.0	.0	.0	12.0	.0	.0	12.0	.0	.0	12.0	.0
LANES	0	0	0	0	1	0	0	1	0	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	0	0	0	1825	0	0	991	0	0	1585	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	120	10		PEDTIME	.0	0
GREENTIMES	30.62	21.38					
YELLOWTIMES	4.00	4.00					
CRITICALS	8	11					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/96
14:49:16

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

```
Intersection Averages for Int # 8 - PAIWA ST & LUMIAINA ST
     Degree of Saturation (v/c) 1.41  Vehicle Delay  46.0@ Level of Service E+
        @ expect more delay due to extreme v/c's (see EVALUATE)
Sq 45 | Phase 1  | Phase 2  | Phase 3  | Phase 4  | Phase 5  |
**/**
      | G/C= .155 | G/C= .188 | G/C= .099 | G/C= .126 | G/C= .099 |
      | G=   9.3" | G=  11.3" | G=   5.9" | G=   7.5" | G=   5.9" |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=22.1% | OFF=47.6% | OFF=64.2% | OFF=83.4% |
      C= 60 sec   G= 40.0 sec = 66.7%  Y=20.0 sec = 33.3%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								12.5	B	
TH+RT	24/2	.058	.222	747	819	151	.184	12.3	B	50 ft
LT	12/1	.056	.188	275	336	61	.182	13.3	B	42 ft
NB Approach								51.7@	E	
TH+RT	24/2	.340	.222	583	653	947	1.450	57.6@	*E	311 ft
LT	12/1	.203	.188	268	329	294	.894	33.0	*D	201 ft
WB Approach								51.0@	E	
TH+RT	24/2	.074	.325	1064	1118	188	.168	9.4	B+	54 ft
LT	12/1	.680	.325	519	574	1196	2.084	57.5@	*E	681 ft
EB Approach								18.1	C+	
TH+RT	24/2	.106	.132	328	400	252	.630	18.2	*C+	92 ft
LT	12/1	.002	.132	177	233	1	.004	14.6	*B	25 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06,
14:17:

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

```
Intersection Averages for Int #  2 - WAIPAHU ST & MOKUOLA ST
     Degree of Saturation (v/c) 1.22  Vehicle Delay  41.8@ Level of Service
        @ expect more delay due to extreme v/c's (see EVALUATE)
Sq 11 | Phase 1  | Phase 2  |
**/**
      | G/C= .510 | G/C= .356 |
      | G=  30.6" | G=  21.4" |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=57.7% |
      C= 60 sec   G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped=  .0 sec =  .
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Ma Queu
NB Approach								16.8	C+	
LT+TH+RT	12/1	.507	.544	503	539	463	.859	16.8	*C+	178
WB Approach								53.1@	E	
LT+TH	12/1	.593	.390	662	711	1063	1.495	53.1@	E	547
EB Approach								41.3	E+	
TH+RT	12/1	.422	.390	569	618	622	1.006	41.3	*E+	320

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/96
14:20:11

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 3 - WAIPAHU ST & PAIWA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
MODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	300	0	0	5

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	786	409	47	62	397	155	93	201	18	83	241	309
WIDTHS	11.0	12.0	.0	.0	12.0	.0	.0	12.0	.0	.0	12.0	.0
LANES	1	1	0	0	1	0	0	1	0	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1332	1396	0	0	619	0	0	626	0	0	387	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	120	10		PEDTIME	.0	0
GREENTIMES	25.16	86.84					
YELLOWTIMES	4.00	4.00					
CRITICALS	8	11					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/96
14:20:20

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

```
Intersection Averages for Int #   3 - WAIPAHU ST & PAIWA ST
        Degree of Saturation (v/c) 1.83  Vehicle Delay  77.2@ Level of Service F
            @ expect more delay due to extreme v/c's (see EVALUATE)
        ------------------------------
Sq 11  |  Phase 1   |  Phase 2   |
**/**  ------------------------------
       | + + +      |        ^   |
   .   | + + +      |      ++++  |
  /|\  |(+ + +)     |     (++++  |
   |   |   v        |    ^  ++++ |
   |   |       ^    |****    v   |
North  |    (* * *)|****)        |
   |   |     * * *  |****        |
       |     * * *  |   v        |
        ------------------------------
       | G/C= .210 | G/C= .724 |
       | G=  25.2" | G=  86.8" |
       | Y+R= 4.0" | Y+R= 4.0" |
       | OFF=  .0% | OFF=24.3% |
        ------------------------------
       C=120 sec   G=112.0 sec = 93.3%  Y= 8.0 sec =  6.7%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								86.0@	F	
RT	11/1	.461	.226	88	290	512	1.701	86.5@	F	668 ft
LT+TH	12/1	.427	.226	93	305	480	1.519	85.5@	F	626 ft
NB Approach								106.9@	F	
LT+TH+RT	12/1	.610	.226	39	127	329	2.317	106.9@	*F	429 ft
WB Approach								58.3@	E	
LT+TH+RT	12/1	1.000	.740	421	458	646	1.410	58.3@	E	283 ft
EB Approach								67.8@	F	
LT+TH+RT	12/1	1.000	.740	252	286	666	2.329	67.8@	*F	292 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/96
14:23:00

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 3 - WAIPAHU ST & PAIWA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	300	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	693	216	34	60	364	33	64	226	29	54	331	442
WIDTHS	11.0	12.0	.0	.0	12.0	.0	.0	12.0	.0	.0	12.0	.0
LANES	1	1	0	0	1	0	0	1	0	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1332	1665	0	0	1140	0	0	1451	0	0	593	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	16.33	35.67					
YELLOWTIMES	4.00	4.00					
CRITICALS	1	11					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/!
14:23:!

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 3 - WAIPAHU ST & PAIWA ST
Degree of Saturation (v/c) 1.34 Vehicle Delay 36.1@ Level of Service
@ expect more delay due to extreme v/c's (see EVALUATE)

```
Sq 11 | Phase 1  | Phase 2  |
**/** -----------------------
      | * + +    |       -  |
  .   | * + +    |    ++++  |
 /|\  |<* + +>   |   <++++  |
  |   |   v      |   -  ++++|
  |   |          |****  v   |
North |  <+ + +> |****>     |
  |   |    + + + |****      |
      |    + + + |   v      |
      -----------------------
      | G/C= .272 | G/C= .595 |
      | G=  16.3" | G=  35.7" |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=33.9% |
      -----------------------
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec = .(

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								36.7	D	
RT	11/1	.350	.305	353	407	414	1.017	52.5	*E	242 ft
LT+TH	12/1	.194	.305	453	509	263	.517	11.9	B	154 ft
NB Approach								17.3	C+	
LT+TH+RT	12/1	.271	.305	388	443	336	.758	17.3	C+	197 ft
WB Approach								6.4	B+	
LT+TH+RT	12/1	.460	.628	690	716	481	.672	6.4	B+	151 ft
EB Approach								59.3@	E	
LT+TH+RT	12/1	1.000	.628	340	372	870	2.339	59.3@	*E	273 ft

AMFAC WAIPAHU TIAR
2000 BASE CONDITIONS
AM PEAK HOUR

02/06/96
14:53:11

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 4 - PAIWA ST & PAIWA PL

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	72	1001	5	3	0	7	1	485	48	1	0	0
WIDTHS	.0	24.0	.0	.0	12.0	.0	.0	24.0	.0	.0	12.0	.0
LANES	0	2	0	0	1	0	0	2	0	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3459	0	0	1561	0	0	2518	0	0	1381	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	39.78	12.22					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	6					
EXCESS	0						

AMFAC WAIPAHU TIAR
2000 BASE CONDITIONS
AM PEAK HOUR

02/06/96
14:53:22

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 4 - PAIWA ST & PAIWA PL
Degree of Saturation (v/c) .42 Vehicle Delay 2.7 Level of Service A

```
      ------------------------
Sq 11 |  Phase 1  |  Phase 2 |
**/** ------------------------
      | * * *     |        - |
  .   | * * *     |     ++++ |
 /|\  |<* * *>    |          |
  |   |  v        |     **** |
  |   |       -   |     v    |
North |    <+ + +>|          |
  |   |     + + + |++++      |
      |     + + + |  v       |
      ------------------------
      | G/C= .663 | G/C= .204|
      | G= 39.8"  | G= 12.2" |
      | Y+R= 4.0" | Y+R= 4.0"|
      | OFF= .0%  | OFF=73.0%|
      ------------------------
    C= 60 sec   G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped= .0 sec = .0%
```

Lane Group	Width/ Lanes	g/c Reqd	g/c Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								2.8	A	
LT+TH+RT	24/2	.343	.696	2408	2408	1135	.471	2.8	*A	145 ft
NB Approach								2.3	A	
LT+TH+RT	24/2	.250	.696	1753	1753	563	.321	2.3	A	72 ft
WB Approach								11.4	B	
LT+TH+RT	12/1	.015	.237	312	370	10	.027	11.4	B	25 ft
EB Approach								11.3	B	
TH+RT	12/1	.003	.237	271	327	1	.003	11.3	B	25 ft

AMFAC WAIPAHU TIAR
2000 BASE CONDITIONS
PM PEAK HOUR

02/06/96
14:54:43

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 4 - PAIWA ST & PAIWA PL

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	8

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	12	966	3	2	0	4	5	713	8	24	0	36
WIDTHS	.0	24.0	.0	.0	12.0	.0	.0	24.0	.0	.0	12.0	.0
LANES	0	2	0	0	1	0	0	2	0	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3487	0	0	1472	0	0	3256	0	0	1530	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	38.77	13.23					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	6					
EXCESS	0						

AMFAC WAIPAHU TIAR
2000 BASE CONDITIONS
PM PEAK HOUR

02/06/
14:54:

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 4 - PAIWA ST & PAIWA PL
Degree of Saturation (v/c) .39 Vehicle Delay 3.1 Level of Service

```
        -------------------------------
Sq 11 | Phase 1   |  Phase 2    |
**/** -------------------------------
      | * * *     |        -    |
  .   | * * *     |        ++++ |
 /|\  |<* * *>    |             |
  |   |  v        |        **** |
  |   |        -  |++++   v     |
North |   <+ + +> |             |
  |   |    + + +  |++++         |
      |    + + +  |    v        |
      -------------------------------
      | G/C= .646 | G/C= .220 |
      | G= 38.8"  | G= 13.2"  |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF= .0%  | OFF=71.3% |
      -------------------------------
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec = .

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Ma Queue
SB Approach								2.9	A	
LT+TH+RT	24/2	.312	.680	2370	2370	1033	.436	2.9	*A	140 f
NB Approach								2.6	A	
LT+TH+RT	24/2	.255	.680	2213	2213	764	.345	2.6	A	103 f
WB Approach								10.8	B	
LT+TH+RT	12/1	.011	.254	317	374	6	.016	10.8	B	25 f
EB Approach								11.2	B	
LT+TH+RT	12/1	.060	.254	330	388	55	.142	11.2	B	36 f

AMFAC WAIPAHU TIAR
2000 BASE CONDITIONS
AM PEAK HOUR

02/06/96
14:25:48

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 5 4 - PAIWA ST & HAPAPA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	BOTH	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	1006	60	30	0	97	57	483	0	0	0	0
WIDTHS	.0	24.0	.0	.0	12.0	.0	.0	24.0	.0	.0	.0	.0
LANES	0	2	0	0	1	0	0	2	0	0	0	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.96	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	6.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3150	0	0	1001	0	0	3621	0	0	0	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	35.67	16.33					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	5					
EXCESS	0						

AMFAC WAIPAHU TIAR
2000 BASE CONDITIONS
AM PEAK HOUR

02/06/96
14:26:12

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 5 4 - PAIWA ST & HAPAPA ST
Degree of Saturation (v/c) .46 Vehicle Delay 4.6 Level of Service A

```
        ---------------------------
Sq 11 |  Phase 1   |  Phase 2   |
**/** ---------------------------
      |   * *      |       -    |
  .   |   * *      |       **** |
 /|\  |   * *)     |            |
  |   |   v     -  |       **** |
North |            |       v    |
  |   |       * *) |            |
      |       * *  |            |
      |       * *  |            |
      ---------------------------
      | G/C= .595  | G/C= .272  |
      | G= 35.7"   | G= 16.3"   |
      | Y+R= 4.0"  | Y+R= 4.0"  |
      | OFF= .0%   | OFF=66.1%  |
      ---------------------------
C= 60 sec   G= 52.0 sec = 86.7%   Y= 8.0 sec = 13.3%   Ped= .0 sec = .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								4.6	A	
LT+TH	24/2	.371	.628	1978	1978	1122	.567	4.5	*A	176 ft
NB Approach								3.2	A	
TH+RT	24/2	.178	.628	2273	2273	568	.250	3.2	A	89 ft
WB Approach								11.5	B	
LT+TH+RT	12/1	.180	.305	257	306	134	.438	11.5	*B	78 ft

AMFAC WAIPAHU TIAR
2000 BASE CONDITIONS
PM PEAK HOUR

02/06/96
14:27:31

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 4 - PAIWA ST & HAPAPA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	BOTH	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	921	48	20	0	36	30	719	0	0	0	0
WIDTHS	.0	24.0	.0	.0	12.0	.0	.0	24.0	.0	.0	.0	.0
LANES	0	2	0	0	1	0	0	2	0	0	0	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	2969	0	0	1003	0	0	3662	0	0	0	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	40.30	11.70					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	6					
EXCESS	0						

AMFAC WAIPAHU TIAR
2000 BASE CONDITIONS
PM PEAK HOUR

02/06/
14:28:

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 4 - PAIWA ST & HAPAPA ST
Degree of Saturation (v/c) .40 Vehicle Delay 2.8 Level of Service

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        -------------------------------
Sq 11 | Phase 1    | Phase 2     |
**/** -------------------------------
      |   * *      |         -   |
  /|\ |   * *      |       ++++  |
   |  |   * *)     |             |
   |  |   v        |       ****  |
   |  |       -    |        v    |
North |       + +) |             |
   |  |       + +  |             |
      |       + +  |             |
        -------------------------------
      | G/C= .672  | G/C= .195   |
      | G=  40.3"  | G=  11.7"   |
      | Y+R= 4.0"  | Y+R= 4.0"   |
      | OFF=  .0%  | OFF=73.8%   |
        -------------------------------
```

C= 60 sec   G= 52.0 sec = 86.7%   Y= 8.0 sec = 13.3%   Ped= .0 sec = .

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								2.7	A	
LT+TH	24/2	.360	.705	2093	2093	1020	.487	2.7	*A	127 f
NB Approach								2.2	A	
TH+RT	24/2	.235	.705	2582	2582	789	.306	2.2	A	98 f
WB Approach								12.4	B	
LT+TH+RT	12/1	.094	.228	180	229	59	.258	12.4	B	38 f

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/96
14:29:47

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 5 - PAIWA ST & HIAPO ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	BOTH	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	83	0	86

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	48	844	83	141	32	84	28	387	86	130	68	79
WIDTHS	.0	24.0	.0	10.0	12.0	.0	.0	24.0	.0	10.0	12.0	.0
LANES	0	2	0	1	1	0	0	2	0	1	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	2993	0	1050	1288	0	0	2202	0	1312	1469	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	38.14	13.86					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	11					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/96
14:29:69

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 5 - PAIWA ST & HIAPO ST
Degree of Saturation (v/c) .43 Vehicle Delay 4.9 Level of Service A

```
       --------------------------------
Sq 11 | Phase 1      | Phase 2      |
**/** --------------------------------
      | * * *        |           -  |
  .   | * * *        |        ++++  |
 /|\  |<* * *>       |       <++++  |
  |   |   v          |    -   ++++  |
  |   |        -     |****     v    |
North |      <+ + +> |****>         |
  |   |       + + +  |++++          |
      |       + + +  |  v           |
       --------------------------------
      | G/C= .636    | G/C= .231    |
      | G=  38.1"    | G=  13.9"    |
      | Y+R= 4.0"    | Y+R= 4.0"    |
      | OFF=  .0%    | OFF=70.2%    |
       --------------------------------
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								3.4	A	
LT+TH+RT	24/2	.369	.669	2002	2002	1026	.512	3.4	*A	143 ft
NB Approach								2.9	A	
LT+TH+RT	24/2	.268	.669	1473	1473	527	.358	2.9	A	74 ft
WB Approach								11.7	B	
RT	10/1	.093	.264	227	277	61	.220	11.2	B	38 ft
LT+TH	12/1	.132	.264	286	340	122	.359	11.9	B	76 ft
EB Approach								11.8	B	
RT	10/1	.060	.264	292	347	46	.133	10.9	B	29 ft
LT+TH	12/1	.142	.264	331	388	155	.399	12.1	*B	96 ft

ANFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/96
14:31:26

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 5 - PAIWA ST & HIAPO ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	BOTH	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	72	0	86

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	177	827	99	72	28	50	40	626	86	114	11	91
WIDTHS	.0	24.0	.0	10.0	12.0	.0	.0	24.0	.0	10.0	12.0	.0
LANES	0	2	0	1	1	0	0	2	0	1	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	2540	0	1050	1459	0	0	2231	0	1312	1370	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	42.86	9.15					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	6					
EXCESS	0						

ANFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/9
14:31:2

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 5 - PAIWA ST & HIAPO ST
Degree of Saturation (v/c) .53 Vehicle Delay 3.6 Level of Service

```
         ---------------------------
Sq 11  | Phase 1    | Phase 2     |
**/**   ---------------------------
       | * * *      |       ^     |
   .   | * * *      |        ****|
 /|\   |(* * *)     |       (****|
  |    |   v        |     ^  ****|
  |    |       ^    |++++    v    |
North  |   (+ + +)|++++)          |
  |    |    + + +   |++++         |
       |    + + +   |   v         |
       ---------------------------
       | G/C= .714 | G/C= .152 |
       | G=  42.9" | G=   9.1" |
       | Y+R= 4.0" | Y+R= 4.0" |
       | OFF=  .0% | OFF=78.1% |
       ---------------------------
       C= 60 sec   G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped= .0 sec = .
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								2.7	A	
LT+TH+RT	24/2	.469	.748	1899	1899	1161	.611	2.7	*A	124 f
NB Approach								2.1	A	
LT+TH+RT	24/2	.377	.748	1668	1668	791	.474	2.1	A	84 f
WB Approach								13.8	B	
RT	10/1	.003	.186	147	192	1	.005	12.9	B	25 f
LT+TH	12/1	.086	.186	215	271	82	.303	13.8	*B	56 f
EB Approach								14.3	B	
RT	10/1	.042	.186	191	244	29	.119	13.1	B	25 f
LT+TH	12/1	.113	.186	200	255	108	.424	14.6	B	74 f

AMFAC WAIPAHU TIAR
2000 BASE CONDITIONS
AM PEAK HOUR

02/06/96
14:33:35

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 6 - PAIWA ST & H-1 EB RAMPS

METROAREA		NONCBD
LOSTTIME		2.0
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	-2.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	599	451	0	0	0	338	271	0	205	6	420
WIDTHS	.0	24.0	12.0	.0	.0	.0	.0	24.0	.0	12.0	12.0	.0
LANES	0	2	1	0	0	0	0	2	0	1	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3688	1770	0	0	0	0	3332	0	1554	1559	0

Phasing Parameters

SEQUENCES	21	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	17.39	11.80	18.81				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	3	8	11				
EXCESS	0						

AMFAC WAIPAHU TIAR
2000 BASE CONDITIONS
AM PEAK HOUR

02/06/96
14:33:45

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 6 - PAIWA ST & H-1 EB RAMPS
Degree of Saturation (v/c) .65 Vehicle Delay 14.5 Level of Service B

```
Sq 21 | Phase 1     | Phase 2     | Phase 3     |
**/** |             |             |             |
      | + *         | +           |             |
  .   | + *         | +           |             |
 /|\  | + *)        | +           |         -   |
  |   | v           | v           |             |
  |   |             |        -    |****         |
North |             |        * *) |****)        |
  |   |             |        * *  |++++         |
      |             |        * *  |   v         |
      | G/C= .290   | G/C= .197   | G/C= .314   |
      | G= 17.4"    | G= 11.8"    | G= 18.8"    |
      | Y+R= 4.0"   | Y+R= 4.0"   | Y+R= 4.0"   |
      | OFF= .0%    | OFF=35.6%   | OFF=62.0%   |
```

C= 60 sec G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								10.5	B	
TH	24/2	.192	.586	2163	2163	631	.292	4.0	A	110 ft
LT	12/1	.301	.323	516	572	475	.830	19.1	*C+	271 ft
NB Approach								19.9	C+	
TH+RT	24/2	.214	.230	696	766	641	.837	19.9	*C+	208 ft
EB Approach								15.9	C+	
RT	12/1	.176	.347	486	539	216	.401	9.9	B+	119 ft
LT+TH	12/1	.323	.347	488	641	448	.828	18.8	*C+	247 ft

AMFAC WAIPAHU TIAR
2000 + BASE
PM PEAK HOUR

02/06/96
14:35:30

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 6 - PAIWA ST & H-1 EB RAMPS

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	-2.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	870	334	0	0	0	555	431	0	241	6	585
WIDTHS	.0	24.0	12.0	.0	.0	.0	.0	24.0	.0	12.0	12.0	.0
LANES	0	2	1	0	0	0	0	2	0	1	1	0
UTILIZATIONS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3688	1770	0	0	0	0	3327	0	1554	1568	0

Phasing Parameters

SEQUENCES	21	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	11.14	13.83	23.03				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	3	8	11				
EXCESS	0						

AMFAC WAIPAHU TIAR
2000 + BASE
PM PEAK HOUR

02/06/9
14:35:4

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 6 - PAIWA ST & H-1 EB RAMPS
Degree of Saturation (v/c) .76 Vehicle Delay 20.8@ Level of Service
@ expect more delay due to extreme v/c's (see EVALUATE)

```
Sq 21 | Phase 1    | Phase 2    | Phase 3    |
**/** -----------------------------------------
      | + *        | +          |            |
  .   | + *        | +          |            |
 /|\  | + *)       | +          |            |
  |   | v          | v          |  ^         |
  |   |            |      ^     |****        |
North |            |      * *)  |****)       |
  |   |            |      * *   |++++        |
      |            |      * *   |  v         |
      -----------------------------------------
      | G/C= .186  | G/C= .231  | G/C= .384  |
      | G=  11.1"  | G=  13.8"  | G=  23.0"  |
      | Y+R= 4.0"  | Y+R= 4.0"  | Y+R= 4.0"  |
      | OFF=  .0%  | OFF=26.2%  | OFF=54.9%  |
```

C= 60 sec G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .(

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Ma: Queue
SB Approach								10.8	B	
TH	24/2	.243	.516	1901	1903	827	.435	6.0	B+	169 f(
LT	12/1	.214	.219	326	387	317	.819	23.4	*C	209 f
NB Approach								37.6@	D	
TH+RT	24/2	.299	.264	813	878	937	1.067	37.6@	*D	291 f
EB Approach								15.4	C+	
RT	12/1	.185	.417	603	649	229	.353	7.9	B+	113 f
LT+TH	12/1	.392	.417	604	650	561	.863	18.4	*C+	276 f·

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AMFAC WAIPAHU TIAR
2000 BASE CONDITIONS                                       02/06/96
AM PEAK HOUR                                               14:37:15

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

   Intersection Parameters for Int #   7 - PAIWA ST & H-1 WB RAMPS

METROAREA              NONCBD
LOSTTIME                  2.0
LEVELOFSERVICE          C     S
NODELOCATION            0     0

   Approach Parameters

APPLABELS                 SB          WB          NB          EB
GRADES                  -2.0        -2.0         2.0          .0
PEDLEVELS                LOW         LOW         LOW         LOW
PARKINGSIDES            NONE        NONE        NONE        NONE
PARKVOLUMES               20          20          20          20
BUSVOLUMES                 5           0           5           0
RIGHTTURNONREDS            0           0           0           0

   Movement Parameters

MOVLABELS           RT   TH   LT     RT   TH   LT     RT   TH   LT     RT   TH   LT
VOLUMES            510  962    0     69    6  185      0  465  230      0    0    0
WIDTHS              .0 24.0   .0     .0 12.0 12.0     .0 24.0 12.0     .0   .0   .0
LANES                0    2    0      0    1    1      0    2    1      0    0    0
UTILIZATIONS      1.00 1.00 1.00   1.00 1.00 1.00   1.00 1.00 1.00   1.00 1.00 1.00
TRUCKPERCENTS      2.0  2.0  2.0    2.0  2.0  2.0    2.0  2.0  2.0    2.0  2.0  2.0
PEAKHOURFACTORS    .95  .95  .95    .95  .95  .95    .95  .95  .95    .95  .95  .95
ARRIVALTYPES         3    3    3      3    3    3      3    3    3      3    3    3
ACTUATIONS         YES  YES  YES    YES  YES  YES    YES  YES  YES    YES  YES  YES
REQCLEARANCES      4.0  4.0  4.0    4.0  4.0  4.0    4.0  4.0  4.0    4.0  4.0  4.0
MINIMUMS           5.0  5.0  5.0    5.0  5.0  5.0    5.0  5.0  5.0    5.0  5.0  5.0
IDEALSATFLOWS     1900 1900 1900   1900 1900 1900   1900 1900 1900   1900 1900 1900
FACTORS           1.00 1.00 1.00   1.00 1.00 1.00   1.00 1.00 1.00   1.00 1.00 1.00
DELAYFACTORS      1.00 1.00 1.00   1.00 1.00 1.00   1.00 1.00 1.00   1.00 1.00 1.00
NSTOPFACTORS      1.00 1.00 1.00   1.00 1.00 1.00   1.00 1.00 1.00   1.00 1.00 1.00
GROUPTYPES        FFLW NORM NORM   FFLW NORM OOPT   NORM NORM NORM   NORM NORM NORM
SATURATIONFLOWS      0 3725    0      0 1573 1554      0 3651 1752      0    0    0

   Phasing Parameters

SEQUENCES           31    ALL
PERMISSIVES         NO     NO     NO     NO      LEADLAGS      NONE   NONE
OVERLAPS           YES    YES    YES    YES      OFFSET         .00      1
CYCLES              60    180     10             PEDTIME         .0      0
GREENTIMES       14.15  24.95   8.91
YELLOWTIMES       4.00   4.00   4.00
CRITICALS            9      2      5
EXCESS               0
```

```
AMFAC WAIPAHU TIAR
2000 BASE CONDITIONS                                       02/06/9
AM PEAK HOUR                                               14:37:2:

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # `Y - PAIWA ST & H-1 WB RAMPS
     Degree of Saturation (v/c)  .46  Vehicle Delay   7.9  Level of Service B-

       --------------------------------------------
Sq 31  |  Phase 1   |  Phase 2   |  Phase 3   |
**/**  --------------------------------------------
       |            |     *      |            |
  *    |            |     *      |            |
 /|\   |            |     *      |     <****|
  |    |            |     v      |      ****|
  |    |       *    |       *    |      v     |
North  |    <* +    |       +    |            |
  |    |     * +    |       +    |            |
       |     * +    |       +    |            |
       --------------------------------------------
       | G/C= .236  | G/C= .416  | G/C= .148  |
       | G=  14.1"  | G=  24.9"  | G=   8.9"  |
       | Y+R= 4.0"  | Y+R= 4.0"  | Y+R= 4.0"  |
       | OFF=  .0%  | OFF=30.2%  | OFF=78.5%  |
       --------------------------------------------
       C= 60 sec    G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped=  .0 sec =  .0'

---------------------------------------------------------------------------------
| Lane  |Width/|    g/C     | Service Rate| Adj  |      |  HCM  | L |90% Max
| Group | Lanes| Reqd  Used | @C (vph) @E |Volume| v/c  | Delay | S | Queue
---------------------------------------------------------------------------------
SB Approach                                                    8.5   B+
=================================================================================
|  TH   | 24/2 | .288 | .449 | 1653 | 1673 | 1013 | .605 |   8.5 |*B+| 235 ft
---------------------------------------------------------------------------------
NB Approach                                                    5.2   B+
=================================================================================
|  TH   | 24/2 | .155 | .752 | 2744 | 2744 |  489 | .178 |   1.4 | A |  51 ft
|  LT   | 12/1 | .173 | .269 |  412 |  471 |  242 | .514 |  12.8 |*B | 149 ft|
---------------------------------------------------------------------------------
WB Approach                                                   14.2   B
=================================================================================
|  TH   | 12/1-| .096 | .182 |  228 |  286 |  103 | .360 |  14.2 |*B |  71 ft|
|  LT   | 12/1+| .093 | .182 |  225 |  283 |   98 | .346 |  14.2 | B |  68 ft|
---------------------------------------------------------------------------------
```

AMFAC WAIPAHU TIAR
2000 BASE CONDITIONS
PM PEAK HOUR

02/06/96
14:38:40

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 7 - PAIWA ST & H-1 WB RAMPS

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	-2.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	566	844	0	259	6	355	0	792	185	0	0	0
WIDTHS	.0	24.0	.0	.0	12.0	12.0	.0	24.0	12.0	.0	.0	.0
LANES	0	2	0	0	1	1	0	2	1	0	0	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	FFLW	NORM	NORM	FFLW	NORM	DOPT	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3725	0	0	1564	1554	0	3651	1752	0	0	0

Phasing Parameters

SEQUENCES	31	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	11.91	22.63	13.46				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	9	2	5				
EXCESS	0						

AMFAC WAIPAHU TIAR
2000 BASE CONDITIONS
PM PEAK HOUR

02/06/
14:39:

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 7 - PAIWA ST & H-1 WB RAMPS
Degree of Saturation (v/c) .47 Vehicle Delay 7.8 Level of Service

```
Sq 31 | Phase 1    | Phase 2    | Phase 3    |
**/** ------------------------------------------
      |            |   *        |            |
  .   |            |   *        |            |
 /|\  |            |   *        |      <****|
  |   |      -     |   v    -   |       ****|
  |   |            |            |       v    |
North |    <* *    |        +   |            |
  |   |     * *    |        +   |            |
      |     * *    |        +   |            |
      ------------------------------------------
      | G/C= .199  | G/C= .377  | G/C= .224  |
      | G=  11.9"  | G=  22.6"  | G=  13.5"  |
      | Y+R= 4.0"  | Y+R= 4.0"  | Y+R= 4.0"  |
      | OFF=  .0%  | OFF=26.5%  | OFF=70.9%  |
      ------------------------------------------
      C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped= .0 sec =
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph) @E		Adj Volume	v/c	HCM Delay	L S	90% Ma Queu
SB Approach								9.3	B+	
TH	24/2	.256	.411	1498	1529	888	.581	9.3	*B+	221
NB Approach								4.7	A	
TH	24/2	.247	.676	2467	2467	834	.338	2.7	A	114
LT	12/1	.145	.232	345	406	195	.480	13.6	*B	126
WB Approach								12.9	B	
TH	12/1-	.161	.258	345	403	195	.484	12.9	*B	122
LT	12/1+	.155	.258	342	400	185	.463	12.8	B	116

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/96
14:47:26

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 8 - PAIWA ST & LUMIAINA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	.0	2.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	8	195	30	32	75	961	360	87	119	357	87	9
WIDTHS	.0	24.0	12.0	.0	24.0	12.0	.0	24.0	12.0	.0	24.0	12.0
LANES	0	2	1	0	2	1	0	2	1	0	2	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3691	740	0	3416	1770	0	2931	939	0	2962	1770

Phasing Parameters

SEQUENCES	14	ALL						
PERMISSIVES	NO	NO	NO	NO		LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO		OFFSET	.00	1
CYCLES	60	120	10			PEDTIME	.0	0
GREENTIMES	8.17	31.82	8.01					
YELLOWTIMES	4.00	4.00	4.00					
CRITICALS	8	6	11					
EXCESS	0							

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/9(
14:47:36

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

```
Intersection Averages for Int #   8 - PAIWA ST & LUMIAINA ST
     Degree of Saturation (v/c)  .87  Vehicle Delay  31.6  Level of Service D+

        ----------------------------------------------
Sq 14   |  Phase 1   |  Phase 2   |  Phase 3   |
**/**   ----------------------------------------------
        | + + +      |            |        -   |
  .     | + + +      |            |      ++++  |
 /|\    |(+ + +)     |            |     <++++  |
  |     |   v        |    -   ****|            |
  |     |        -   |****   v    |            |
North   |     (+ * *)|            |****>       |
  |     |      + * * |            |****        |
        |      + * * |            |   v        |
        ----------------------------------------------
        | G/C= .136  | G/C= .530  | G/C= .133  |
        | G=   8.2"  | G=  31.8"  | G=   8.0"  |
        | Y+R= 4.0"  | Y+R= 4.0"  | Y+R= 4.0"  |
        | OFF=  .0%  | OFF=20.3%  | OFF=80.0%  |
        ----------------------------------------------
        C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								14.3	B	
TH+RT	24/2	.077	.170	549	626	213	.340	14.3	B	75 ft
LT	12/1	.000	.170	87	118	32	.256	14.2	B	25 ft
NB Approach								34.9	D	
TH+RT	24/2	.185	.170	424	497	471	.948	36.1	*D	165 ft
LT	12/1	.182	.170	115	153	125	.786	30.3	D+	88 ft
WB Approach								32.0	D+	
TH+RT	24/2	.049	.167	494	570	113	.198	13.9	B	40 ft
LT	12/1	.584	.564	972	997	1012	1.015	34.0	*D	372 ft
EB Approach								35.6	D	
TH+RT	24/2	.183	.167	421	494	468	.947	36.2	*D	164 ft
LT	12/1	.013	.564	972	997	9	.009	3.7	A	25 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/06/96
14:49:05

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 8 - PAIWA ST & LUMIAINA ST

METROAREA	NONCBD	
LOSTTIME		2.0
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	.0	2.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	5	139	58	48	130	1136	710	190	279	177	63	1
WIDTHS	.0	24.0	12.0	.0	24.0	12.0	.0	24.0	12.0	.0	24.0	12.0
LANES	0	2	1	0	2	1	0	2	1	0	2	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3695	1787	0	3443	1770	0	2945	1752	0	3021	1770

Phasing Parameters

SEQUENCES	45								
PERMISSIVES	NO	NO	NO	NO			LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO			OFFSET	.00	1
CYCLES	60	120	10				PEDTIME	.0	0
GREENTIMES	9.28	11.30	5.94	7.54	5.94				
YELLOWTIMES	4.00	4.00	4.00	4.00	4.00				
CRITICALS	9	8	12	6	11				
EXCESS	0								

ATA

APPENDIX B

• YEAR 2000 WITH PHASE I LOS CALCULATIONS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
14:36:35

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 1 - WAIPAHU ST & WAIPAHU DEPOT RD

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	3.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	109	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	0	0	0	349	291	109	0	73	120	433	0
WIDTHS	.0	.0	.0	.0	12.0	.0	11.0	.0	11.0	.0	12.0	.0
LANES	0	0	0	0	1	0	1	0	1	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	NO	NO
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	0	0	0	1825	0	1172	0	1465	0	1580	0

Phasing Parameters

SEQUENCES	17	ALL		
PERMISSIVES	YES	YES	YES	YES
OVERLAPS	NO	NO	NO	NO
CYCLES	60	180	10	
GREENTIMES	5.07	26.32	26.61	
YELLOWTIMES	4.00	4.00	4.00	
CRITICALS	9	5	11	
EXCESS	0			

LEADLAGS	NONE	NONE
OFFSET	.00	1
PEDTIME	.0	0

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
14:36:40

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 1 - WAIPAHU ST & WAIPAHU DEPOT RD
Degree of Saturation (v/c) .88 Vehicle Delay 23.6 Level of Service C

```
       --------------------------------------
Sq 17 ¦  Phase 1  ¦  Phase 2  ¦  Phase 3  ¦
**/** --------------------------------------
  .   ¦           ¦           ¦           ¦
 /|\  ¦           ¦    <****  ¦           ¦
  |   ¦           ¦     ****  ¦           ¦
  |   ¦           ¦      v    ¦           ¦
North ¦   <*   +> ¦           ¦ ****>     ¦
  |   ¦    *   +  ¦           ¦ ****      ¦
      ¦    *   +  ¦           ¦    v      ¦
      --------------------------------------
      ¦ G/C= .072 ¦ G/C= .376 ¦ G/C= .380 ¦
      ¦ G=   5.1" ¦ G=  26.3" ¦ G=  26.6" ¦
      ¦ Y+R= 4.0" ¦ Y+R= 4.0" ¦ Y+R= 4.0" ¦
      ¦ OFF=  .0% ¦ OFF=13.0% ¦ OFF=56.3% ¦
      --------------------------------------
```

C= 70 sec G= 58.0 sec = 82.9% Y=12.0 sec = 17.1% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph) @E		Adj Volume	v/c	HCM Delay	L S	90% Max Queue
NB Approach								21.8	C	
RT	11/1	.004	.101	71	108	1	.008	18.3	C+	25 ft
LT	11/1	.088	.101	93	139	77	.520	21.9	*C	68 ft
WB Approach								23.8	C	
LT+TH	12/1	.401	.405	682	739	673	.911	23.8	*C	394 ft
EB Approach								23.8	C	
TH+RT	12/1	.405	.409	590	646	582	.901	23.8	*C	339 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
14:38:38

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 1 - WAIPAHU ST & WAIPAHU DEPOT ST

METROAREA	NONCBD	
LOSTTIME		2.0
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	3.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	147	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	0	0	0	618	210	162	0	101	108	369	0
WIDTHS	.0	.0	.0	.0	12.0	.0	11.0	.0	11.0	.0	12.0	.0
LANES	0	0	0	0	1	0	1	0	1	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	NO	NO
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	0	0	0	973	0	1172	0	1465	0	1577	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	5.35	66.65					
YELLOWTIMES	4.00	4.00					
CRITICALS	9	5					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
14:38:43

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 1 - WAIPAHU ST & WAIPAHU DEPOT ST
Degree of Saturation (v/c) .79 Vehicle Delay 26.7 Level of Service D+

```
      -----------------------------
Sq 11 |   Phase 1    |   Phase 2    |
**/** -----------------------------
      |              |              |
 /|\  |              |         <****|
  |   |              |          ****|
North |    <*     +>|++++>     v    |
  |   |     *     + |++++           |
      |     *     + |  v            |
      -----------------------------
      | G/C= .067   | G/C= .833    |
      | G=   5.3"   | G=  66.7"    |
      | Y+R= 4.0"   | Y+R= 4.0"    |
      | OFF=   .0%  | OFF=11.7%    |
      -----------------------------
      C= 80 sec   G= 72.0 sec = 90.0%  Y= 8.0 sec = 10.0%  Ped=  .0 sec =  -.0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
NB Approach								37.5	D	
RT	11/1	.044	.092	53	97	16	.148	21.7	C	25 ft
LT	11/1	.123	.092	69	124	106	.785	39.9	*D	108 ft
WB Approach								40.0	D	
LT+TH	12/1	.900	.858	827	835	872	1.044	40.0	*D	139 ft
EB Approach								.8	A	
TH+RT	12/1	.365	.858	1353	1353	502	.371	.8	A	80 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 SCENARIO A
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
12:37:23

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 2 - WAIPAHU ST & MOKUOLA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	5
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	175	115	11	11	484	371	207	33	83	156	312	79
WIDTHS	12.0	12.0	.0	.0	12.0	.0	~~12.0~~	12.0	.0	.0	12.0	12.0
LANES	1	1	0	0	1	0	~~1~~	1	0	0	1	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1539	1811	0	0	585	0	1219	1264	0	0	1720	312

Phasing Parameters

SEQUENCES	11	ALL						
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	10.61	41.39					
YELLOWTIMES	4.00	4.00					
CRITICALS	7	5					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 SCENARIO A
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
12:37:32

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 2 - WAIPAHU ST & MOKUOLA ST
Degree of Saturation (v/c) 1.21 Vehicle Delay 30.10 Level of Service D+
@ expect more delay due to extreme v/c's (see EVALUATE)

```
          ---------------------------
Sq 11 |  Phase 1  |  Phase 2  |
**/** ---------------------------
      | + + +     |        -  |
      | + + +     |      **** |
 /|\  |<+ + +>    |     <**** |
  |   |   v       |    - **** |
  |   |       -   |++++   v   |
North |   <+ + +>|++++>       |
  |   |     + + + |++++       |
      |     + + + |  v        |
      ---------------------------
      | G/C= .177 | G/C= .690 |
      | G=  10.6" | G=  41.4" |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=24.4% |
      ---------------------------
C= 60 sec   G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped= .0 sec = .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								14.6	B	
RT	12/1	.156	.210	265	323	184	.570	15.5	C+	123 ft
LT+TH	12/1	.103	.210	319	381	133	.349	13.3	B	89 ft
NB Approach								24.7	C	
RT	12/1	.223	.210	203	256	218	.852	30.5	*D+	145 ft
LT+TH	12/1	.135	.210	212	266	122	.459	14.3	B	81 ft
WB Approach								55.00	E	
LT+TH+RT	12/1	1.000	.723	396	423	912	2.156	55.00	*E	213 ft
EB Approach								2.2	A	
TH+RT	12/1	.319	.723	1244	1244	492	.395	2.2	A	115 ft
LT	12/1	.187	.723	198	225	83	.369	2.5	A	25 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
12:39:57

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 2 - WAIPAHU ST & MOKUOLA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	200	66	15	14	536	248	281	58	106	125	464	63
WIDTHS	12.0	12.0	.0	.0	12.0	.0	~~12.0~~	12.0	.0	.0	12.0	11.0
LANES	1	1	0	0	1	0	~~1~~	1	0	0	1	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1539	1727	0	0	537	0	1219	1461	0	0	1758	286

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	13.01	38.99					
YELLOWTIMES	4.00	4.00					
CRITICALS	7	5					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/9
12:40:0

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 2 - WAIPAHU ST & MOKUOLA ST
Degree of Saturation (v/c) 1.21 Vehicle Delay 31.2@ Level of Service D
@ expect more delay due to extreme v/c's (see EVALUATE)

```
Sq 11 | Phase 1  | Phase 2  |
**/** ----------------------
      | + + +    |     -    |
  .   | + + +    |     ****|
 /|\  |(+ + +)   |    (****|
  |   |   v      |  -  ****|
  |   |      -   |++++  v  |
North |  (+ + ^)|++++)    |
  |   |    + + ^ |++++     |
      |    + + ^ |  v      |
      ----------------------
      | G/C= .217 | G/C= .650 |
      | G=  13.0" | G=  39.0" |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=28.4% |
      ----------------------
      C= 60 sec   G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped= .0 sec = .(
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								13.2	B	
RT	12/1	.174	.250	327	385	211	.548	13.9	B	133 ft
LT+TH	12/1	.075	.250	372	432	85	.197	11.5	B	54 ft
NB Approach								34.3	D	
RT	12/1	.287	.250	252	305	296	.970	46.7	*E+	187 ft
LT+TH	12/1	.156	.250	309	366	173	.473	13.1	B	109 ft
WB Approach								58.5@	E	
LT+TH+RT	12/1	1.000	.683	338	367	840	2.289	58.5@	*E	224 ft
EB Approach								3.3	A	
TH+RT	12/1	.381	.683	1196	1201	620	.516	3.3	A	166 f'
LT	11/1	.000	.683	160	195	66	.338	2.9	A	25 f'

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
14:23:38

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 3 - WAIPAHU ST & PAIWA ST

METROAREA		NONCBD
LOSTTIME		2.0
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	156	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	513	407	45	65	484	371	93	212	30	95	252	223
WIDTHS	11.0	12.0	.0	.0	12.0	.0	.0	12.0	.0	.0	12.0	.0
LANES	1	1	0	0	1	0	0	1	0	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1332	1264	0	0	546	0	0	374	0	0	332	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	35.62	136.38					
YELLOWTIMES	4.00	4.00					
CRITICALS	8	5					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
14:23:42

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 3 - WAIPAHU ST & PAIWA ST
Degree of Saturation (v/c) 2.38 Vehicle Delay 88.8@ Level of Service F
@ expect more delay due to extreme v/c's (see EVALUATE)

```
         -------------------------------
Sq 11  ¦   Phase 1   ¦   Phase 2    ¦
**/**  -------------------------------
       ¦ + + +       ¦              ¦
       ¦ + + +       ¦         **** ¦
 /|\   ¦<+ + +>      ¦        <**** ¦
  |    ¦  v          ¦         **** ¦
  |    ¦       ^     ¦++++    v     ¦
North  ¦   <* * *>   ¦++++>         ¦
  |    ¦    * * *    ¦++++          ¦
       ¦    * * *    ¦  v           ¦
       -------------------------------
       ¦ G/C= .198   ¦ G/C= .758    ¦
       ¦ G=  35.6"   ¦ G= 136.4"    ¦
       ¦ Y+R= 4.0"   ¦ Y+R= 4.0"    ¦
       ¦ OFF=  .0%   ¦ OFF=22.0%    ¦
       -------------------------------
       C=180 sec  G=172.0 sec = 95.6%  Y= 8.0 sec = 4.4%  Ped= .0 sec = .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								105.0@	F	
RT	11/1	.459	.209	1	239	376	1.353	104.3@	F	752 ft
LT+TH	12/1	.513	.209	1	226	475	1.799	105.5@	F	951 ft
NB Approach								145.7@	F	
LT+TH+RT	12/1	.994	.209	1	56	353	4.526	145.7@	*F	706 ft
WB Approach								63.2@	F	
LT+TH+RT	12/1	1.000	.769	377	420	968	2.305	63.2@	*F	566 ft
EB Approach								73.8@	F	
LT+TH+RT	12/1	1.000	.769	218	255	600	2.353	73.8@	F	351 ft

AMFAC - WAIPAHU TRAFFIC STUDY 02/21/96
2000 - SCENARIO A 14:27:30
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 3 - WAIPAHU ST & PAIWA ST

METROAREA		NONCBD
LOSTTIME		2.0
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	235	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	455	226	37	57	376	33	64	221	43	72	356	341
WIDTHS	11.0	12.0	.0	.0	12.0	.0	.0	12.0	.0	.0	12.0	.0
LANES	1	1	0	0	1	0	0	1	0	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1332	1632	0	0	1150	0	0	1351	0	0	666	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	15.08	36.92					
YELLOWTIMES	4.00	4.00					
CRITICALS	8	11					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY 02/21/96
2000 - SCENARIO A 14:27:42
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

```
Intersection Averages for Int #   3 - WAIPAHU ST & PAIWA ST
     Degree of Saturation (v/c) 1.14  Vehicle Delay  30.3@ Level of Service D
       @ expect more delay due to extreme v/c's (see EVALUATE)
       ---------------------------
Sq 11 | Phase 1  |  Phase 2  |
**/** ---------------------------
      | + + +    |       ..  |
      | + + +    |      ++++|
 /|\  |<+ + +>   |     <++++|
  |   |   v      |    ^ ++++|
  |   |       ^  |****   v   |
North |    <* * *>|****>      |
  |   |     * * *|****       |
      |     * * *|   v       |
       ---------------------------
      | G/C= .251 | G/C= .615 |
      | G=  15.1" | G=  36.9" |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=31.8% |
       ---------------------------
      C= 60 sec   G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped= .0 sec = .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								13.8	B	
RT	11/1	.216	.285	325	379	232	.612	14.1	B	140 ft
LT+TH	12/1	.206	.285	407	464	277	.597	13.5	B	167 ft
NB Approach								29.3	D+	
LT+TH+RT	12/1	.296	.285	330	385	345	.896	29.3	*D+	208 ft
WB Approach								5.7	B+	
LT+TH+RT	12/1	.464	.649	722	746	491	.658	5.7	B+	145 ft
EB Approach								56.1@	E	
LT+TH+RT	12/1	1.000	.649	402	432	810	1.875	56.1@	*E	240 ft

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS [illegible]

Major Street: PAIWA ST
Minor Street: PAIWA PL
Scenario: YEAR 2000 - SCENARIO A
Peak Hour: AM

Print Date: [illegible]
[illegible]: [illegible]
File Name: [illegible]
Intersection: [illegible]

Peak Hour Factor: 1.00

---------MAJOR STREET---------
Num of Lanes - V2: 2
Excl LT - V1 (Y/N): N
Excl RT - V3 (Y/N): N
Stop/Yield - V3 (Y/N): N
Grade - V1,V2,V3: 0

Num of Lanes - V5: 2
Excl LT - V4 (Y/N): N
Excl RT - V6 (Y/N): N
Stop/Yield - V6 (Y/N): N
Grade - V4,V5,V6: 0

---------MINOR STREET---------
Num of Lanes - V8: 1
Grade - V7,V8,V9: 0
Shared Lane-V7,8,9: 3
(0=N,1=LT,2=TR,3=LTR)

Num of Lanes - V11: 1
Grade - V10,V11,V12: 0
Shared Lane-V10,11,12: 0
(0=N,1=LT,2=TR,3=LTR)

V12 V11 V10

V1 [illegible] ----- ---- [illegible] V4
V2 539 ------- ---- 1009 V5
V3 1 ----- ---- [illegible] V6

NORTH ---

MAJOR STREET
PAIWA ST

V7 V8 V9

MINOR STREET - PAIWA PL

VOLUME ADJUSTMENTS												
MOVEMENT NO.	1	2	3	4	5	6	7	8	9	10	11	12
HOURLY FLOW RATE, v(vph)	[illegible]	539	1	5	1009	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
VOLUME, v (pcph)	0	539	1	[illegible]	1009	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

STEP 1: RT FROM MINOR STREET

Conflicting Flows:	Vc9 = 1/2 V3 + V2 =	[illegible] vph	Vc12 = 1/2 V6 + V5 =	[illegible] vph
Potential Capacity:	Cp,9 =	[illegible] pcph	Cp,12 =	[illegible] pcph
Movement Capacity:	Cm,9=Cp,9:	1010 pcph	Cm,12=Cp,12:	[illegible] pcph
Prb. of Queu-free State:	po,9=1-v9/Cm,9=	1.00	po,12=1-v12/Cm,12=	[illegible]

STEP 2: LT FROM MAJOR STREET

Conflicting Flows:	Vc,4 = V2 + V3 =	540 vph	Vc,1 = V5 + V6 =	[illegible] vph
Potential Capacity:	Cp,4 =	319 pcph	Cp,1 =	[illegible] pcph
Movement Capacity:	Cm,4=Cp,4:	819 pcph	Cm,1=Cp,1:	357 pcph
Prb. of Queu-free State:	po,4=1-v4/Cm4:	0.99	po,1=1-v1/Cm1:	[illegible]
Major Left Shared Lane				
Prob. of Queue-free State	p*o,4:	0.99	p*o,1:	[illegible]

PAGE 1 OF 2 ----continued ----

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS [illegible]

Major Street: PAIWA ST
Minor Street: PAIWA PL
Scenario: YEAR 2000 - SCENARIO A
Peak Hour: AM

DATE: [illegible]
[illegible]: [illegible]
File Name: PAIPAI-[illegible]
Intersection [illegible]

STEP 3: TH FROM MINOR STREET

Conflicting Flows:	Vc,8 = [illegible] =	1814 vph	Vc,11 = [illegible] =	[illegible] vph
Potential Capacity:	Cp,8 =	95 pcph	Cp,11 =	112 pcph
Capacity Adj Factor:	f8 = po,4*po,1 =	0.99	f11 = po,4*po,1 =	[illegible]
Movement Capacity:	Cm,8 = Cp,8*f8 =	94 pcph	Cm,11 = Cp,11*f11 =	111 pcph
Prob. of Queue-free State:	po,8 = 1-v8/Cm,8 =	1.00	po,11 = 1-v11/Cm,11 =	[illegible]

STEP 4: LT FROM MINOR STREET

Conflicting Flows:	Vc,7 = [illegible] =	[illegible] vph	Vc,10 = [illegible] =	[illegible] vph
Potential Capacity:	Cp7 =	[illegible] pcph	Cp10 =	[illegible] pcph
Major Left, Minor Through Impedance Factor:	P''7=po,11*f11 =	0.99	P''10=po,8*f8 =	[illegible]
Major Left, Minor Through Adjusted Impedance Factor:	P'7 =	0.99	P'10 =	[illegible]
Capacity Adjustment Factor:	f7 = p'7*po,12 =	[illegible]	f10 = p'10*po,9 =	0.99
Movement Capacity:	Cm,7 = f7*Cp,7 =	[illegible] pcph	Cm,10 = f10*Cp,10 =	[illegible] pcph

DELAY AND LEVEL OF SERVICE SUMMARY

MOVEMENT		v(pcph)	Cm(pcph)	Csh(pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN	(7)	0	107	SHRE	SHRE	--
MINOR THROUGH	(8)	[illegible]	[illegible]	141	[illegible]	[illegible]
MINOR RIGHT TURN	(9)	3	1010	SHRD	SHRD	---
MINOR LEFT TURN	(10)	0	86	--NA--	41.[illegible]	E
MINOR THROUGH	(11)	0	111	--NA--	[illegible]	E
MINOR RIGHT TURN	(12)	0	[illegible]	--NA--	5.5	B
MAJOR LEFT	(1)	0	357	--NA--	10.[illegible]	C
MAJOR LEFT	(4)	[illegible]	819	--NA--	4.1	A
MINOR APPROACH (7)(8)(9)		-	-	-	27.[illegible]	[illegible]
MINOR APPROACH (10)(11)(12)		-	-	-	[illegible]	[illegible]
MAJOR APPROACH (1)(2)(3)		-	-	-	0.0	----
MAJOR APPROACH (4)(5)(6)		-	-	-	[illegible]	A
TOTAL INTERSECTION (1-12)		-	-	-	[illegible]	[illegible]

LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE	AVG TOTAL DELAY (SEC/VEH)
A	[illegible]
B	[illegible]
C	[illegible]
D	[illegible]
E	[illegible]
F	45

PAGE 2 OF 2

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	PAIWA ST	Print Date:	[illegible]
Minor Street:	PAIWA PL	Analyst:	[illegible]
Scenario:	YEAR 2000 - SCENARIO A	File name:	[illegible]
Peak Hour:	PM	Intersection #:	[illegible]

Peak Hour Factor: 1.00

V12 V11 V10

10 0 0

NORTH

---------MAJOR STREET---------

Num of Lanes - V2:	2
Excl LT - V1 (Y/N):	N
Excl RT - V3 (Y/N):	N
Stop/Yield - V3 (Y/N):	N
Grade - V1,V2,V3:	0
Num of Lanes - V5:	2
Excl LT - V4 (Y/N):	N
Excl RT - V6 (Y/N):	N
Stop/Yield - V6 (Y/N):	N
Grade - V4,V5,V6:	0

V1 0 ----- ---- 82 V6

V2 942 ------- ---- 952 V5

V3 5 ----- ---- 5 V4

MAJOR STREET PAIWA ST

---------MINOR STREET---------

Num of Lanes - V8:	1
Grade - V7,V8,V9:	0
Shared Lane-V7,8,9: (0:N,1:LT,2:TR,3:LTR)	3
Num of Lanes - V11:	1
Grade - V10,V11,V12:	0
Shared Lane-V10,11,12: (0:N,1:LT,2:TR,3:LTR)	0

4 0 2

V7 V8 V9

MINOR STREET - PAIWA PL

VOLUME ADJUSTMENTS

MOVEMENT NO.	1	2	3	4	5	6	7	8	9	10	11	12
HOURLY FLOW RATE, V(vph)	0	942	5	5	952	82	4	0	2	0	0	1[illegible]
VOLUME, v (pcph)	0	942	5	6	952	82	4	0	2	0	0	11

STEP 1: RT FROM MINOR STREET

Conflicting Flows:	Vc9 = 1/2 V3 + V2 =	474 vph	Vc12 = 1/2 V6 + V5 =	523 vph
Potential Capacity:	Cp,9 =	797 pcph	Cp,12 =	752 pcph
Movement Capacity:	Cm,9=Cp,9=	797 pcph	Cm,12=Cp,12=	752 pcph
Prb. of Queu-free State:	po,9=1-v9/Cm,9=	1.00	po,12=1-v12/Cm,12=	0.99

STEP 2: LT FROM MAJOR STREET

Conflicting Flows:	Vc,4 = V2 + V3 =	947 vph	Vc,1 = V5 + V6 =	1034 vph
Potential Capacity:	Cp,4 =	532 pcph	Cp,1 =	470 pcph
Movement Capacity:	Cm,4=Cp,4=	532 pcph	Cm,1=Cp,1=	470 pcph
Prb. of Queu-free State:	po,4=1-v4/Cm4=	0.99	po,1=1-v1/Cm1=	1.00
Major Left Shared Lane Prob. of Queue-free State	p*o,4=	0.98	p*o,1=	1.00

PAGE 1 OF 2

----continued ----

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	PAIWA ST	DATE:	21-Feb-9[illegible]
Minor Street:	PAIWA PL	Analyst:	EC
Scenario:	YEAR 2000 - SCENARIO A	File name:	PAIPAI-F
Peak Hour:	PM	Intersection Intersection #:	11

STEP 3: TH FROM MINOR STREET

Conflicting Flows:	Vc,8 = 1/2V3+2V1+V2+V4+V5+V6 =	1796 vph	Vc,11 = 1/2V6+V5+V4+3V1+V2 =	1757 vph
Potential Capacity:	Cp,8 =	74 pcph	Cp,11 =	78 pcph
Capacity Adj Factor:	f8 = po,4*po,1 =	0.98	f11 = po,4*po,1 =	0.98
Movement Capacity:	Cm,8 = Cp,8*f8 =	73 pcph	Cm,11 = Cp,11*f11 =	77 pcph
Prob. of Queue-free State:	po,8 = 1-v8/Cm,8 =	1.00	po,11 = 1-v11/Cm,11 =	1.00

STEP 4: LT FROM MINOR STREET

Conflicting Flows:	Vc,7 = 1/2V3+V2+V1+1/2V6+V5+V4+1/2(V11+V12) =	1914 vph	Vc,10 = 1/2V6+V5+V4+1/2V3+V2+V1+1/2(V8+V9) =	1952 vph
Potential Capacity:	Cp7 =	63 pcph	Cp10 =	60 pcph
Major Left, Minor Through Impedance Factor:	P"7=po,11*f11 =	0.96	P"10=po,8*f8 =	0.98
Major Left, Minor Through Adjusted Impedance Factor:	p'7 =	0.99	p'10 =	0.99
Capacity Adjustment Factor:	f7 = p'7*po,12 =	0.97	f10 = p'10*po,9 =	0.99
Movement Capacity:	Cm,7 = f7*Cp,7 =	62 pcph	Cm,10 = f10*Cp,10 =	59 pcph

DELAY AND LEVEL OF SERVICE SUMMARY

MOVEMENT	v(pcph)	cm(pcph)	csh(pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN (7)	4	62	SHRD	SHRD	--
MINOR THROUGH (8)	0	73	89	43.4	E
MINOR RIGHT TURN (9)	2	797	SHRD	SHRD	----
MINOR LEFT TURN (10)	0	59	--NA--	61.1	F
MINOR THROUGH (11)	0	77	--NA--	46.3	F
MINOR RIGHT TURN (12)	11	752	--NA--	4.9	A
MAJOR LEFT (1)	0	470	--NA--	7.7	B
MAJOR LEFT (4)	6	532	--NA--	6.8	B
MINOR APPROACH (7)(8)(9)	-	-	-	43.4	E
MINOR APPROACH (10)(11)(12)	-	-	-	4.9	A
MAJOR APPROACH (1)(2)(3)	-	-	-	0.0	----
MAJOR APPROACH (4)(5)(6)	-	-	-	0.0	A
TOTAL INTERSECTION (1-12)	-	-	-	0.2	A

LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE	AVG TOTAL DELAY (SEC/VEH)
A	<5
B	5<=10
C	10<=20
D	20<=30
E	30<=45
F	45

PAGE 2 OF 2

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS [illegible]

Major Street: PAIWA ST
Minor Street: PAIWA PL
Scenario: YEAR 2000 - SCENARIO A
Peak Hour: AM

Print Date: [illegible]
Analyst: [illegible]
File Name: [illegible]
Intersection # [illegible]

Peak Hour Factor: 1.00

---------MAJOR STREET---------
Num of Lanes - V2: 2
Excl LT - V1 (Y/N): N
Excl RT - V3 (Y/N): N
Stop/Yield - V3 (Y/N): N
Grade - V1,V2,V3: 0

Num of Lanes - V5: 2
Excl LT - V4 (Y/N): N
Excl RT - V6 (Y/N): N
Stop/Yield - V6 (Y/N): N
Grade - V4,V5,V6: 0

---------MINOR STREET---------
Num of Lanes - V8: 1
Grade - V7,V8,V9: 0
Shared Lane-V7,8,9: 3
(0:N,1:LT,2:TR,3:LTR)

Num of Lanes - V11: 1
Grade - V10,V11,V12: 0
Shared Lane-V10,11,12: 0
(0:N,1:LT,2:TR,3:LTR)

V12 V11 V10

V1 0
V2 539
V3 1

[illegible] V4
1009 V5
[illegible] V6

NORTH
MAJOR STREET
PAIWA ST

V7 V8 V9

MINOR STREET - PAIWA PL

VOLUME ADJUSTMENTS

MOVEMENT NO.	1	2	3	4	5	6	7	8	9	10	11	12
HOURLY FLOW RATE, v(vph)	0	539	1	5	1009	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
VOLUME, v (pcph)	0	539	1	6	1009	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

STEP 1: RT FROM MINOR STREET

Conflicting Flows:	Vc9 = 1/2 V3 + V2 =	270 vph	Vc12 = 1/2 V6 + V5 =	[illegible] vph
Potential Capacity:	Cp,9 =	1010 pcph	Cp,12 =	[illegible] pcph
Movement Capacity:	Cm,9=Cp,9:	1010 pcph	Cm,12=Cp,12:	[illegible] pcph
Prb. of Queu-Free State:	po,9=1-v9/Cm,9:	1.00	po,12=1-v12/Cm,12:	[illegible]

STEP 2: LT FROM MAJOR STREET

Conflicting Flows:	Vc,4 = V2 + V3 =	540 vph	Vc,1 = V5 + V6 =	[illegible] vph
Potential Capacity:	Cp,4 =	379 pcph	Cp,1 =	[illegible] pcph
Movement Capacity:	Cm,4=Cp,4:	879 pcph	Cm,1=Cp,1:	357 pcph
Prb. of Queu-free State:	po,4=1-v4/Cm4:	0.99	po,1=1-v1/Cm1:	1.00
Major Left Shared Lane				
Prob. of Queue-free State	p*o,4=	0.99	p*o,1=	1.00

PAGE 1 OF 2 ----continued ----

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS [illegible]

Major Street: PAIWA ST
Minor Street: PAIWA PL
Scenario: YEAR 2000 - SCENARIO A
Peak hour: AM

DATE: [illegible]
Analyst: [illegible]
File Name: [illegible]
Intersection Intersection # [illegible]

STEP 3: TH FROM MINOR STREET

Conflicting Flows:	Vc,8 = 1/2V3+V2+V1+Vc+V5+V4 =	1014 vph	Vc,11 = 1/2V6+V5+V4+V3+V2+V1 =	1064 vph
Potential Capacity:	Cp,8 =	95 pcph	Cp,11 =	[illegible] pcph
Capacity Adj Factor:	f8 = po,4*po,1 =	0.99	f11 = po,4*po,1 =	[illegible]
Movement Capacity:	Cm,8 = Cp,8*f8 =	94 pcph	Cm,11 = Cp,11*f11 =	111 pcph
Prob. of Queue-free State:	po,8 = 1-v8/Cm,8 =	1.00	po,11 = 1-v11/Cm,11 =	[illegible]

STEP 4: LT FROM MINOR STREET

Conflicting Flows:	Vc,7 = 1/2V3+V2+V1+1/2V6+V5+V4+1/2V11+Vc12 =	1554 vph	Vc,10 = [illegible]	[illegible] vph
Potential Capacity:	Cp7 =	108 pcph	Cp10 =	85 pcph
Major Left, Minor Through Impedance Factor:	P7 = po,11*f11 =	0.99	P10 = po,8*f8 =	[illegible]
Major Left, Minor Through Adjusted Impedance Factor:	P'7 =	0.99	P'10 =	[illegible]
Capacity Adjustment Factor:	f7 = p'7*po,12 =	0.99	f10 = p'10*po,9 =	[illegible]
Movement Capacity:	Cm,7 = f7*Cp,7 =	[illegible] pcph	Cm,10 = f10*Cp,10 =	86 pcph

DELAY AND LEVEL OF SERVICE SUMMARY

MOVEMENT	v(pcph)	Cm(pcph)	Csh(pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN (7)	8	107	SHRD	SHRD	--
MINOR THROUGH (8)	0	94	141	27.7	D
MINOR RIGHT TURN (9)	1	1010	SHRD	SHRD	----
MINOR LEFT TURN (10)	6	86	--NA--	43.6	E
MINOR THROUGH (11)	0	111	--NA--	[illegible]	E
MINOR RIGHT TURN (12)	0	660	--NA--	5.5	B
MAJOR LEFT (1)	0	357	--NA--	10.1	C
MAJOR LEFT (4)	5	879	--NA--	4.1	A
MINOR APPROACH (7)(8)(9)	-	-	-	27.7	D
MINOR APPROACH (10)(11)(12)	-	-	-	ERR	ERR
MAJOR APPROACH (1)(2)(3)	-	-	-	0.0	----
MAJOR APPROACH (4)(5)(6)	-	-	-	0.0	A
TOTAL INTERSECTION (1-12)	-	-	-	ERR	ERR

LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE	AVG TOTAL DELAY (SEC/VEH)
A	<=5
B	5 <=10
C	10 <=20
D	20 <=30
E	30 <=45
F	45

PAGE 2 OF 2

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street: PAIWA ST
Minor Street: PAIWA PL
Scenario: YEAR 2000 - SCENARIO A
Peak Hour: PM

Print Date: 21-Feb-96
Analyst: BC
File Name: PAIPAI-P
Intersection #: 11

Peak Hour Factor: 1.00

			V12	V11	V10	
			10	0	0	NORTH

---------MAJOR STREET---------

Num of Lanes - V2:	2
Excl LT - V1 (Y/N):	N
Excl RT - V3 (Y/N):	N
Stop/Yield - V3 (Y/N):	N
Grade - V1,V2,V3:	0
Num of Lanes - V5:	2
Excl LT - V4 (Y/N):	N
Excl RT - V6 (Y/N):	N
Stop/Yield - V6 (Y/N):	N
Grade - V4,V5,V6:	0

V1 0 ----- ---- 82 V6
V2 942 ------- ---- 952 V5
V3 5 ----- ---- 5 V4

MAJOR STREET
PAIWA ST

---------MINOR STREET---------

Num of Lanes - V8:	1
Grade - V7,V8,V9:	0
Shared Lane-V7,8,9:	3
(0:N,1:LT,2:TR,3:LTR)	
Num of Lanes - V11:	1
Grade - V10,V11,V12:	0
Shared Lane-V10,11,12:	0
(0:N,1:LT,2:TR,3:LTR)	

	V7	V8	V9
	4	5	2

MINOR STREET - PAIWA PL

VOLUME ADJUSTMENTS

MOVEMENT NO.	1	2	3	4	5	6	7	8	9	10	11	12
HOURLY FLOW RATE, V(vph)	0	942	5	5	952	82	4	5	2	0	0	10
VOLUME, v (pcph)	0	942	5	6	964	82	4	6	2	0	0	11

STEP 1: RT FROM MINOR STREET

Conflicting Flows:	Vc9 = 1/2 V3 + V2 =	474 vph	Vc12 = 1/2 V6 + V5 =	523 vph
Potential Capacity:	Cp,9 =	797 pcph	Cp,12 =	752 pcph
Movement Capacity:	Cm,9=Cp,9:	797 pcph	Cm,12=Cp,12=	752 pcph
Prb. of Queu-free State:	po,9=1-v9/Cm,9=	1.00	po,12=1-v12/Cm,12=	0.99

STEP 2: LT FROM MAJOR STREET

Conflicting Flows:	Vc,4 = V2 + V3 =	947 vph	Vc,1 = V5 + V6 =	1034 vph
Potential Capacity:	Cp,4 =	532 pcph	Cp,1 =	470 pcph
Movement Capacity:	Cm,4=Cp,4=	532 pcph	Cm,1=Cp,1=	470 pcph
Prb. of Queu-free State:	po,4=1-v4/Cm4=	0.99	po,1=1-v1/Cm1=	1.00
Major Left Shared Lane				
Prob. of Queue-free State	p*o,4=	0.98	p*o,1=	1.00

PAGE 1 OF 2 ----continued----

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street: PAIWA ST
Minor Street: PAIWA PL
Scenario: YEAR 2000 - SCENARIO A
Peak Hour: PM

DATE: 21-Feb-96
Analyst: BC
File Name: PAIPAI-P
Intersection Intersection #: 11

STEP 3: TH FROM MINOR STREET

Conflicting Flows:	Vc,8 = 1/2V3+V2+V1+V4+V5+V6 :	1996 vph	Vc,11 = 1/2V6+V5+V4+V3+V2+V1 :	1957 vph
Potential Capacity:	Cp,8 =	74 pcph	Cp,11 =	78 pcph
Capacity Adj Factor:	f8 = po,4*po,1 =	0.98	f11 = po,4*po,1 =	0.98
Movement Capacity:	Cm,8 = Cp,8*f8 =	73 pcph	Cm,11 = Cp,11*f11 =	77 pcph
Prob. of Queue-free State:	po,8 = 1-v8/Cm,8 =	1.00	po,11 = 1-v11/Cm,11 =	1.00

STEP 4: LT FROM MINOR STREET

Conflicting Flows:	Vc,7 = 1/2V3+V2+V1+1/2V6+V5+V4+1/2(V11+V12) =	1914 vph	Vc,10 = 1/2V6+V5+V4+1/2V3+V2+V1+1/2(V8+V9) =	1952 vph
Potential Capacity:	Cp7 =	63 pcph	Cp10 =	60 pcph
Major Left, Minor Through Impedance Factor:	P''7=po,11*f11 =	0.98	P''10=po,8*f8 =	0.92
Major Left, Minor Through Adjusted Impedance Factor:	p'7 =	0.99	p'10 =	0.94
Capacity Adjustment Factor:	f7 = p'7*po,12 =	0.97	f10 = p'10*po,9 =	0.94
Movement Capacity:	Cm,7 = f7*Cp,7 =	62 pcph	Cm,10 = f10*Cp,10 =	59 pcph

DELAY AND LEVEL OF SERVICE SUMMARY

MOVEMENT		v(pcph)	cm(pcph)	csh(pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN	(7)	4	62	SHRD	SHRD	--
MINOR THROUGH	(8)	6	73	89	43.4	E
MINOR RIGHT TURN	(9)	2	797	SHRD	SHRD	----
MINOR LEFT TURN	(10)	0	59	--NA--	61.1	F
MINOR THROUGH	(11)	0	77	--NA--	46.3	F
MINOR RIGHT TURN	(12)	11	752	--NA--	4.9	A
MAJOR LEFT	(1)	0	470	--NA--	7.7	B
MAJOR LEFT	(4)	6	532	--NA--	6.8	B
MINOR APPROACH (7)(8)(9)		-	-	-	43.4	E
MINOR APPROACH (10)(11)(12)		-	-	-	4.9	A
MAJOR APPROACH (1)(2)(3)		-	-	-	0.0	----
MAJOR APPROACH (4)(5)(6)		-	-	-	0.0	A
TOTAL INTERSECTION (1-12)		-	-	-	0.2	A

LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE	AVE TOTAL DELAY (SEC/VEH)
A	<5
B	5< <10
C	10< <20
D	20< <30
E	30< <45
F	45

PAGE 2 OF 2

```
AMFAC WAIPAHU TIAR                                                    02/21/96
2000 - SCENARIO A                                                     13:00:25
AM PEAK HOUR

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

   Intersection Parameters for Int #  4 - PAIWA ST & HAPAPA ST

METROAREA            NONCBD
LOSTTIME                2.0
LEVELOFSERVICE      C     S
NODELOCATION        0     0

   Approach Parameters

APPLABELS                SB           WB           NB           EB
GRADES                   .0           .0           .0           .0
PEDLEVELS               LOW          LOW          LOW          LOW
PARKINGSIDES           NONE         BOTH         NONE         NONE
PARKVOLUMES              20           20           20           20
BUSVOLUMES                5            0            5            0
RIGHTTURNONREDS           0            0            0            0

   Movement Parameters

MOVLABELS          RT   TH   LT    RT   TH   LT    RT   TH   LT    RT   TH   LT
VOLUMES             0 1167   60    30    0  102    60  515    0     0    0    0
WIDTHS             .0 24.0   .0    .0 12.0   .0    .0 24.0   .0    .0   .0   .0
LANES               0    2    0     0    1    0     0    2    0     0    0    0
UTILIZATIONS     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
TRUCKPERCENTS     2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0
PEAKHOURFACTORS   .95  .95  .95   .95  .95  .95   .95  .95  .95   .95  .95  .95
ARRIVALTYPES        3    3    3     3    3    3     3    3    3     3    3    3
ACTUATIONS        YES  YES  YES   YES  YES  YES   YES  YES  YES   YES  YES  YES
REQCLEARANCES     4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0
MINIMUMS          5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0
IDEALSATFLOWS    1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
FACTORS          1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
DELAYFACTORS     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
NSTOPFACTORS     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
GROUPTYPES       NORM NORM NORM  NORM NORM NORM  NORM NORM NORM  NORM NORM NORM
SATURATIONFLOWS     0 3157    0     0 1001    0     0 3621    0     0    0    0

   Phasing Parameters

SEQUENCES          11   ALL
PERMISSIVES       YES   YES   YES   YES        LEADLAGS     NONE  NONE
OVERLAPS          YES   YES   YES   YES        OFFSET        .00     1
CYCLES             60   180    10              PEDTIME        .0     0
GREENTIMES      36.78 15.22
YELLOWTIMES      4.00  4.00
CRITICALS           2     5
EXCESS              0
```

```
AMFAC WAIPAHU TIAR                                                    02/21/96
2000 - SCENARIO A                                                     13:00:51
AM PEAK HOUR

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int #   4 - PAIWA ST & HAPAPA ST
     Degree of Saturation (v/c)  .51  Vehicle Delay   4.6   Level of Service A

Sq 11 ! Phase 1  ! Phase 2  !
**/** --------------------------
      !  * *     !          !
 /|\  !  * *     !     **** !
  |   !  * *>    !          !
  |   !  v       !     **** !
  |   !          !     v    !
North !     + +> !          !
  |   !     + +  !          !
      !     + +  !          !
      --------------------------
      ! G/C= .613 ! G/C= .254 !
      ! G=  36.8" ! G=  15.2" !
      ! Y+R= 4.0" ! Y+R= 4.0" !
      ! OFF=  .0% ! OFF=68.0% !
      --------------------------
      C= 60 sec    G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped=  .0 sec =   .0%

---------------------------------------------------------------------------------
! Lane   !Width/!    g/C      ! Service Rate!  Adj  !      !  HCM  ! L !90% Max!
!  Group ! Lanes! Reqd   Used ! @C (vph) @E !Volume!  v/c ! Delay ! S ! Queue !
---------------------------------------------------------------------------------
SB Approach                                                    4.6   A
=================================================================================
!LT+TH   ! 24/2 ! .420 ! .646 ! 2041 ! 2041 !  1291 ! .633 !  4.6 !*A ! 192 ft!
---------------------------------------------------------------------------------
NB Approach                                                    2.9   A
=================================================================================
!   TH+RT! 24/2 ! .188 ! .646 ! 2341 ! 2341 !   605 ! .258 !  2.9 ! A !  90 ft!
---------------------------------------------------------------------------------
WB Approach                                                   12.5   B
=================================================================================
!LT+TH+RT! 12/1 ! .186 ! .287 !  238 !  287 !   139 ! .484 ! 12.5 !*B !  84 ft!
---------------------------------------------------------------------------------
```

MFAC WAIPAHU TIAR
000 - SCENARIO A
M PEAK HOUR

02/21/96
13:02:36

IGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 4 - PAIWA ST & HAPAPA ST

ETROAREA	NONCBD	
OSTTIME		2.0
EVELOFSERVICE	C	S
ODELOCATION	0	0

Approach Parameters

PPLABELS	SB	WB	NB	EB
RADES	.0	.0	.0	.0
EDLEVELS	LOW	LOW	LOW	LOW
ARKINGSIDES	NONE	BOTH	NONE	NONE
ARKVOLUMES	20	20	20	20
USVOLUMES	5	0	5	0
IGHTTURNONREDS	0	0	0	0

Movement Parameters

OVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
OLUMES	0	940	48	20	0	39	37	902	0	0	0	0
IDTHS	.0	24.0	.0	.0	12.0	.0	.0	24.0	.0	.0	.0	.0
ANES	0	2	0	0	1	0	0	2	0	0	0	0
ITILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
RUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
RRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
CTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
EQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
INIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
ACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ISTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
ATURATIONFLOWS	0	2651	0	0	1002	0	0	3663	0	0	0	0

Phasing Parameters

EQUENCES	11	ALL					
ERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
VERLAPS	YES	YES	YES	YES	OFFSET	.00	1
YCLES	60	180	10		PEDTIME	.0	0
REENTIMES	41.56	10.44					
ELLOWTIMES	4.00	4.00					
RITICALS	2	6					
XCESS	0						

AMFAC WAIPAHU TIAR
2000 - SCENARIO A
PM PEAK HOUR

02/21/96
13:02:45

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 4 - PAIWA ST & HAPAPA ST
Degree of Saturation (v/c) .45 Vehicle Delay 2.7 Level of Service A

```
        -------------------------
Sq 11  | Phase 1  |  Phase 2   |
**/**  ------------------------- 
       |  * *     |      ..    |
  /|\  |  * *     |      ++++  |
   |   |  * *>    |            |
   |   |  v       |      ****  |
   |   |     -    |      v     |
North  |     + +> |            |
   |   |     + +  |            |
       |     + +  |            |
        -------------------------
       | G/C= .693 | G/C= .174 |
       | G=  41.6" | G=  10.4" |
       | Y+R= 4.0" | Y+R= 4.0" |
       | OFF=  .0% | OFF=75.9% |
        -------------------------
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								2.6	A	
LT+TH	24/2	.408	.726	1924	1924	1040	.541	2.6	*A	120 ft
NB Approach								2.0	A	
TH+RT	24/2	.287	.726	2659	2659	988	.372	2.0	A	114 ft
WB Approach								13.2	B	
LT+TH+RT	12/1	.098	.207	160	206	62	.298	13.2	B	41 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
13:04:48

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 5 - PAIWA ST & HIAPO ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	BOTH	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	86	0	83

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	48	1005	83	141	37	84	28	419	86	130	71	79
WIDTHS	.0	24.0	.0	10.0	12.0	.0	.0	24.0	.0	10.0	12.0	.0
LANES	0	2	0	1	1	0	0	2	0	1	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3016	0	1050	1255	0	0	2187	0	1312	1457	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	39.34	12.66					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	11					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
13:05:00

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 5 - PAIWA ST & HIAPO ST
Degree of Saturation (v/c) .48 Vehicle Delay 4.9 Level of Service A

```
        -----------------------------
Sq 11  |  Phase 1    |   Phase 2    |
**/**  -----------------------------
       | * * *       |          ^   |
       | * * *       |         ++++ |
 /|\   |<* * *>      |        <++++ |
  |    |  v          |     ^   ++++ |
  |    |      ^      |****     v    |
North  |   <+ + +>   |****>         |
  |    |    + + +    |++++          |
       |    + + +    |  v           |
        -----------------------------
       | G/C= .656   | G/C= .211    |
       | G=  39.3"   | G=  12.7"    |
       | Y+R= 4.0"   | Y+R= 4.0"    |
       | OFF=  .0%   | OFF=72.2%    |
        -----------------------------
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								3.4	A	
LT+TH+RT	24/2	.409	.689	2078	2078	1196	.576	3.4	*A	157 ft
NB Approach								2.6	A	
LT+TH+RT	24/2	.285	.689	1507	1507	561	.372	2.6	A	74 ft
WB Approach								12.5	B	
RT	10/1	.089	.244	207	257	58	.226	11.8	B	37 ft
LT+TH	12/1	.140	.244	253	307	127	.414	12.8	B	81 ft
EB Approach								12.7	B	
RT	10/1	.063	.244	266	321	49	.153	11.5	B	31 ft
LT+TH	12/1	.145	.244	299	356	158	.444	13.0	*B	101 ft

1FAC - WAIPAHU TRAFFIC STUDY
)00 - SCENARIO A
1 PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
13:09:07

IGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 5 - PAIWA ST & HIAPO ST

ETROAREA	NONCBD	
JSTTIME	2.0	
EVELOFSERVICE	C	S
ODELOCATION	0	0

Approach Parameters

PPLABELS	SB	WB	NB	EB
RADES	.0	.0	.0	.0
EDLEVELS	MODER	MODER	MODER	MODER
ARKINGSIDES	NONE	BOTH	NONE	NONE
ARKVOLUMES	20	20	20	20
USVOLUMES	5	0	5	0
IGHTTURNONREDS	0	72	0	86

Movement Parameters

1OVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	177	846	99	72	31	50	40	808	86	114	18	91
WIDTHS	.0	24.0	.0	10.0	12.0	.0	.0	24.0	.0	10.0	12.0	.0
LANES	0	2	0	1	1	0	0	2	0	1	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	2212	0	1050	1443	0	0	2260	0	1312	1348	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	43.85	8.15					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	11					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
13:09:16

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 5 - PAIWA ST & HIAPO ST
Degree of Saturation (v/c) .62 Vehicle Delay 4.0 Level of Service A

```
         --------------------------
Sq 11  | Phase 1  |  Phase 2  |
**/**  --------------------------
       | * * *    |        ^  |
  .    | * * *    |     ++++  |
 /|\   |<* * *>   |    <++++  |
  |    |  v       |   ^  ++++ |
  |    |      ^   |****    v  |
North  |  <+ + +> |****>      |
  |    |   + + +  |++++       |
       |   + + +  |  v        |
       --------------------------
       | G/C= .731 | G/C= .136 |
       | G=  43.9" | G=   8.1" |
       | Y+R= 4.0" | Y+R= 4.0" |
       | OFF=  .0% | OFF=79.8% |
       --------------------------
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								3.2	A	
LT+TH+RT	24/2	.544	.764	1690	1690	1181	.699	3.2	*A	117 ft
NB Approach								2.3	A	
LT+TH+RT	24/2	.452	.764	1727	1727	984	.570	2.3	A	98 ft
WB Approach								14.6	B	
RT	10/1	.003	.169	131	174	1	.006	13.4	B	25 ft
LT+TH	12/1	.090	.169	189	244	86	.352	14.6	B	60 ft
EB Approach								15.7	C+	
RT	10/1	.042	.169	170	221	29	.131	13.7	B	25 ft
LT+TH	12/1	.121	.169	175	227	115	.504	16.1	*C+	81 ft

```
\MFAC WAIPAHU TIAR                                                    02/21/96
!000 - SCENARIO A                                                     12:00:59
\M PEAK HOUR

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

   Intersection Parameters for Int #   6 - PAIWA ST & H-1 EB RAMPS

METROAREA            NONCBD
LOSTTIME                2.0
LEVELOFSERVICE       C    S
NODELOCATION         0    0

   Approach Parameters

APPLABELS                SB              WB              NB              EB
GRADES                   .0              .0              .0            -2.0
PEDLEVELS               LOW             LOW             LOW             LOW
PARKINGSIDES           NONE            NONE            NONE            NONE
PARKVOLUMES              20              20              20              20
BUSVOLUMES                5               0               5               0
RIGHTTURNONREDS           0               0               0               0

   Movement Parameters

MOVLABELS          RT   TH   LT    RT   TH   LT    RT   TH   LT    RT   TH   LT
VOLUMES             0  706  469     0    0    0   360  281    0   259    6  420
WIDTHS             .0 24.0 12.0    .0   .0   .0    .0 24.0   .0  12.0 12.0   .0
LANES               0    2    1     0    0    0     0    2    0     1    1    0
UTILIZATIONS     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
TRUCKPERCENTS     2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0
PEAKHOURFACTORS   .95  .95  .95   .95  .95  .95   .95  .95  .95   .95  .95  .95
ARRIVALTYPES        3    3    3     3    3    3     3    3    3     3    3    3
ACTUATIONS        YES  YES  YES   YES  YES  YES   YES  YES  YES   YES  YES  YES
REQCLEARANCES     4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0
MINIMUMS          5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0
IDEALSATFLOWS    1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
FACTORS          1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
DELAYFACTORS     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
NSTOPFACTORS     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
GROUPTYPES       NORM NORM NORM  NORM NORM NORM  NORM NORM NORM  NORM NORM NORM
SATURATIONFLOWS     0 3688 1770     0    0    0     0 3328    0  1554 1559    0

   Phasing Parameters

SEQUENCES          21   ALL
PERMISSIVES        NO    NO    NO    NO       LEADLAGS     NONE  NONE
OVERLAPS          YES   YES   YES   YES       OFFSET        .00     1
CYCLES             60   180    10             PEDTIME        .0     0
GREENTIMES      17.59 12.10 18.31
YELLOWTIMES      4.00  4.00  4.00
CRITICALS           3     8    11
EXCESS              0
```

```
AMFAC WAIPAHU TIAR                                                    02/21/96
2000 - SCENARIO A                                                     12:01:08
AM PEAK HOUR

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int #   6 - PAIWA ST & H-1 EB RAMPS
     Degree of Saturation (v/c)  .68  Vehicle Delay  15.1  Level of Service C+

        --------------------------------------------
Sq 21  |  Phase 1  |  Phase 2  |  Phase 3  |
**/**   --------------------------------------------
       |  + *      |  +        |           |
  /|\  |  + *      |  +        |           |
   |   |  + *>     |  +        |           |
   |   |  v        |  v      ^ |        ^  |
   |   |           |           |****       |
North  |           |       * *\|****\      |
   |   |           |       * * |++++       |
       |           |       * * |   v       |
        --------------------------------------------
       | G/C= .293 | G/C= .202 | G/C= .305 |
       | G=  17.6" | G=  12.1" | G=  18.3" |
       | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
       | OFF=  .0% | OFF=36.0% | OFF=62.8% |
        --------------------------------------------
       C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped=  .0 sec =   .0%

-------------------------------------------------------------------------------
| Lane  |Width/|    g/C     | Service Rate| Adj  |      |  HCM  | L |90% Max|
| Group | Lanes| Reqd  Used | @C (vph) @E |Volume|  v/c | Delay | S | Queue |
-------------------------------------------------------------------------------
SB Approach                                                 10.6   B
===============================================================================
|  TH   | 24/2 | .221 | .595 | 2194 | 2194 |  743 | .339 |   4.0 | A | 127 ft|
|  LT   | 12/1 | .312 | .327 |  523 |  578 |  494 | .855 |  20.6 |*C | 281 ft|
-------------------------------------------------------------------------------
NB Approach                                                 21.2   C
===============================================================================
| TH+RT | 24/2 | .224 | .235 |  713 |  782 |  675 | .863 |  21.2 |*C | 218 ft|
-------------------------------------------------------------------------------
EB Approach                                                 16.9   C+
===============================================================================
|  RT   | 12/1 | .213 | .338 |  473 |  526 |  273 | .519 |  11.0 | B | 152 ft|
|LT+TH  | 12/1 | .323 | .338 |  475 |  528 |  448 | .848 |  20.5 |*C | 250 ft|
-------------------------------------------------------------------------------
```

MFAC WAIPAHU TIAR 02/21/96
000 - SCENARIO A 12:02:48
M PEAK HOUR

IGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 6 - PAIWA ST & H-1 EB RAMPS

IETROAREA	NONCBD	
OSTTIME	2.0	
EVELOFSERVICE	C	S
ODELOCATION	0	0

Approach Parameters

PPLABELS	SB	WB	NB	EB
RADES	.0	.0	.0	-2.0
EDLEVELS	LOW	LOW	LOW	LOW
ARKINGSIDES	NONE	NONE	NONE	NONE
ARKVOLUMES	20	20	20	20
USVOLUMES	5	0	5	0
IGHTTURNONREDS	0	0	0	0

Movement Parameters

OVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
OLUMES	0	881	356	0	0	0	673	496	0	249	6	585
IDTHS	.0	24.0	12.0	.0	.0	.0	.0	24.0	.0	12.0	12.0	.0
ANES	0	2	1	0	0	0	0	2	0	1	1	0
TILIZATIONS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
RUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EAKHOURFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
RRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
CTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
EQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
INIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
ACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ISTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
ATURATIONFLOWS	0	3688	1770	0	0	0	0	3319	0	1554	1558	0

Phasing Parameters

EQUENCES	21	ALL					
ERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
VERLAPS	YES	YES	YES	YES	OFFSET	.00	1
YCLES	60	180	10		PEDTIME	.0	0
REENTIMES	11.74	13.61	22.65				
ELLOWTIMES	4.00	4.00	4.00				
RITICALS	3	8	11				
XCESS	0						

AMFAC WAIPAHU TIAR 02/21/96
2000 - SCENARIO A 12:02:56
PM PEAK HOUR

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 6 - PAIWA ST & H-1 EB RAMPS
Degree of Saturation (v/c) .86 Vehicle Delay 22.1@ Level of Service C
@ expect more delay due to extreme v/c's (see EVALUATE)

```
        ------------------------------------------
Sq 21 ! Phase 1  ! Phase 2   ! Phase 3  !
**/** ------------------------------------------
      !  + *     !  +        !          !
      !  + *     !  +        !          !
 /|\  !  + *>    !  +        !    ^     !
  |   !  v       !  v     ^  !****      !
North !          !      * *> !****>     !
  |   !          !      * *  !++++      !
      !          !      * *  !   v      !
        ------------------------------------------
      ! G/C= .196 ! G/C= .227 ! G/C= .377 !
      ! G=  11.7" ! G=  13.6" ! G=  22.6" !
      ! Y+R= 4.0" ! Y+R= 4.0" ! Y+R= 4.0" !
      ! OFF=  .0% ! OFF=26.2% ! OFF=55.6% !
        ------------------------------------------
```

C= 60 sec G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								11.0	B	
TH	24/2	.246	.523	1927	1927	837	.434	5.8	B+	169 ft
LT	12/1	.226	.229	344	405	338	.835	23.9	*C	220 ft
NB Approach								37.9@	D	
TH+RT	24/2	.350	.260	798	864	1111	1.286	37.9@	*D	347 ft
EB Approach								16.3	C+	
RT	12/1	.190	.411	592	639	237	.371	8.1	B+	118 ft
LT+TH	12/1	.392	.411	593	640	561	.877	19.7	*C+	279 ft

AMFAC WAIPAHU TIAR
2000 - SCENARIO A
AM PEAK HOUR

02/21/96
13:27:14

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 7 - PAIWA ST & H-1 WB RAMPS

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	-2.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	510	982	0	312	6	290	0	464	241	0	0	0
WIDTHS	.0	24.0	.0	.0	12.0	12.0	.0	24.0	12.0	.0	.0	.0
LANES	0	2	0	0	1	1	0	2	1	0	0	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	FFLW	NORM	NORM	FFLW	NORM	DOPT	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3725	0	0	1567	1554	0	3651	1752	0	0	0

Phasing Parameters

SEQUENCES	31	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	13.91	24.01	10.08				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	9	2	5				
EXCESS	0						

AMFAC WAIPAHU TIAR
2000 - SCENARIO A
AM PEAK HOUR

02/21/96
13:27:37

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 7 - PAIWA ST & H-1 WB RAMPS
Degree of Saturation (v/c) .50 Vehicle Delay 8.8 Level of Service B+

```
        ----------------------------------------
Sq 31  |  Phase 1   |  Phase 2   |  Phase 3    |
**/**  ----------------------------------------
       |            |     *      |             |
  /|\  |            |     *      |             |
   |   |            |     *      |      <****  |
   |   |        -   |     v   .  |       ++++  |
North  |      <* +  |         +  |        v    |
   |   |       * +  |         +  |             |
       |       * +  |         +  |             |
        ----------------------------------------
       | G/C= .232  | G/C= .400  | G/C= .168   |
       | G= 13.9"   | G= 24.0"   | G= 10.1"    |
       | Y+R= 4.0"  | Y+R= 4.0"  | Y+R= 4.0"   |
       | OFF= .0%   | OFF=29.8%  | OFF=76.5%   |
        ----------------------------------------
```

C= 60 sec G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								9.2	B+	
TH	24/2	.294	.434	1590	1615	1034	.640	9.2	*B+	247 ft
NB Approach								5.6	B+	
TH	24/2	.155	.732	2673	2673	488	.183	1.6	A	55 ft
LT	12/1	.180	.265	405	465	254	.546	13.3	*B	157 ft
WB Approach								14.8	B	
TH	12/1-	.136	.201	257	315	159	.505	14.9	*B	107 ft
LT	12/1+	.132	.201	255	313	152	.486	14.7	B	102 ft

AMFAC WAIPAHU TIAR
2000 - SCENARIO A
PM PEAK HOUR

02/21/96
13:29:27

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 7 - PAIWA ST & H-1 WB RAMPS

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	-2.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	566	862	0	1109	6	370	0	795	247	0	0	0
WIDTHS	.0	24.0	.0	.0	12.0	12.0	.0	24.0	12.0	.0	.0	.0
LANES	0	2	0	0	1	1	0	2	1	0	0	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	FFLW	NORM	NORM	FFLW	NORM	DOPT	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3725	0	0	1564	1554	0	3651	1752	0	0	0

Phasing Parameters

SEQUENCES	31	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	14.20	21.09	12.71				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	9	2	5				
EXCESS	0						

AMFAC WAIPAHU TIAR
2000 - SCENARIO A
PM PEAK HOUR

02/21/96
13:29:34

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 7 - PAIWA ST & H-1 WB RAMPS
Degree of Saturation (v/c) .50 Vehicle Delay 8.5 Level of Service B+

```
        --------------------------------------------
Sq 31 | Phase 1  |  Phase 2  |  Phase 3  |
**/** --------------------------------------------
  .    |          |    *      |           |
 /|\   |          |    *      |     <**** |
  |    |          |    *      |      ++++ |
  |    |     ^    |    v   ^  |      v    |
North  |  <* +    |        +  |           |
  |    |   * +    |        +  |           |
       |   * +    |        +  |           |
        --------------------------------------------
       | G/C= .237 | G/C= .351 | G/C= .212 |
       | G=  14.2" | G=  21.1" | G=  12.7" |
       | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
       | OFF=  .0% | OFF=30.3% | OFF=72.1% |
        --------------------------------------------
```

C= 60 sec G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								10.4	B	
TH	24/2	.261	.385	1395	1433	907	.633	10.4	*B	235 ft
NB Approach								5.0	B+	
TH	24/2	.248	.688	2512	2512	837	.333	2.5	A	110 ft
LT	12/1	.183	.270	414	473	260	.550	13.2	*B	160 ft
WB Approach								13.7	B	
TH	12/1-	.167	.245	326	384	203	.529	13.8	*B	129 ft
LT	12/1+	.160	.245	323	381	192	.504	13.5	B	122 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
13:19:33

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 8 - PAIWA ST & LUMIAINA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	.0	2.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	8	195	30	32	75	991	384	87	115	347	87	9
WIDTHS	.0	24.0	12.0	.0	24.0	12.0	.0	24.0	12.0	.0	24.0	12.0
LANES	0	2	1	0	2	1	0	2	1	0	2	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3691	604	0	3416	1770	0	2922	919	0	2966	1770

Phasing Parameters

SEQUENCES	14	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	10.45	38.15	9.39				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	8	6	11				
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
13:19:41

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 8 - PAIWA ST & LUMIAINA ST
Degree of Saturation (v/c) .87 Vehicle Delay 34.9 Level of Service D

```
Sq 14 | Phase 1   | Phase 2   | Phase 3   |
**/** ----------------------------------------
      | + + +     |           |        ^  |
  .   | + + +     |           |      ++++ |
 /|\  |<+ + +>    |           |     <++++ |
  |   |   v       |   ^  **** |           |
  |   |       ^   |++++  v    |           |
North |   <+ * *> |           |****>      |
  |   |    + * *  |           |****       |
      |    + * *  |           |  v        |
----------------------------------------
      | G/C= .149 | G/C= .545 | G/C= .134 |
      | G=  10.5" | G=  38.2" | G=   9.4" |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=20.6% | OFF=80.9% |
----------------------------------------
```

C= 70 sec G= 58.0 sec = 82.9% Y=12.0 sec = 17.1% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								16.4	C+	
TH+RT	24/2	.082	.178	556	657	213	.324	16.3	C+	86 ft
LT	12/1	.000	.178	69	99	32	.296	16.6	C+	26 ft
NB Approach								36.9	D	
TH+RT	24/2	.201	.178	428	520	496	.954	39.1	*D	201 ft
LT	12/1	.189	.178	113	157	121	.738	28.2	D+	98 ft
WB Approach								36.3	D	
TH+RT	24/2	.054	.163	458	556	113	.203	16.4	C+	47 ft
LT	12/1	.604	.574	985	1015	1043	1.028	38.5	*D	438 ft
EB Approach								38.4	D	
TH+RT	24/2	.185	.163	390	483	457	.946	39.1	*D	188 ft
LT	12/1	.015	.574	985	1015	9	.009	4.1	A	25 ft

MFAC - WAIPAHU TRAFFIC STUDY 02/21/96
000 - SCENARIO A 13:24:03
M PEAK HOUR LEVEL OF SERVICE CALCULATIONS

IGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 8 - PAIWA ST & LUMIAINA ST

METROAREA	NONCBD	
LOSTTIME		2.0
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	.0	2.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	5	139	58	48	130	1161	745	190	266	170	63	1
WIDTHS	.0	24.0	12.0	.0	24.0	12.0	.0	24.0	12.0	.0	24.0	12.0
LANES	0	2	1	0	2	1	0	2	1	0	2	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3695	389	0	3443	1074	0	2938	1259	0	3027	1189

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	17.36	34.64					
YELLOWTIMES	4.00	4.00					
CRITICALS	9	6					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY 02/21/96
2000 - SCENARIO A 13:24:49
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 8 - PAIWA ST & LUMIAINA ST
Degree of Saturation (v/c) 1.15 Vehicle Delay 36.4@ Level of Service D
@ expect more delay due to extreme v/c's (see EVALUATE)

```
        ---------------------------
Sq 11 | Phase 1  |  Phase 2  |
**/** ---------------------------
      | + + +    |        ^  |
      | + + +    |     ++++  |
 /|\  |<+ + +>   |    <++++  |
  |   |  v       |   ^ ****  |
  |   |       ^  |++++   v   |
North |    <* + +>|++++>      |
  |   |     * + +|++++        |
      |     * + +|   v        |
        ---------------------------
      | G/C= .289 | G/C= .577 |
      | G=  17.4" | G=  34.6" |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=35.6% |
        ---------------------------
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								10.3	B	
TH+RT	24/2	.058	.323	1139	1192	151	.127	9.3	B+	43 ft
LT	12/1	.000	.323	93	119	61	.488	12.9	B	35 ft
NB Approach								39.0	D	
TH+RT	24/2	.352	.323	892	948	984	1.038	45.9	E+	281 ft
LT	12/1	.266	.323	354	406	280	.690	14.8	*B	160 ft
WB Approach								43.7@	E+	
TH+RT	24/2	.074	.611	2103	2103	188	.089	3.1	A	31 ft
LT	12/1	.986	.611	627	656	1222	1.863	50.0@	*E+	401 ft
EB Approach								3.2	A	
TH+RT	24/2	.104	.611	1849	1849	245	.133	3.2	A	40 ft
LT	12/1	.000	.611	698	726	1	.001	2.9	A	25 ft

```
ATA Inc.            STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS                 1994 HCM
:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
Major Street: MANAGER'S DRIVE                                          Print Date:    21-Feb
Minor Street:   ROAD Y                                                    Analyst:        BC
   Peak Hour:       AM                                                   File Name:   MAKROY-A
    Scenario: YEAR 2000 - SCENARIO A                                  Intersection:       12
-----------------------------------------------------------------------------------------------------
Peak Hour Factor:       1.00  :
--------MAJOR STREET--------  : V2      25 ----------->            <---------  18      V5
     Num of Lanes - V2:    2  :
    Excl RT - V3 (Y/N):    N  : V3      97 -----                        -----  24      V4
 Stop/Yield - V3 (Y/N):    N  :              \                         /
      % Grade - V2,V3:     0  :               v                       v     MAJOR STREET:
                              :                                              MANAGER'S DRIVE
     Num of Lanes - V5:    2  :                          (         )
    Excl LT - V4 (Y/N):    Y  :                           \       /
      % Grade - V4,V5:     0  :                            :     :
                              :                            :     :
--------MINOR STREET--------  :                           282   118                    NORTH--->
  Num of Lanes - V7,V9:    2  :
     Shared Lane (Y/N):    N  :                            V7    V9
      % Grade - V7&V9:     0  :                 MINOR STREET: ROAD Y
-----------------------------------------------------------------------------------------------------
VOLUME ADJUSTMENTS
  MOVEMENT NO.                      2        3         4            5         7         9
  VOLUME, V (vph)                  25       97        24           18       282       118
  VOLUME, v (pcph)                 25       97        26           18       310       130
-----------------------------------------------------------------------------------------------------
STEP 1: RT FROM MINOR STREET - V9
  Conflicting Flows:     :  Vc,9 = 1/2*V3+V2 =         49   +   25     =          74   vph
  Potential Capacity:    :  Cp,9 =                                              1271   pcph
  Movement Capacity:     :  Cm,9 = Cp,9 =                                       1271   pcph
-----------------------------------------------------------------------------------------------------
STEP 2: LT FROM MAJOR STREET - V4
  Conflicting Flows:            :  Vc,4 = V3+V2 =          97   +   25   =       122   vph
  Potential Capacity:           :  Cp,4 =                                       1474   pcph
  Movement Capacity:            :  Cm,4 = Cp,4 =                                1474   pcph
  Prob. of Queue-free State:    :  po,4 = 1-v4/Cm,4 =                            0.98
  Major Left Shared Lane        :
   Prob. of Queue-free State:   :  p*o,4 =                                         NA
-----------------------------------------------------------------------------------------------------
STEP 3: LT FROM MINOR STREET - V7
  Conflicting Flows:            :  Vc,7 = 1/2V3+V2+V5+V4 =                       116   vph
  Potential Capacity:           :  Cp,7 =                                        893   pcph
  Capacity Adjustment Factor
   Due To Impeding Movements:   :  f7=po,4=                                      0.98
  Movement Capacity:            :  Cm,7 = Cp,7 =                                 877   pcph
-----------------------------------------------------------------------------------------------------
DELAY AND LEVEL OF SERVICE SUMMARY                          csh     AVG TOTAL
    Movement                v(pcph)      cm(pcph)    (pcph)     DELAY       LOS
  ------------             ---------     --------    ------     -----      -----
  MINOR LEFT TURN   (7)        310          877      --NA--       6.3         B
  MINOR RIGHT TURN  (9)        130         1271      --NA--       3.2         A
  MAJOR LEFT TURN   (4)         26         1474      ------       2.5         A
-----------------------------------------------------------------------------------------------------
     AVERAGE MINOR APPROACH DELAY :   5.4 sec/veh   :   AVERAGE TOTAL INTERSECTION DELAY :    4.0 sec/veh
                LEVEL OF SERVICE :    A             :                   LEVEL OF SERVICE :    A
:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
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ATA Inc.            STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS                 1994 HCM
:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
Major Street: MANAGER'S DRIVE                                          Print Date:    21-Feb
Minor Street:   ROAD Y                                                    Analyst:        BC
   Peak Hour:       PM                                                   File Name:   [illegible]
    Scenario: YEAR 2000 - SCENARIO A                                  Intersection:   [illegible]
-----------------------------------------------------------------------------------------------------
Peak Hour Factor:       1.00  :
--------MAJOR STREET--------  : V2   [illegible] ----------        --------  [illegible]   V5
     Num of Lanes - V2:    2  :
    Excl RT - V3 (Y/N):    N  : V3   [illegible] -----               -----  [illegible]   V4
 Stop/Yield - V3 (Y/N):    N  :
      % Grade - V2,V3:     0  :                                              MAJOR STREET:
                              :                                              MANAGER'S DRIVE
     Num of Lanes - V5:    2  :
    Excl LT - V4 (Y/N):    Y  :
      % Grade - V4,V5:     0  :
                              :
--------MINOR STREET--------  :                      [illegible]   [illegible]       NORTH--->
  Num of Lanes - V7,V9:    2  :
     Shared Lane (Y/N):    N  :                          V7        V9
      % Grade - V7&V9:     0             MINOR STREET: ROAD Y
-----------------------------------------------------------------------------------------------------
VOLUME ADJUSTMENTS
  MOVEMENT NO.                      2        3         4            5         7         9
  VOLUME, V (vph)         [illegible]  [illegible]  [illegible]  [illegible]  [illegible]  [illegible]
  VOLUME, v (pcph)        [illegible]  114  147  [illegible]  [illegible]  [illegible]
-----------------------------------------------------------------------------------------------------
STEP 1: RT FROM MINOR STREET - V9
  Conflicting Flows:     :  Vc,9 = 1/2*V3+V2 =    [illegible]  +  [illegible]  =   [illegible]   vph
  Potential Capacity:    :  Cp,9 =                                              1263   pcph
  Movement Capacity:     :  Cm,9 = Cp,9 =                                [illegible]   pcph
-----------------------------------------------------------------------------------------------------
STEP 2: LT FROM MAJOR STREET - V4
  Conflicting Flows:            :  Vc,4 = V3+V2 =     114   +  [illegible]  =  [illegible]   vph
  Potential Capacity:           :  Cp,4 =                                [illegible]   pcph
  Movement Capacity:            :  Cm,4 = Cp,4 =                         [illegible]   pcph
  Prob. of Queue-free State:    :  po,4 = 1-v4/Cm,4 =                    [illegible]
  Major Left Shared Lane        :
   Prob. of Queue-free State:   :  p*o,4 =                                         NA
-----------------------------------------------------------------------------------------------------
STEP 3: LT FROM MINOR STREET - V7
  Conflicting Flows:            :  Vc,7 = 1/2V3+V2+V5+V4 =               [illegible]   vph
  Potential Capacity:           :  Cp,7 =                                [illegible]   pcph
  Capacity Adjustment Factor    :
   Due To Impeding Movements:   :  f7=po,4=                              [illegible]
  Movement Capacity:            :  Cm,7 = Cp,7 =                         [illegible]   pcph
-----------------------------------------------------------------------------------------------------
DELAY AND LEVEL OF SERVICE SUMMARY                          csh     AVG TOTAL
    Movement                v(pcph)      cm(pcph)    (pcph)     DELAY       LOS
  ------------             ---------     --------    ------     -----      -----
  MINOR LEFT TURN   (7)        263      [illegible]  --NA--   [illegible]     B
  MINOR RIGHT TURN  (9)         19         1263      --NA--   [illegible]     A
  MAJOR LEFT TURN   (4)        147         1449      ------       2.8         A
-----------------------------------------------------------------------------------------------------
     AVERAGE MINOR APPROACH DELAY :   8.5 sec/veh   :   AVERAGE TOTAL INTERSECTION DELAY :    4.7 sec/veh
                LEVEL OF SERVICE :    B             :                   LEVEL OF SERVICE :    A
:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
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RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.41] - Summary of Parameter Values

Intersection Parameters for Int # [illegible]

METROAREA NONCBD
LOSTTIME [illegible]
LEVELOFSERVICE C [illegible]
NODELOCATION 0 0

Approach Parameters

APPLABELS	SB	NB	[illegible]	[illegible]
GRADES	[illegible]	[illegible]	[illegible]	[illegible]
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	[illegible]	[illegible]	[illegible]	[illegible]
BUSVOLUMES	5	[illegible]	[illegible]	[illegible]
RIGHTTURNONREDS	0	[illegible]	[illegible]	[illegible]

Movement Parameters

MOVLABELS	RT	TH	LT
VOLUMES	262	[illegible]	[illegible]
WIDTHS	0	21.[illegible]	0
LANES	0	[illegible]	[illegible]
UTILIZATIONS	1.00	1.[illegible]	1.[illegible]
TRUCKPERCENTS	2.[illegible]	2.[illegible]	2.[illegible]
PEAKHOURFACTORS	.95	.95	.95
ARRIVALTYPES	3	3	3
ACTUATIONS	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.[illegible]
IDEALSATFLOWS	1900	1900	1900
FACTORS	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.[illegible]
GROUPTYPES	NORM	NORM	NORM
SATURATIONFLOWS	0	3517	0

Phasing Parameters

SEQUENCES	11	ALL
PERMISSIVES	YES	YES
OVERLAPS	YES	YES
CYCLES	[illegible]	[illegible]
GREENTIMES	37.64	14.36
YELLOWTIMES	4.[illegible]	4.00
CRITICALS	2	12
EXCESS	0	

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.41] - Capacity Analysis Summary

Intersection Averages for Int # [illegible]
Degree of Saturation [illegible] Level of Service [illegible]

Sq 11 | Phase 1 | Phase 2
North
G/C= .627 | G/C= .239
G= 37.6" | G= 14.4"
Y+R= 4.0" | Y+R= 4.0"
OFF= .0% | OFF=69.4%

C= 60 sec G= 52.0 sec [illegible]

Lane Group	Width/Lanes	g/C Reqd	g/C Used	Service Rate	Adj Volume	v/c	HCM Delay	L O S	90% Max Queue
SB Approach									
TH+RT	24/2	.30[illegible]	.[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NB Approach									
LT+TH	24/2	.251	.661	1578	1576	[illegible]	[illegible]	[illegible]	[illegible]
EB Approach									
RT	12/1	.007	.273	363	120	.[illegible]	[illegible]	[illegible]	25 ft
LT	12/1	.128	.273	362	120	[illegible]	11.5	[illegible]	56 ft

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.41] - Summary of Parameter Values

Intersection Parameters for Int # [illegible] - Waipahu [illegible]

METROAREA	NONCBD
LOSTTIME	3.0
LEVELOFSERVICE	C [illegible]
NODELOCATION	0 0

Approach Parameters

	SB	WB	NB	EB
APPLABELS	SB	WB	NB	[illegible]
GRADES	[illegible]	[illegible]	[illegible]	[illegible]
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	[illegible]	[illegible]	[illegible]	[illegible]
BUSVOLUMES	5	[illegible]	5	[illegible]
RIGHTTURNONREDS	0	[illegible]	[illegible]	[illegible]

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	200	[illegible]	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WIDTHS	[illegible]	24.0	0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LANES	0	2	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UTILIZATIONS	1.00	1.00	1.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	[illegible]	[illegible]	2.0	[illegible]	[illegible]	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ARRIVALTYPES	3	3	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	[illegible]	[illegible]	[illegible]
REQCLEARANCES	4.0	4.0	4.0	4.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MINIMUMS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
IDEALSATFLOWS	1900	1900	1900	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
FACTORS	1.00	1.00	1.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DELAYFACTORS	1.00	1.00	1.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NSTOPFACTORS	1.00	1.00	1.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3550	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	[illegible]	[illegible]	[illegible]
OVERLAPS	YES	YES	YES	YES	[illegible]	[illegible]	[illegible]
CYCLES	60	180	15		[illegible]		
GREENTIMES	27.06	24.94					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	12					
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.41] - Capacity Analysis Summary

Intersection Averages for Int # [illegible] - Waipahu [illegible]
Degree of Saturation (v/c) [illegible] Vehicle Delay [illegible] Level of Service [illegible]

Sq 11	Phase 1	Phase 2
North		
	G/C= .451	G/C= .415
	G= 27.1"	G= 24.9"
	Y+R= 4.0"	Y+R= 4.0"
	OFF= .0%	OFF=51.8%

C= 60 sec G= 52.0 sec [illegible] Y= [illegible] sec [illegible] Ped= [illegible] sec [illegible]

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach										
TH+RT	24/2	.292	.484	1706	1719	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NB Approach										
LT+TH	24/2	.226	.484	1505	1524	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EB Approach										
RT	12/1	.041	.449	646	691	34	[illegible]	[illegible]	[illegible]	[illegible]
LT	12/1	.271	.449	648	691	159	[illegible]	[illegible]	[illegible]	[illegible]

CORRECTION

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

RECEIVED AS FOLLOWS

OMPAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.41 - Summary of Parameter Values

Intersection Parameters for Int # [illegible] - Waipahu [illegible]

METROAREA	NONCBD
LOSTTIME	[illegible]
LEVELOFSERVICE	C [illegible]
NODELOCATION	[illegible]

Approach Parameters

APPLABELS	SB	NB	EB	[illegible]
GRADES	[illegible]	[illegible]	[illegible]	[illegible]
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	[illegible]	[illegible]	[illegible]	[illegible]
BUSVOLUMES	5	[illegible]	5	[illegible]
RIGHTTURNONREDS	0	[illegible]	[illegible]	[illegible]

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	LT	TH	LT
VOLUMES	200	[illegible]	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
WIDTHS	[illegible]	24.0	0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LANES	0	2	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UTILIZATIONS	1.00	1.00	1.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TRUCKPERCENTS	2.0	2.0	2.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PEAKHOURFACTORS	.95	.95	.95	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ARRIVALTYPES	3	3	3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ACTUATIONS	YES	YES	YES	YES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
REQCLEARANCES	4.0	4.0	4.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MINIMUMS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
IDEALSATFLOWS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
FACTORS	1.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DELAYFACTORS	1.00	1.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NSTOPFACTORS	1.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
GROUPTYPES	NORM	NORM	NORM	NORM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SATURATIONFLOWS	[illegible]	[illegible]										

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	[illegible]	[illegible]	[illegible]
OVERLAPS	YES	YES	YES	YES	OFFSET	[illegible]	[illegible]
CYCLES	60	180	15		ACTION		
GREENTIMES	27.06	24.94					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	12					
EXCESS	0						

OMPAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.41 - Capacity Analysis Summary

Intersection Averages for Int # [illegible] - Waipahu [illegible]
Degree of Saturation (v/c) [illegible] Vehicle Delay [illegible] Level of Service [illegible]

```
Sq 11 | Phase 1 | Phase 2
**/** |         |
      | G/C= .451 | G/C= .415
      | G= 27.1"  | G= 24.9"
      | Y+R= 4.0" | Y+R= 4.0"
      | OFF= .0%  | OFF=51.8%
North
```

C= 60 sec G= 52.0 sec [illegible]

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach										
TH+RT	24/2	.292	.484	1706	1719	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] ft
NB Approach										
LT+TH	24/2	.228	.484	1505	1519	[illegible]	[illegible]	[illegible]	[illegible]	180 ft
EB Approach										
RT	12/1	.041	.449	646	691	34	[illegible]	[illegible]	[illegible]	[illegible] ft
LT	12/1	.271	.449	646	691	359	.520	[illegible]	[illegible]	[illegible] ft

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS

APPENDIX B

• YEAR 2000 WITH PHASES I AND II LOS CALCULATIONS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
17:21:10

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 1 - WAIPAHU ST & WAIPAHU DEPOT ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	3.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	158	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	0	0	0	248	294	113	0	73	120	351	0
WIDTHS	.0	.0	.0	.0	12.0	.0	11.0	.0	11.0	.0	12.0	.0
LANES	0	0	0	0	1	0	1	0	1	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	NO	NO
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	0	0	0	1825	0	1172	0	1465	0	1569	0

Phasing Parameters

SEQUENCES	17	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	5.79	20.85	21.35				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	9	5	11				
EXCESS	0						

RECEIVED AS FOLLOWS

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY 02/21/96
2000 - SCENARIO B 17:21:18
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 1 - WAIPAHU ST & WAIPAHU DEPOT ST
Degree of Saturation (v/c) .79 Vehicle Delay 16.2 Level of Service C+

```
      ---------------------------------------
Sq 17 |  Phase 1  |  Phase 2  |  Phase 3  |
**/** ---------------------------------------
      |           |           |           |
 /|\  |           |     <****|           |
  |   |           |      ****|           |
  |   |           |      v   |           |
North |    <*   +>|           |****>      |
  |   |     *   + |           |****       |
      |     *   + |           |    v      |
      ---------------------------------------
      | G/C= .097 | G/C= .348 | G/C= .356 |
      | G=   5.8" | G=  20.9" | G=  21.4" |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=16.3% | OFF=57.7% |
      ---------------------------------------
```

C= 60 sec G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
NB Approach								16.3	C+	
RT	11/1	.003	.130	107	146	1	.007	14.7	B	25 ft
LT	11/1	.082	.130	139	186	77	.405	16.3	*C+	57 ft
WB Approach								16.2	C+	
LT+TH	12/1	.342	.381	645	695	570	.820	16.2	*C+	298 ft
EB Approach								16.2	C+	
TH+RT	12/1	.350	.389	562	611	495	.810	16.2	*C+	255 ft

AMFAC - WAIPAHU TRAFFIC STUDY 02/21/96
2000 SCENARIO B 17:19:41
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 1 - WAIPAHU ST & WAIPAHU DEPOT ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	3.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	158	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	0	0	0	457	225	177	0	101	108	263	0
WIDTHS	.0	.0	.0	.0	12.0	.0	11.0	.0	11.0	.0	12.0	.0
LANES	0	0	0	0	1	0	1	0	1	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	NO	NO
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	0	0	0	1113	0	1172	0	1465	0	1558	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	6.35	45.65					
YELLOWTIMES	4.00	4.00					
CRITICALS	9	5					
EXCESS	0						

MFAC - WAIPAHU TRAFFIC STUDY
000 SCENARIO B
M PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
17:19:46

IGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

```
ntersection Averages for Int #   1 - WAIPAHU ST & WAIPAHU DEPOT ST
     Degree of Saturation (v/c)  .62  Vehicle Delay   5.8  Level of Service B+

     ----------------------------
:q 11 |  Phase 1   |  Phase 2   |
:*/** ----------------------------
      |            |            |
 /|\  |            |       <****|
  |   |            |        ****|
  |   |            |        v   |
lorth |    <*    +>|++++>       |
  |   |     *    + |++++        |
      |     *    + |  v         |
      ----------------------------
      | G/C= .106  | G/C= .761  |
      | G=   6.3"  | G=  45.7"  |
      | Y+R= 4.0"  | Y+R= 4.0"  |
      | OFF=  .0%  | OFF=17.2%  |
      ----------------------------
    C= 60 sec   G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
B Approach								16.9	C+	
RT	11/1	.035	.139	117	157	20	.123	14.6	B	25 ft
LT	11/1	.105	.139	152	201	106	.520	17.4	*C+	77 ft
'B Approach								6.4	B+	
LT+TH	12/1	.666	.794	876	884	718	.812	6.4	*B+	125 ft
B Approach								1.1	A	
TH+RT	12/1	.288	.794	1238	1238	391	.316	1.1	A	68 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 SCENARIO B
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
13:11:04

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int #   2 - WAIPAHU ST & MOKUOLA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	93	130	48	55	467	359	198	46	83	156	284	29
WIDTHS	12.0	12.0	.0	.0	12.0	.0	~~12.0~~	12.0	.0	.0	12.0	12.0
LANES	1	1	0	0	1	0	1	1	0	0	1	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1539	1636	0	0	655	0	1219	1044	0	0	1713	311

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	10.91	41.09					
YELLOWTIMES	4.00	4.00					
CRITICALS	7	5					
EXCESS	0						

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 SCENARIO B
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
13:12:02

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 2 - WAIPAHU ST & MOKUOLA ST
Degree of Saturation (v/c) 1.16 Vehicle Delay 30.20 Level of Service D+
@ expect more delay due to extreme v/c's (see EVALUATE)

```
Sq 11 | Phase 1  | Phase 2  |
**/** ------------------------
      | + + +    |       -  |
      | + + +    |     **** |
 /|\  |(+ + +)   |    <**** |
  |   |   v      |  -  **** |
  |   |      -   |****  v   |
North |  (+ + *) |****>     |
  |   |   + + *  |****      |
      |   + + *  | v        |
      ------------------------
      | G/C= .182 | G/C= .685 |
      | G= 10.9"  | G= 41.1"  |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF= .0%  | OFF=24.9% |
      ------------------------
C= 60 sec   G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped= .0 sec = .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								14.1	B	
RT	12/1	.094	.215	273	331	98	.296	12.9	B	65 ft
LT+TH	12/1	.150	.215	293	352	188	.534	14.7	B	124 ft
NB Approach								21.7	C	
RT	12/1	.215	.215	209	262	208	.794	24.8	*C	138 ft
LT+TH	12/1	.175	.215	176	224	135	.600	16.8	C+	89 ft
WB Approach								53.20	E	
LT+TH+RT	12/1	1.000	.718	444	470	920	1.974	53.20	*E	221 ft
EB Approach								2.2	A	
TH+RT	12/1	.304	.718	1229	1230	463	.376	2.2	A	110 ft
LT	12/1	.000	.718	196	223	31	.139	1.7	A	25 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
13:15:56

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 2 - WAIPAHU ST & MOKUOLA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	76	91	112	120	514	238	269	85	106	125	371	59
WIDTHS	12.0	12.0	.0	.0	12.0	.0	~~12.0~~	12.0	.0	.0	12.0	11.0
LANES	1	1	0	0	1	0	1	1	0	0	1	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1539	1117	0	0	721	0	1219	1060	0	0	1745	290

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	14.64	37.36					
YELLOWTIMES	4.00	4.00					
CRITICALS	7	5					
EXCESS	0						

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS
02/25/96
13:16:19

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 2 - WAIPAHU ST & MOKUOLA ST
Degree of Saturation (v/c) 1.13 Vehicle Delay 29.20 Level of Service D+
@ expect more delay due to extreme v/c's (see EVALUATE)

```
Sq 11 | Phase 1  | Phase 2  |
**/** -----------------------
      | + + +    |      -   |
  ^   | + + +    |     ****|
 /|\  |(+ + +)   |    (****|
  |   | v        |   - ****|
  |   |       -  |++++  v  |
North |  (+ + *)|++++)     |
  |   |   + + * |++++      |
      |   + + * |  v       |
      -----------------------
      | G/C= .244 | G/C= .623 |
      | G=  14.6" | G=  37.4" |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=31.1% |
      -----------------------
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								15.2	C+	
RT	12/1	.080	.277	370	427	80	.187	10.7	B	49 ft
LT+TH	12/1	.230	.277	258	310	214	.690	16.9	C+	130 ft
NB Approach								21.3	C	
RT	12/1	.276	.277	285	338	283	.837	24.6	*C	172 ft
LT+TH	12/1	.235	.277	245	296	201	.679	16.7	C+	123 ft
WB Approach								54.30	E	
LT+TH+RT	12/1	1.000	.656	444	473	918	1.941	54.30	*E	266 ft
EB Approach								3.5	A	
TH+RT	12/1	.331	.656	1135	1145	523	.457	3.5	A	152 ft
LT	11/1	.000	.656	162	190	62	.326	3.3	A	25 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS
02/21/96
16:58:05

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 3 - WAIPAHU ST & PAIWA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	130	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	484	402	40	58	444	155	93	205	46	111	273	186
WIDTHS	11.0	12.0	.0	.0	12.0	.0	.0	12.0	.0	.0	12.0	.0
LANES	1	1	0	0	1	0	0	1	0	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1332	1439	0	0	756	0	0	256	0	0	434	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	40.33	131.67					
YELLOWTIMES	4.00	4.00					
CRITICALS	8	11					
EXCESS	0						

RECEIVED AS FOLLOWS

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
16:58:19

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 3 - WAIPAHU ST & PAIWA ST
Degree of Saturation (v/c) 2.10 Vehicle Delay 89.6@ Level of Service F
@ expect more delay due to extreme v/c's (see EVALUATE)

```
-------------------------------------
Sq 11 | Phase 1  |  Phase 2  |
**/** -------------------------------
      | + + +    |        ^  |
  .   | + + +    |     ++++  |
 /|\  |<+ + +>   |    <++++  |
  |   |   v      |  ^  ++++  |
  |   |      ^   |****  v    |
North |   <* * *>|****>      |
  |   |    * * * |****       |
      |    * * * |    v      |
      -----------------------
      | G/C= .224 | G/C= .732 |
      | G=  40.3" | G= 131.7" |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=   .0%| OFF=24.6% |
      -----------------------
   C=180 sec   G=172.0 sec = 95.6%  Y= 8.0 sec =  4.4%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								99.2@	F	
RT	11/1	.458	.235	1	277	373	1.192	100.2@	F	722 ft
LT+TH	12/1	.480	.235	1	302	465	1.376	98.5@	F	900 ft
NB Approach								156.6@	F	
LT+TH+RT	12/1	1.000	.235	1	43	362	6.033	156.6@	*F	701 ft
WB Approach								59.7@	E	
LT+TH+RT	12/1	.931	.743	510	562	691	1.230	59.7@	E	450 ft
EB Approach								70.0@	F	
LT+TH+RT	12/1	1.000	.743	278	322	600	1.863	70.0@	*F	391 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
17:05:58

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 3 - WAIPAHU ST & PAIWA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	170	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	423	222	33	52	448	33	64	216	77	101	424	243
WIDTHS	11.0	12.0	.0	.0	12.0	.0	.0	12.0	.0	.0	12.0	.0
LANES	1	1	0	0	1	0	0	1	0	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1332	1664	0	0	1181	0	0	1234	0	0	739	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	17.94	34.06					
YELLOWTIMES	4.00	4.00					
CRITICALS	8	11					
EXCESS	0						

RECEIVED AS FOLLOWS

MFAC - WAIPAHU TRAFFIC STUDY
000 - SCENARIO B
M PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
17:06:04

IGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

```
Intersection Averages for Int #   3 - WAIPAHU ST & PAIWA ST
     Degree of Saturation (v/c) 1.12  Vehicle Delay  30.2@ Level of Service D+
        @ expect more delay due to extreme v/c's (see EVALUATE)
        ---------------------------
iq 11 | Phase 1  | Phase 2  |
:*/** ---------------------------
      | + + +    |     ~    |
      | + + +    |      ++++|
 /|\  |<+ + +>   |     <++++|
  |   |  v       |   ^  ++++|
  |   |     ^    |****  v   |
orth  |  <* * *> |****>     |
  |   |   * * *  |****      |
      |   * * *  |   v      |
      ---------------------------
      | G/C= .299 | G/C= .568 |
      | G=  17.9" | G=  34.1" |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=36.6% |
      ---------------------------
   C= 60 sec   G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
B Approach								11.6	B	
RT	11/1	.241	.332	391	443	266	.600	12.4	B	150 ft
LT+TH	12/1	.198	.332	499	553	269	.486	10.9	B	151 ft
B Approach								30.1	D+	
LT+TH+RT	12/1	.346	.332	359	410	375	.915	30.1	*D+	211 ft
B Approach								10.1	B	
LT+TH+RT	12/1	.508	.601	681	710	562	.792	10.1	B	189 ft
B Approach								56.5@	E	
LT+TH+RT	12/1	1.000	.601	411	444	808	1.820	56.5@	*E	272 ft

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	PAIWA ST	Print Date:	21-Feb-96
Minor Street:	PAIWA PL	Analyst:	BC
Scenario:	YEAR 2000 - SCENARIO B	File Name:	PAIPAI-A
Peak Hour:	AM	Intersection #:	-1T

```
     Peak Hour Factor:   1.00 :         V12    V11    V10
                              :
                              :          0      0      0          NORTH --->
---------MAJOR STREET-------- :          :      :      :
  Num of Lanes - V2:        2 :          :      :      :
  Excl LT - V1 (Y/N):       N :          /      :      \
  Excl RT - V3 (Y/N):       N :         <       v       >
  Stop/Yield - V3 (Y/N):    N :
     Grade - V1,V2,V3:      0 :    -                        -
                              :   /                          \
  Num of Lanes - V5:        2 : V1    0 -----               ----  214 V6
  Excl LT - V4 (Y/N):       N :
  Excl RT - V6 (Y/N):       N : V2  428 ------->           <----  960 V5
  Stop/Yield - V6 (Y/N):    N :
     Grade - V4,V5,V6:      0 : V3    1 -----               ----    5 V4
                              :   \                          /
---------MINOR STREET-------- :    v                        v   MAJOR STREET
  Num of Lanes - V8:        1 :                                 PAIWA ST
     Grade - V7,V8,V9:      0 :         <       ^       >
  Shared Lane-V7,8,9:       3 :          \      :      /
(0:N,1:LT,2:TR,3:LTR)         :          :      :      :
                              :          :      :      :
  Num of Lanes - V11:       1 :          7      0      3
  Grade - V10,V11,V12:      0 :
  Shared Lane-V10,11,12:    0 :         V7     V8     V9
(0:N,1:LT,2:TR,3:LTR)         :
                              :       MINOR STREET - PAIWA PL
```

VOLUME ADJUSTMENTS												
MOVEMENT NO.	1	2	3	4	5	6	7	8	9	10	11	12
HOURLY FLOW RATE, V(vph)	0	428	1	5	960	214	7	0	3	0	0	0
VOLUME, v (pcph)	0	428	1	6	969	214	8	0	3	0	0	0

STEP 1: RT FROM MINOR STREET				
Conflicting Flows:	Vc9 : 1/2 V5 + V2 :	215 vhp	Vc12 : 1/2 V6 + V5 :	591 vhp
Potential Capacity:	Cp,9 :	1078 pcph	Cp,12 :	695 pcph
Movement Capacity:	Cm,9:Cp,9:	1078 pcph	Cm,12:Cp,12:	695 pcph
Prb. of Queue-free State:	po,9:1-v9/Cm,9:	1.00	po,12:1-v12/Cm,12:	1.00

STEP 2: LT FROM MAJOR STREET				
Conflicting Flows:	Vc,4 : V2 + V3 :	429 vhp	Vc,1 : V5 + V6 :	1182 vhp
Potential Capacity:	Cp,4 :	1009 pcph	Cp,1 :	398 pcph
Movement Capacity:	Cm,4:Cp,4:	1009 pcph	Cm,1:Cp,1:	398 pcph
Prb. of Queue-free State:	po,4:1-v4/Cm4:	0.99	po,1:1-v1/Cm1:	1.00
Major Left Shared Lane				
Prob. of Queue-free State	p*o,4:	0.99	p*o,1:	1.00

PAGE 1 OF 2

----continued ----

RECEIVED AS FOLLOWS

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ATA Inc.          TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS          1994 HCM
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
Major Street:   PAIWA ST                                                        DATE:   21-Feb-96
Minor Street:   PAIWA PL                                                     Analyst:   BC
   Scenario:   YEAR 2000 - SCENARIO B                                      File Name:   PAIPAI-A
  Peak Hour:   AM                                         Intesection  Intesection #:          11
....................................................................................................
STEP 3: TH FROM MINOR STREET   :                                    :
   Conflicting Flows:          :Vc.,8 = 1/2V3+V2+V1+V6+V5+V4         :  Vc.,11 = 1/2V6+V5+V4+V3+V2+V1
                               :      =                1416  vph    :         =              1509 vph
   Potential Capacity:         :Cp,8 =                  124 pcph    :  Cp,11 =                 143 pcph
   Capacity Adj Factor:        :f8 = po,4*po,1 =       0.99         :  f11 = po,4*po,1 =      0.99
   Movement Capacity:          :Cm,8 = Cp,8*f8 =        123 pcph    :  Cm,11 = Cp,11*f11 =     141 pcph
   Prob. of Queue-free State:  :po,8 = 1-v8/Cm,8 =     1.00         :  po,11 = 1-v11/Cm,11 =  1.00
....................................................................................................
STEP 4: LT FROM MINOR STREET   :                                    :
   Conflicting Flows:          :Vc,7 = 1/2V3+V2+V1+1/2V6+V5+V4+     :  Vc,10 = 1/2V6+V5+V4+1/2V3+V2+V1+
                               :         1/2(V11+V12) =  1402  vph  :           1/2(V8+V9) =   1508 vph
   Potential Capacity:         :Cp7 =                   135 pcph    :  Cp10 =                  115 pcph
   Major Left, Minor Through   :                                    :
    Impedance Factor:          :P''7=po,11*f11 =       0.99         :  P''10=po,8*f8 =        0.99
   Major Left, Minor Through   :                                    :
    Adjusted Impedance Factor: :p'7 =                  0.99         :  p'10 =                 0.99
   Capacity Adjustment Factor: :f7 = p'7*po,12 =       0.99         :  f10 = p'10*po,9 =      0.99
   Movement Capacity:          :Cm,7 = f7*Cp,7 =        133 pcph    :  Cm,10 = f10*Cp,10 =     114 pcph
....................................................................................................
DELAY AND LEVEL OF SERVICE SUMMARY                          AVG            :
                                                            TOTAL          :
   MOVEMENT                  v(pcph)  cm(pcph) csh(pcph)    DELAY    LOS   :
   --------------------      -------------------------      ------   ----  :
   MINOR LEFT TURN    (7)       0        133     SHRD       SHRD      --   : LEVEL OF SERVICE CRITERIA
   MINOR THROUGH      (8)       0        123      175       21.9      D    :
   MINOR RIGHT TURN   (9)       5       1070     SHRD       SHRD     ----  :                 AVG
                                                                           :   LEVEL         TOTAL
   MINOR LEFT TURN   (10)       0        114    --NA--      31.4      E    :    OF           DELAY
   MINOR THROUGH     (11)       0        141    --NA--      25.5      D    :  SERVICE      (SEC/VEH)
   MINOR RIGHT TURN  (12)       0        695    --NA--       5.2      B    :  -------      ---------
                                                                           :     A         <=5
   MAJOR LEFT         (1)       0        398    --NA--       9.1      B    :     B         >5&<=10
   MAJOR LEFT         (4)       6       1009    --NA--       3.6      A    :     C         >10&<=20
                                                                           :     D         >20&<=30
   MINOR APPROACH (7)(8)(9)     -         -        -        21.9      D    :     E         >30&<=45
   MINOR APPROACH (10)(11)(12)  -         -        -         ERR     ERR   :     F         >45
                                                                           :
   MAJOR APPROACH (1)(2)(3)     -         -        -         0.0     ----  :
   MAJOR APPROACH (4)(5)(6)     -         -        -         0.0      A    :
                                                                           :
   TOTAL INTERSECTION (1-12)    -         -        -         ERR     ERR   :
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
   PAGE 2 OF 2
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ATA Inc.      TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS               1994 HCM
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
Major Street:   PAIWA ST                                                   Print Date:   21-Feb-96
Minor Street:   PAIWA PL                                                      Analyst:          BC
   Scenario:   YEAR 2000 - SCENARIO B                                       File Name:    PAIPAI-P
  Peak Hour:        PM                                                 Intesection #:           11
....................................................................................................
                              :          V12      V11      V10
     Peak Hour Factor:   1.00 :
                              :           0        0        0                    NORTH --->
---------MAJOR STREET-------- :           :        :        :
    Num of Lanes - V2:      2 :           :        :        :
   Excl LT - V1 (Y/N):      N :           /        :        \
   Excl RT - V3 (Y/N):      N :          <         v         >
Stop/Yield - V3 (Y/N):      N :
    Grade - V1,V2,V3:       0 :       .                           .
                              :      /                             \
    Num of Lanes - V5:      2 : V1   0 -----                        ----  116 V6
   Excl LT - V4 (Y/N):      N :
   Excl RT - V6 (Y/N):      N : V2 781 ------->                    <----  950 V5
Stop/Yield - V6 (Y/N):      N :
    Grade - V4,V5,V6:       0 : V3   5 -----                        ----    3 V4
                              :      \                             /
---------MINOR STREET-------- :       v                           v   MAJOR STREET
    Num of Lanes - V8:      1 :                                       PAIWA ST
    Grade - V7,V8,V9:       0 :          <         .         >
   Shared Lane-V7,8,9:      3 :           \        :        /
(0:N,1:LT,2:TR,3:LTR)         :           :        :        :
                              :           :        :        :
    Num of Lanes - V11:     1 :           4        0        2
  Grade - V10,V11,V12:      0 :
Shared Lane-V10,11,12:      0 :          V7       V8       V9
(0:N,1:LT,2:TR,3:LTR)         :
                              :          MINOR STREET - PAIWA PL
....................................................................................................
VOLUME ADJUSTMENTS            :
   MOVEMENT NO.               :    1   2   3    4   5    6    7   8   9   10   11   12
   HOURLY FLOW RATE, V(vph)   :    0 781   5    3 950  116    4   0   2    0    0    0
   VOLUME, v (pcph)           :    0 781   5    3 950  116    4   0   2    0    0    0
....................................................................................................
STEP 1: RT FROM MINOR STREET  :                                :
   Conflicting Flows:         :Vc9 = 1/2 V3 + V2 :    393  vhp :  Vc12 = 1/2 V6 + V5 :   533 vhp
   Potential Capacity:        :Cp,9 =                 875 pcph :  Cp,12 =                743 pcph
   Movement Capacity:         :Cm,9=Cp,9:             875 pcph :  Cm,12=Cp,12:           743 pcph
   Prb. of Queue-free State:  :po,9=1-v9/Cm,9:       1.00      :  po,12=1-v12/Cm,12:    1.00
....................................................................................................
STEP 2: LT FROM MAJOR STREET  :                                :
   Conflicting Flows:         :Vc,4 = V2 + V3 :       786  vhp :  Vc,1 = V5 + V6 :      1066 vhp
   Potential Capacity:        :Cp,4 =                 649 pcph :  Cp,1 =                 459 pcph
   Movement Capacity:         :Cm,4=Cp,4:             649 pcph :  Cm,1=Cp,1:             459 pcph
   Prb. of Queue-free State:  :po,4=1-v4/Cm4:        1.00      :  po,1=1-v1/Cm1:        1.00
   Major Left Shared Lane     :                                :
    Prob. of Queue-free State :p*o,4:                0.99      :  p*o,1:                1.00
....................................................................................................
   PAGE 1 OF 2                                                               ----continued ----
```

```
ATA Inc.               TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS          1994 HCM
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
Major Street:  PAIWA ST                                                       DATE:      21-Feb-96
Minor Street:  PAIWA PL                                                   Analyst:      BC
    Scenario:  YEAR 2000 - SCENARIO B                                   File Name:      PAIPAI-P
   Peak Hour:  PM                                  Intesection  Intesection #:          11
----------------------------------------------------------------------------------------------------
STEP 3: TH FROM MINOR STREET    :                                :
  Conflicting Flows:            :Vc.,8 = 1/2V3+V2+V1+V6+V5+V4     :  Vc.,11 = 1/2V6+V5+V4+V3+V2+V1
                                :      :              1053 vph   :        :                1797 vph
  Potential Capacity:           :Cp,8 :                 90 pcph  :  Cp,11 :                  97 pcph
  Capacity Adj Factor:          :f8 = po,4*po,1 :     0.99       :  f11 : po,4*po,1 :      0.99
  Movement Capacity:            :Cm,8 = Cp,8*f8 :       89 pcph  :  Cm,11 : Cp,11*f11 :     96 pcph
  Prob. of Queue-free State:    :po,8 = 1-v8/Cm,8 :   1.00       :  po,11 = 1-v11/Cm,11 :  1.00
----------------------------------------------------------------------------------------------------
STEP 4: LT FROM MINOR STREET    :                                :
  Conflicting Flows:            :Vc,7 = 1/2V3+V2+V1+1/2V6+V5+V4+ :  Vc,10 = 1/2V6+V5+V4+1/2V3+V2+V1+
                                :        1/2(V11+V12) :  1737 vph :        1/2(V8+V9) :    1792 vph
  Potential Capacity:           :Cp7 :                  82 pcph  :  Cp10 :                  76 pcph
  Major Left, Minor Through     :                                :
   Impedance Factor:            :p''7:po,11*f11 :      0.99      :  p''10:po,8*f8 :         0.99
  Major Left, Minor Through     :                                :
   Adjusted Impedance Factor:   :p'7 :                 0.99      :  p'10 :                  0.99
  Capacity Adjustment Factor:   :f7 = p'7*po,12 :      0.99      :  f10 = p'10*po,9 :       0.99
  Movement Capacity:            :Cm,7 = f7*Cp,7 :       82 pcph  :  Cm,10 = f10*Cp,10 :     75 pcph
----------------------------------------------------------------------------------------------------
DELAY AND LEVEL OF SERVICE SUMMARY                      AVG          :
                                                        TOTAL        :
  MOVEMENT                 v(pcph)  cm(pcph) csh(pcph)  DELAY   LOS  :
  --------------------    ---------------------------   ------  ---- :
  MINOR LEFT TURN   (7)      4        82     SHRD       SHRD    --   : LEVEL OF SERVICE CRITERIA
  MINOR THROUGH     (8)      0        89      117       32.4    E    :
  MINOR RIGHT TURN  (9)      2       875     SHRD       SHRD    ---- :                AVG
                                                                     :     LEVEL      TOTAL
  MINOR LEFT TURN  (10)      0        75    --NA--      47.9    F    :      OF        DELAY
  MINOR THROUGH    (11)      0        96    --NA--      37.4    E    :    SERVICE   (SEC/VEH)
  MINOR RIGHT TURN (12)      0       743    --NA--       4.8    A    :    -------   ---------
                                                                     :       A       <=5
  MAJOR LEFT        (1)      0       459    --NA--       7.8    B    :       B       >5&<=10
  MAJOR LEFT        (4)      3       649    --NA--       5.6    B    :       C       >10&<=20
                                                                     :       D       >20&<=30
  MINOR APPROACH (7)(8)(9)   -        -        -        32.4    E    :       E       >30&<=45
  MINOR APPROACH (10)(11)(12) -       -        -        ERR     ERR  :       F       >45
                                                                     :
  MAJOR APPROACH (1)(2)(3)   -        -        -         0.0    ---- :
  MAJOR APPROACH (4)(5)(6)   -        -        -         0.0    A    :
                                                                     :
  TOTAL INTERSECTION (1-12)  -        -        -        ERR     ERR  :
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
PAGE 2 OF 2
```

AMFAC WAIPAHU TIAR
2000 - SCENARIO B
AM PEAK HOUR

02/21/96
16:21:26

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 4 - PAIWA ST & HAPAPA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	BOTH	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	1080	60	30	0	102	60	423	0	0	0	0
WIDTHS	.0	24.0	.0	.0	12.0	.0	.0	24.0	.0	.0	.0	.0
LANES	0	2	0	0	1	0	0	2	0	0	0	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3208	0	0	1001	0	0	3609	0	0	0	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	35.80	16.20					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	5					
EXCESS	0						

RECEIVED AS FOLLOWS

RECEIVED AS FOLLOWS

```
AMFAC WAIPAHU TIAR                                        02/21/96
2000 - SCENARIO B                                         16:21:34
AM PEAK HOUR

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int #  4 - PAIWA ST & HAPAPA ST
     Degree of Saturation (v/c)  .48  Vehicle Delay  4.7    Level of Service A

      ---------------------------
Sq 11 |  Phase 1  |  Phase 2  |
**/** ---------------------------
      |   * *     |     ..    |
  .   |   * *     |       ****|
 /|\  |   * *>    |           |
  |   |   v       |       ****|
  |   |       ^   |     v     |
North |     + +>  |           |
  |   |     + +   |           |
      |     + +   |           |
      ---------------------------
      | G/C= .597 | G/C= .270 |
      | G=  35.8" | G=  16.2" |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=66.3% |
      ---------------------------
      C= 60 sec    G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped= .0 sec =  .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								4.6	A	
LT+TH	24/2	.387	.630	2021	2021	1200	.594	4.6	*A	187 ft
NB Approach								3.1	A	
TH+RT	24/2	.162	.630	2273	2273	508	.223	3.1	A	79 ft
WB Approach								11.7	B	
LT+TH+RT	12/1	.186	.303	255	304	139	.457	11.7	*B	82 ft

```
AMFAC WAIPAHU TIAR                                        02/21/96
2000 - SCENARIO B                                         16:22:44
PM PEAK HOUR

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

   Intersection Parameters for Int #   4 - PAIWA ST & HAPAPA ST

METROAREA          NONCBD
LOSTTIME              2.0
LEVELOFSERVICE      C   S
NODELOCATION        0   0
```

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	BOTH	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	946	48	20	0	39	37	744	0	0	0	0
WIDTHS	.0	24.0	.0	.0	12.0	.0	.0	24.0	.0	.0	.0	.0
LANES	0	2	0	0	1	0	0	2	0	0	0	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	2905	0	0	1002	0	0	3658	0	0	0	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	40.75	11.25					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	6					
EXCESS	0						

RECEIVED AS FOLLOWS

:GNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

ıtersection Averages for Int # ' 4 - PAIWA ST & HAPAPA ST
Degree of Saturation (v/c) .42 Vehicle Delay 2.8 Level of Service A

```
       ------------------------------
ʒ 11 ! Phase 1  !  Phase 2  !
k/** ------------------------------
     !  * *        !    ..     !
  .  !  * *        !     ++++!
 /!\ !  * *>       !           !
  !  !  v          !     ****!
  !  !      -      !     v     !
orth !       + +>!           !
  !  !       + +  !           !
     !       + +  !           !
     ------------------------------
     ! G/C= .679 ! G/C= .187 !
     ! G=  40.8" ! G=  11.2" !
     ! Y+R= 4.0" ! Y+R= 4.0" !
     ! OFF=  .0% ! OFF=74.6% !
     ------------------------------
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
B Approach								2.7	A	
LT+TH	24/2	.376	.713	2070	2070	1047	.506	2.7	*A	127 ft
B Approach								2.1	A	
TH+RT	24/2	.244	.713	2606	2606	822	.315	2.1	A	100 ft
B Approach								12.7	B	
LT+TH+RT	12/1	.098	.221	172	220	62	.281	12.7	B	41 ft

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 5 - PAIWA ST & HIAPO ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	BOTH	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	58	0	56

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	139	925	83	141	44	84	28	332	80	123	75	346
WIDTHS	.0	24.0	.0	10.0	12.0	.0	.0	24.0	.0	10.0	12.0	.0
LANES	0	2	0	1	1	0	0	2	0	1	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3049	0	1050	855	0	0	2124	0	1312	1168	0

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	25.63	26.37					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	11					
EXCESS	0						

RECEIVED AS FOLLOWS

MFAC - WAIPAHU TRAFFIC STUDY 02/21/96
000 - SCENARIO B 16:26:11
M PEAK HOUR LEVEL OF SERVICE CALCULATIONS

IGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

ntersection Averages for Int # 5 - PAIWA ST & HIAPO ST
Degree of Saturation (v/c) .70 Vehicle Delay 11.6 Level of Service B

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 --------------------------------
 q 11 |  Phase 1   |  Phase 2   |
 */** --------------------------------
      | * * *      |          ^ |
      | * * *      |       ++++ |
 /|\  |<* * *>     |      <++++ |
  |   |  v         |    ^  ++++ |
  |   |        ^   |****  v     |
 North|   <+ + +>  |****>       |
  |   |    + + +   |++++        |
      |    + + +   |  v         |
 --------------------------------
      | G/C= .427  | G/C= .439  |
      | G=  25.6"  | G=  26.4"  |
      | Y+R= 4.0"  | Y+R= 4.0"  |
      | OFF=  .0%  | OFF=49.4%  |
 --------------------------------
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								13.4	B	
LT+TH+RT	24/2	.409	.461	1378	1404	1207	.860	13.4	*B	275 ft
NB Approach								7.5	B+	
LT+TH+RT	24/2	.247	.461	941	978	462	.472	7.5	B+	105 ft
WB Approach								6.3	B+	
RT	10/1	.122	.473	455	496	87	.175	5.9	B+	39 ft
LT+TH	12/1	.209	.473	363	404	134	.332	6.6	B+	60 ft
EB Approach								13.3	B	
RT	10/1	.085	.473	579	620	71	.115	5.7	B+	32 ft
LT+TH	12/1	.419	.473	511	552	443	.803	14.5	*B	197 ft

AMFAC - WAIPAHU TRAFFIC STUDY 02/21/96
2000 - SCENARIO B 16:28:23
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 5 - PAIWA ST & HIAPO ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	BOTH	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	70	0	55

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	290	858	99	72	55	50	40	657	79	108	42	348
WIDTHS	.0	24.0	.0	10.0	12.0	.0	.0	24.0	.0	10.0	12.0	.0
LANES	0	2	0	1	1	0	0	2	0	1	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	2471	0	1050	1128	0	0	2200	0	1312	1207	0

Phasing Parameters

SEQUENCES	11	ALL			LEADLAGS	NONE	NONE
PERMISSIVES	YES	YES	YES	YES	OFFSET	.00	1
OVERLAPS	YES	YES	YES	YES	PEDTIME	.0	0
CYCLES	60	180	10				
GREENTIMES	30.82	21.18					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	11					
EXCESS	0						

RECEIVED AS FOLLOWS

```
MFAC - WAIPAHU TRAFFIC STUDY                                02/21/96
000 - SCENARIO B                                            16:28:30
M PEAK HOUR LEVEL OF SERVICE CALCULATIONS

IGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

ntersection Averages for Int #   5 - PAIWA ST & HIAPO ST
   Degree of Saturation (v/c)  .82  Vehicle Delay  16.9  Level of Service C+

      ----------------------------
q 11 ¦  Phase 1  ¦  Phase 2  ¦
*/** ----------------------------
     ¦ * * *     ¦      ^    ¦
     ¦ * * *     ¦       ++++¦
 /|\ ¦<* * *>    ¦      <++++¦
  |  ¦  v        ¦     ^ ++++¦
  |  ¦      ^    ¦****  v    ¦
lorth¦  <+ + +>  ¦****>      ¦
  |  ¦    + + +  ¦++++       ¦
     ¦    + + +  ¦  v        ¦
      ----------------------------
     ¦ G/C= .514 ¦ G/C= .353 ¦
     ¦ G=  30.8" ¦ G=  21.2" ¦
     ¦ Y+R= 4.0" ¦ Y+R= 4.0" ¦
     ¦ OFF=  .0% ¦ OFF=58.0% ¦
      ----------------------------
     C= 60 sec   G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								21.9	C	
LT+TH+RT	24/2	.539	.547	1335	1351	1312	.971	21.9	*C	251 ft
WB Approach								7.4	B+	
LT+TH+RT	24/2	.393	.547	1183	1203	817	.679	7.4	B+	156 ft
NB Approach								8.1	B+	
RT	10/1	.006	.386	359	406	2	.005	7.3	B+	25 ft
LT+TH	12/1	.139	.386	388	436	111	.255	8.2	B+	57 ft
EB Approach								21.4	C	
RT	10/1	.070	.386	458	507	56	.110	7.6	B+	29 ft
LT+TH	12/1	.380	.386	418	466	410	.880	23.3	*C	212 ft

AMFAC WAIPAHU TIAR   02/21/96
2000 '- SCENARIO B   16:18:47
AM PEAK HOUR

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int #   6 - PAIWA ST & H-1 EB RAMPS

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	-2.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	708	338	0	0	0	548	274	0	268	6	420
WIDTHS	.0	24.0	12.0	.0	.0	.0	.0	24.0	.0	12.0	12.0	.0
LANES	0	2	1	0	0	0	0	2	0	1	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3688	1770	0	0	0	0	3261	0	1554	1559	0

Phasing Parameters

SEQUENCES	21	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	13.11	16.21	18.68				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	3	8	11				
EXCESS	0						

RECEIVED AS FOLLOWS

MFAC WAIPAHU TIAR 02/21/96
000 - SCENARIO B 16:19:00
M PEAK HOUR

IGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

ntersection Averages for Int # 6 - PAIWA ST & H-1 EB RAMPS
Degree of Saturation (v/c) .67 Vehicle Delay 14.3 Level of Service B

```
---------------------------------------------
iq 21 | Phase 1  | Phase 2  | Phase 3  |
*/**  ---------------------------------------
      |  + *     |  +       |          |
      |  + *     |  +       |          |
 /|\  |  + *>    |  +       |          |
  |   |  v       |  v       |     ^    |
  |   |          |      ^   |****      |
North |          |   * *>   |****>     |
  |   |          |   * *    |++++      |
      |          |   * *    |  v       |
      ---------------------------------------
      | G/C= .218 | G/C= .270 | G/C= .311 |
      | G=  13.1" | G=  16.2" | G=  18.7" |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=28.5% | OFF=62.2% |
      ---------------------------------------
   C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped= .0 sec =  .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								9.4	B+	
TH	24/2	.222	.589	2171	2171	745	.343	4.1	A	129 ft
LT	12/1	.236	.252	386	446	356	.798	20.4	*C	225 ft
NB Approach								19.0	C+	
TH+RT	24/2	.284	.303	932	990	865	.874	19.0	*C+	254 ft
EB Approach								16.1	C+	
RT	12/1	.219	.345	483	536	282	.526	10.9	B	156 ft
LT+TH	12/1	.323	.345	484	537	448	.834	19.3	*C+	248 ft

AMFAC WAIPAHU TIAR 02/21/96
2000 - SCENARIO B 16:19:38
PM PEAK HOUR

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 6 - PAIWA ST & H-1 EB RAMPS

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	-2.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	974	291	0	0	0	770	505	0	281	6	585
WIDTHS	.0	24.0	12.0	.0	.0	.0	.0	24.0	.0	12.0	12.0	.0
LANES	0	2	1	0	0	0	0	2	0	1	1	0
UTILIZATIONS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1:00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3688	1770	0	0	0	0	3301	0	1554	1558	0

Phasing Parameters

SEQUENCES	21	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	9.93	14.35	23.72				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	3	8	11				
EXCESS	0						

RECEIVED AS FOLLOWS

MFAC WAIPAHU TIAR
000 - SCENARIO B
M PEAK HOUR

02/21/96
16:19:45

IGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

ntersection Averages for Int # 6 - PAIWA ST & H-1 EB RAMPS
Degree of Saturation (v/c) .89 Vehicle Delay 21.1@ Level of Service C
@ expect more delay due to extreme v/c's (see EVALUATE)

```
q 21 | Phase 1  | Phase 2   | Phase 3   |
*/** ----------------------------------------
     |  + *     |  +        |           |
 /|\ |  + *     |  +        |           |
     |  + *>    |  +        |           |
     |  v       |  v        |           |
     |          |      ^    |****       |
orth |          |    * *>   |****>      |
     |          |    * *    |++++       |
     |          |    * *    |  v        |
     ----------------------------------------
     | G/C= .166 | G/C= .239 | G/C= .395 |
     | G=   9.9" | G=  14.4" | G=  23.7" |
     | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
     | OFF=  .0% | OFF=23.2% | OFF=53.8% |
```

C= 60 sec G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
B Approach								10.1	B	
TH	24/2	.268	.505	1856	1861	925	.497	6.5	B+	193 ft
LT	12/1	.191	.199	291	352	276	.784	22.3	*C	186 ft
B Approach								37.2@	D	
TH+RT	24/2	.380	.273	836	900	1211	1.346	37.2@	*D	371 ft
B Approach								13.7	B	
RT	12/1	.209	.429	621	666	267	.401	7.9	B+	129 ft
LT+TH	12/1	.392	.429	623	668	561	.840	16.4	*C+	270 ft

AMFAC WAIPAHU TIAR
2000 - SCENARIO B
AM PEAK HOUR

02/21/96
16:43:57

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 7 - PAIWA ST & H-1 WB RAMPS

METROAREA	NONCBD	
LOSTTIME		2.0
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	-2.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	510	770	0	291	6	318	0	442	256	0	0	0
WIDTHS	.0	24.0	.0	.0	12.0	12.0	.0	24.0	12.0	.0	.0	.0
LANES	0	2	0	0	1	1	0	2	1	0	0	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	FFLW	NORM	NORM	FFLW	NORM	DOPT	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3725	0	0	1566	1554	0	3651	1752	0	0	0

Phasing Parameters

SEQUENCES	31	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	15.79	20.32	11.89				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	9	2	5				
EXCESS	0						

RECEIVED AS FOLLOWS

ıMFAC WAIPAHU TIAR
:000 - SCENARIO B
ıM PEAK HOUR

02/21/96
16:44:02

3IGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 7 - PAIWA ST & H-1 WB RAMPS
Degree of Saturation (v/c) .46 Vehicle Delay 9.1 Level of Service B+

```
3q 31 ¦  Phase 1  ¦  Phase 2  ¦  Phase 3  ¦
**/** -------------------------------------
      ¦           ¦  *        ¦           ¦
  .   ¦           ¦  *        ¦           ¦
 /|\  ¦           ¦  *        ¦      <****¦
  |   ¦           ¦  v        ¦       ++++¦
  |   ¦      ..   ¦       ..  ¦       v   ¦
North ¦    <* +   ¦       +   ¦           ¦
  |   ¦     * +   ¦       +   ¦           ¦
      ¦     * +   ¦       +   ¦           ¦
      -------------------------------------
      ¦ G/C= .263 ¦ G/C= .339 ¦ G/C= .198 ¦
      ¦ G=  15.8" ¦ G=  20.3" ¦ G=  11.9" ¦
      ¦ Y+R= 4.0" ¦ Y+R= 4.0" ¦ Y+R= 4.0" ¦
      ¦ OFF=  .0% ¦ OFF=33.0% ¦ OFF=73.5% ¦
      -------------------------------------
      C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								10.2	B	
TH	24/2	.237	.372	1345	1386	811	.585	10.2	*B	215 ft
NB Approach								5.7	B+	
TH	24/2	.149	.702	2563	2563	465	.181	2.0	A	58 ft
LT	12/1	.189	.297	462	520	269	.517	12.1	*B	160 ft
WB Approach								13.6	B	
TH	12/1-	.147	.231	303	362	175	.483	13.7	*B	113 ft
LT	12/1+	.142	.231	302	360	166	.461	13.5	B	108 ft

AMFAC WAIPAHU TIAR
2000 - SCENARIO B
PM PEAK HOUR

02/21/96
16:45:36

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 7 - PAIWA ST & H-1 WB RAMPS

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	-2.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	566	794	0	1090	6	466	0	779	272	0	0	0
WIDTHS	.0	24.0	.0	.0	12.0	12.0	.0	24.0	12.0	.0	.0	.0
LANES	0	2	0	0	1	1	0	2	1	0	0	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	FFLW	NORM	NORM	FFLW	NORM	DOPT	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3725	0	0	1562	1554	0	3651	1752	0	0	0

Phasing Parameters

SEQUENCES	31	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	14.68	18.44	14.88				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	9	2	5				
EXCESS	0						

RECEIVED AS FOLLOWS

MFAC WAIPAHU TIAR
000 - SCENARIO B
M PEAK HOUR

02/21/96
16:45:40

IGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

ntersection Averages for Int # 7 - PAIWA ST & H-1 WB RAMPS
Degree of Saturation (v/c) .53 Vehicle Delay 9.3 Level of Service B+

```
q 31 | Phase 1  | Phase 2  | Phase 3  |
*/** ------------------------------------
     |          |    *     |          |
     |          |    *     |          |
/|\  |          |    *     |   <****  |
 |   |          |    v     |    ++++  |
 |   |     ^    |      ^   |    v     |
lorth|    <* +  |      +   |          |
 |   |     * +  |      +   |          |
     |     * +  |      +   |          |
     ------------------------------------
     | G/C= .245 | G/C= .307 | G/C= .248 |
     | G= 14.7"  | G= 18.4"  | G= 14.9"  |
     | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
     | OFF= .0%  | OFF=31.1% | OFF=68.5% |
```

C= 60 sec G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
3B Approach								11.8	B	
TH	24/2	.243	.341	1220	1269	836	.659	11.8	*B	232 ft
4B Approach								5.7	B+	
TH	24/2	.244	.652	2381	2381	820	.344	3.1	A	120 ft
LT	12/1	.198	.278	428	487	286	.587	13.4	*B	174 ft
IB Approach								13.2	B	
TH	12/1-	.201	.281	382	439	255	.581	13.4	*B	155 ft
LT	12/1+	.193	.281	380	437	242	.554	13.0	B	147 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
16:31:58

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 8 - PAIWA ST & LUMIAINA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	.0	2.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	8	195	30	32	110	971	365	87	91	210	120	9
WIDTHS	.0	24.0	12.0	.0	24.0	12.0	.0	24.0	12.0	.0	24.0	12.0
LANES	0	2	1	0	2	1	0	2	1	0	2	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3691	701	0	3483	1770	0	2929	948	0	3112	1770

Phasing Parameters

SEQUENCES	14	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	8.73	33.68	5.59				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	8	6	11				
EXCESS	0						

RECEIVED AS FOLLOWS

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)MFAC - WAIPAHU TRAFFIC STUDY                                   02/21/96
2000 - SCENARIO B                                               16:32:08
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # ; 8 - PAIWA ST & LUMIAINA ST
        Degree of Saturation (v/c)  .82  Vehicle Delay  23.9    Level of Service C

        -------------------------------------------
Sq 14 |  Phase 1   |  Phase 2   |  Phase 3   |
**/** -------------------------------------------
      | + + +      |            |        ^   |
   .  | + + +      |            |       ++++ |
  /|\ |<+ + +>     |            |      <++++ |
   |  |   v        |   ^  **** |            |
   |  |        ^   |++++   v    |            |
North |    <+ * *> |            |****>       |
   |  |      + * * |            |****        |
      |      + * * |            |    v       |
        -------------------------------------------
      | G/C= .145  | G/C= .561  | G/C= .093  |
      | G=   8.7"  | G=  33.7"  |.G=   5.6"  |
      | Y+R= 4.0"  | Y+R= 4.0"  | Y+R= 4.0"  |
      | OFF=  .0%  | OFF=21.2%  | OFF=84.0%  |
        -------------------------------------------
        C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								14.0	B	
TH+RT	24/2	.077	.179	583	660	213	.323	14.0	B	74 ft
LT	12/1	.000	.179	87	118	32	.256	13.9	B	25 ft
NB Approach								27.7	D+	
TH+RT	24/2	.187	.179	452	524	476	.908	29.7	*D+	165 ft
LT	12/1	.146	.179	125	165	96	.565	17.7	C+	66 ft
WB Approach								22.3	C	
TH+RT	24/2	.061	.127	365	441	150	.340	15.6	C+	55 ft
LT	12/1	.590	.595	1032	1052	1022	.971	23.3	*C	349 ft
EB Approach								29.9	D+	
TH+RT	24/2	.135	.127	321	394	347	.881	30.6	*D+	128 ft
LT	12/1	.013	.595	1032	1052	9	.009	3.2	A	25 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
16:37:29

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 8 - PAIWA ST & LUMIAINA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	.0	2.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	5	139	58	48	223	1155	735	190	241	108	152	1
WIDTHS	.0	24.0	12.0	.0	24.0	12.0	.0	24.0	12.0	.0	24.0	12.0
LANES	0	2	1	0	2	1	0	2	1	0	2	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3695	421	0	3527	1022	0	2940	1259	0	3312	1003

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	15.87	36.13					
YELLOWTIMES	4.00	4.00					
CRITICALS	9	6					
EXCESS	0						

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
16:37:41

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 8 - PAIWA ST & LUMIAINA ST
Degree of Saturation (v/c) 1.14 Vehicle Delay 37.0@ Level of Service D
@ expect more delay due to extreme v/c's (see EVALUATE)

```
Sq 11 | Phase 1  | Phase 2  |
**/** ------------------------
      | + + +    |          |
      | + + +    |      ++++|
 /|\  |<+ + +>   |     <++++|
  |   |    v     |      ****|
  |   |      ^   |++++  v   |
North |   <* + +>|++++>     |
  |   |    * + + |++++      |
      |    * + + |   v      |
      ------------------------
      | G/C= .264 | G/C= .602 |
      | G=  15.9" | G=  36.1" |
      | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=33.1% |
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								11.0	B	
TH+RT	24/2	.058	.298	1042	1100	151	.137	10.0	B+	45 ft
LT	12/1	.000	.298	92	119	61	.488	13.6	B	36 ft
NB Approach								44.5@	E+	
TH+RT	24/2	.349	.298	815	875	974	1.113	52.1@	E	288 ft
LT	12/1	.245	.298	322	375	254	.677	15.3	*C+	150 ft
WB Approach								40.7@	E+	
TH+RT	24/2	.102	.636	2242	2242	286	.128	2.8	A	44 ft
LT	12/1	.988	.636	623	650	1216	1.871	49.6@	*E+	374 ft
EB Approach								2.8	A	
TH+RT	24/2	.105	.636	2105	2105	274	.130	2.8	A	42 ft
LT	12/1	.000	.636	609	637	1	.002	2.6	A	25 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
17:09:53

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 10 - WAIPAHU ST & ROAD X

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	-3.0	.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	469	87	106	0	10	10	321	0	0	0	0
WIDTHS	.0	12.0	11.0	11.0	.0	11.0	11.0	12.0	.0	.0	.0	.0
LANES	0	1	1	1	0	1	1	1	0	0	0	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	1825	727	1510	0	1510	1458	1863	0	0	0	0

Phasing Parameters

SEQUENCES	11	ALL			LEADLAGS	NONE	NONE
PERMISSIVES	YES	YES	YES	YES	OFFSET	.00	1
OVERLAPS	YES	YES	YES	YES	PEDTIME	.0	0
CYCLES	60	180	10				
GREENTIMES	38.42	13.58					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	6					
EXCESS	0						

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
17:09:58

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 10 - WAIPAHU ST & ROAD X
Degree of Saturation (v/c) .32 Vehicle Delay 3.7 Level of Service A

```
      ------------------------------
Sq 11 |   Phase 1    |   Phase 2   |
**/** ------------------------------
      |    * +       |       ^     |
  .   |    * +       |       ++++  |
 /|\  |    * +>      |             |
  |   |    v         |       ****  |
  |   |       -      |       v     |
North |       + +>   |         +>  |
  |   |       + +    |         +   |
      |       + +    |         +   |
      ------------------------------
      | G/C= .640    | G/C= .226   |
      | G=  38.4"    | G=  13.6"   |
      | Y+R= 4.0"    | Y+R= 4.0"   |
      | OFF=  .0%    | OFF=70.7%   |
      ------------------------------
```

C= 60 sec G= 52.0 sec = 86.7% Y= 8.0 sec = 13.3% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								2.9	A	
TH	12/1	.303	.674	1225	1230	494	.402	3.0	*A	136 ft
LT	11/1	.181	.674	462	490	92	.188	2.4	A	25 ft
NB Approach								2.5	A	
RT	11/1	.018	1.000	1458	1458	11	.008	.0	A	25 ft
TH	12/1	.215	.674	1251	1255	338	.269	2.6	A	93 ft
WB Approach								11.5	B	
RT	11/1	.106	.260	335	392	112	.286	11.6	B	70 ft
LT	11/1	.017	.260	335	392	11	.028	10.7	*B	25 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000'- SCENARIO B
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
17:11:15

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 10 - WAIPAHU ST & ROAD X

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	-3.0	.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	373	123	178	0	10	10	557	0	0	0	0
WIDTHS	.0	12.0	11.0	11.0	.0	11.0	11.0	12.0	.0	.0	.0	.0
LANES	0	1	1	1	0	1	1	1	0	0	0	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	1825	1711	1510	0	1510	1458	1863	0	0	0	0

Phasing Parameters

SEQUENCES	21	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	8.92	30.17	8.92				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	3	8	6				
EXCESS	0						

RECEIVED AS FOLLOWS

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MFAC - WAIPAHU TRAFFIC STUDY
000 - SCENARIO B                                          02/21/96
M PEAK HOUR LEVEL OF SERVICE CALCULATIONS                 17:11:22

IGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

ntersection Averages for Int #  10 - WAIPAHU ST & ROAD X
    Degree of Saturation (v/c)  .42  Vehicle Delay   5.0  Level of Service B+

     ----------------------------------------
q 21 ! Phase 1  !  Phase 2  !  Phase 3  !
*/** ----------------------------------------
     !  + * ^    ! + +      !       ^   !
 /!\ !  + * ++++ ! + +      !       ++++!
  !  !  + *>     ! + +>     !           !
  !  !  v        ! v    ^   !       ****!
lorth!           !          !       v   !
  !  !           !      * +>!        +> !
     !           !      * + !        +  !
     !           !      * + !        +  !
     ----------------------------------------
     ! G/C= .149 ! G/C= .503 ! G/C= .149 !
     ! G=    8.9"! G=  30.2" ! G=    8.9"!
     ! Y+R= 4.0" ! Y+R= 4.0" ! Y+R= 4.0" !
     ! OFF=  .0% ! OFF=21.5% ! OFF=78.5% !
     ----------------------------------------
  C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
B Approach								1.9	A	
TH	12/1	.249	.751	1372	1372	393	.286	1.6	A	82 ft
LT	11/1	.023	.182	390	431	129	.299	3.0	*A	27 ft
B Approach								6.6	B+	
RT	11/1	.018	.751	1093	1096	11	.010	1.2	A	25 ft
TH	12/1	.344	.536	971	999	586	.587	6.7	*B+	229 ft
B Approach								8.4	B+	
RT	11/1	.161	.397	552	600	187	.312	8.1	B+	95 ft
LT	11/1	.017	.182	218	275	11	.040	13.1	*B	25 ft

```
ATA Inc.          STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS        1994 HCM
==========================================================================================
Major Street: MANAGER'S DRIVE                                  Print Date:   21-Feb
Minor Street:   ROAD X                                           Analyst:       BC
   Peak Hour:      AM                                           File Name:  MANRDX-A
    Scenario: YEAR 2000 - SCENARIO B                         Intersection:     -18
------------------------------------------------------------------------------------------
Peak Hour Factor:        1.00 :
--------MAJOR STREET-------- : V2    127 ----------->           <--------- 146     V5
    Num of Lanes - V2:      2 :
  Excl RT - V3 (Y/N):       N : V3    15 -----                  ----- 95      V4
Stop/Yield - V3 (Y/N):      N :             \                  /
    % Grade - V2,V3:        0 :              v                v    MAJOR STREET:
                              :                                    MANAGER'S DRIVE
    Num of Lanes - V5:      2 :                  (        )
  Excl LT - V4 (Y/N):       N :                   \      /
    % Grade - V4,V5:        0 :                   :      :
                              :                   :      :
--------MINOR STREET-------- :                   53     30          <--- NORTH
 Num of Lanes - V7,V9:      2 :
   Shared Lane (Y/N):       N :                  V7     V9
    % Grade - V7&V9:        0 :           MINOR STREET: ROAD X
------------------------------------------------------------------------------------------
VOLUME ADJUSTMENTS
  MOVEMENT NO.                 2      3       4          5      7      9
  VOLUME, V (vph)            127     15      95        146     53     30
  VOLUME, v (pcph)           127     15     105        146     58     33
------------------------------------------------------------------------------------------
STEP 1: RT FROM MINOR STREET - V9
  Conflicting Flows:     ! Vc,9 = 1/2*V3+V2 :     8  +  127     :     135  vph
  Potential Capacity:    ! Cp,9 :                                     1184  pcph
  Movement Capacity:     ! Cm,9 = Cp,9 :                              1184  pcph
------------------------------------------------------------------------------------------
STEP 2: LT FROM MAJOR STREET - V4
  Conflicting Flows:           ! Vc,4 = V3+V2 :      15  +  127  :     142  vph
  Potential Capacity:          ! Cp,4 :                                1438  pcph
  Movement Capacity:           ! Cm,4 = Cp,4 :                         1438  pcph
  Prob. of Queue-free State:   ! po,4 = 1-v4/Cm,4 :                    0.93
  Major Left Shared Lane       !
   Prob. of Queue-free State:  ! p*o,4 :                               0.92
------------------------------------------------------------------------------------------
STEP 3: LT FROM MINOR STREET - V7
  Conflicting Flows:           ! Vc,7 = 1/2V3+V2+V5+V4 :               376  vph
  Potential Capacity:          ! Cp,7 :                                609  pcph
  Capacity Adjustment Factor   !
   Due To Impeding Movements:  ! f7=po,4:                              0.92
  Movement Capacity:           ! Cm,7 = Cp,7 :                         563  pcph
------------------------------------------------------------------------------------------
DELAY AND LEVEL OF SERVICE SUMMARY
                                                  csh    AVG TOTAL
    Movement                 v(vcph)   cm(pcph)  (pcph)    DELAY     LOS
  -----------               --------   --------  ------    -----    -----
  MINOR LEFT TURN   (7)         58        563     --NA--     7.1      B
  MINOR RIGHT TURN  (9)         33       1184     --NA--     3.1      A
  MAJOR LEFT TURN   (4)        105       1438     ------     2.7      A
------------------------------------------------------------------------------------------
  AVERAGE MINOR APPROACH DELAY :  5.7 sec/veh  !  AVERAGE TOTAL INTERSECTION DELAY :  1.7 sec/veh
          LEVEL OF SERVICE :    B              !              LEVEL OF SERVICE :   A
==========================================================================================
```

RECEIVED AS FOLLOWS

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ATA Inc.             STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS             1994 HCM
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
Major Street: MANAGER'S DRIVE                                             Print Date:    21-Feb
Minor Street:   ROAD X                                                       Analyst:        BC
   Peak Hour:        PM                                                    File Name:  MANRDX-P
    Scenario: YEAR 2000 - SCENARIO B                                    Intersection:        18
..................................................................................................
Peak Hour Factor:        1.00 :
---------MAJOR STREET-------- : V2    299 ----------->             <--------- 271     V5
    Num of Lanes - V2:      2 :
   Excl RT - V3 (Y/N):      N : V3     15 -----                          ----- 155     V4
Stop/Yield - V3 (Y/N):      N :                \                        /
      % Grade - V2,V3:      0 :                 v                      v     MAJOR STREET:
                              :                                               MANAGER'S DRIVE
    Num of Lanes - V5:      2 :                        <         >
   Excl LT - V4 (Y/N):      N :                         \       /
      % Grade - V4,V5:      0 :                         :       :
                              :                         :       :
---------MINOR STREET-------- :                         78      31                <--- NORTH
  Num of Lanes - V7,V9:     2 :
     Shared Lane (Y/N):     N :                        V7      V9
      % Grade - V7&V9:      0 :                  MINOR STREET: ROAD X
..................................................................................................
VOLUME ADJUSTMENTS
 MOVEMENT NO.                    2         3          4           5         7          9
 VOLUME, V (vph)               299        15        155         271        78         31
 VOLUME, v (pcph)              299        15        171         271        86         34
..................................................................................................
STEP 1: RT FROM MINOR STREET - V9
 Conflicting Flows:    : Vc,9 = 1/2*V3+V2 :          8  +   299      :          307   vph
 Potential Capacity:   : Cp,9 =                                                 968   pcph
 Movement Capacity:    : Cm,p = Cp,9 =                                          968   pcph
..................................................................................................
STEP 2: LT FROM MAJOR STREET - V4
 Conflicting Flows:              : Vc,4 = V3+V2 :         15  +   299  :        314   vph
 Potential Capacity:             : Cp,4 =                                      1163   pcph
 Movement Capacity:              : Cm,4 = Cp,4 =                               1163   pcph
 Prob. of Queue-free State:      : po,4 = 1-v4/Cm,4 =                          0.85
 Major Left Shared Lane          :
  Prob. of Queue-free State:     : p*o,4 =                                     0.84
..................................................................................................
STEP 3: LT FROM MINOR STREET - V7
 Conflicting Flows:              : Vc,7 = 1/2V3+V2+V5+V4 :                      733   vph
 Potential Capacity:             : Cp,7 =                                       360   pcph
 Capacity Adjustment Factor      :
  Due To Impeding Movements:     : f7=po,4:                                    0.84
 Movement Capacity:              : Cm,7 = Cp,7 =                                303   pcph
..................................................................................................
DELAY AND LEVEL OF SERVICE SUMMARY                          csh   AVG TOTAL
   Movement                v(vcph)       cm(pcph)      (pcph)    DELAY     LOS
 -----------             -----------     --------      ------    -----    ------
 MINOR LEFT TURN  (7)        86            303         --NA--     16.5      C
 MINOR RIGHT TURN (9)        34            968         --NA--      3.9      A
 MAJOR LEFT TURN  (4)       171           1163         ------      3.6      A
..................................................................................................
   AVERAGE MINOR APPROACH DELAY :  12.9 sec/veh  :  AVERAGE TOTAL INTERSECTION DELAY :  2.5 sec/veh
             LEVEL OF SERVICE :     C           :                  LEVEL OF SERVICE :  A
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
```

```
ATA Inc.             STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS             1994 HCM
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
Major Street: MANAGER'S DRIVE                                             Print Date:    21-Feb
Minor Street:   ROAD Y                                                       Analyst:        BC
   Peak Hour:        AM                                                    File Name:  MANRDY-A
    Scenario: YEAR 2000 - SCENARIO B                                    Intersection:        21
..................................................................................................
Peak Hour Factor:        1.00 :
---------MAJOR STREET-------- : V2     97 ----------->             <---------  81     V5
    Num of Lanes - V2:      2 :
   Excl RT - V3 (Y/N):      N : V3     32 -----                          -----  48     V4
Stop/Yield - V3 (Y/N):      N :                \                        /
      % Grade - V2,V3:      0 :                 v                      v     MAJOR STREET:
                              :                                               MANAGER'S DRIVE
    Num of Lanes - V5:      2 :                        <         >
   Excl LT - V4 (Y/N):      N :                         \       /
      % Grade - V4,V5:      0 :                         :       :
                              :                         :       :
---------MINOR STREET-------- :                        196     157                  NORTH--->
  Num of Lanes - V7,V9:     2 :
     Shared Lane (Y/N):     N :                        V7      V9
      % Grade - V7&V9:      0 :                  MINOR STREET: ROAD Y
..................................................................................................
VOLUME ADJUSTMENTS
 MOVEMENT NO.                    2         3          4           5         7          9
 VOLUME, V (vph)                97        32         48          81       196        157
 VOLUME, v (pcph)               97        32         53          81       216        175
..................................................................................................
STEP 1: RT FROM MINOR STREET - V9
 Conflicting Flows:    : Vc,9 = 1/2*V3+V2 :         16  +    97      :          113   vph
 Potential Capacity:   : Cp,9 =                                                1214   pcph
 Movement Capacity:    : Cm,p = Cp,9 =                                         1214   pcph
..................................................................................................
STEP 2: LT FROM MAJOR STREET - V4
 Conflicting Flows:              : Vc,4 = V3+V2 :         32  +    97  :        129   vph
 Potential Capacity:             : Cp,4 =                                      1462   pcph
 Movement Capacity:              : Cm,4 = Cp,4 =                               1462   pcph
 Prob. of Queue-free State:      : po,4 = 1-v4/Cm,4 =                          0.96
 Major Left Shared Lane          :
  Prob. of Queue-free State:     : p*o,4 =                                     0.96
..................................................................................................
STEP 3: LT FROM MINOR STREET - V7
 Conflicting Flows:              : Vc,7 = 1/2V3+V2+V5+V4 :                      242   vph
 Potential Capacity:             : Cp,7 =                                       741   pcph
 Capacity Adjustment Factor      :
  Due To Impeding Movements:     : f7=po,4:                                    0.96
 Movement Capacity:              : Cm,7 = Cp,7 =                                714   pcph
..................................................................................................
DELAY AND LEVEL OF SERVICE SUMMARY                          csh   AVG TOTAL
   Movement                v(vcph)       cm(pcph)      (pcph)    DELAY     LOS
 -----------             -----------     --------      ------    -----    ------
 MINOR LEFT TURN  (7)       216            714         --NA--      7.2      B
 MINOR RIGHT TURN (9)       175           1214         --NA--      3.5      A
 MAJOR LEFT TURN  (4)        53           1462         ------      2.6      A
..................................................................................................
   AVERAGE MINOR APPROACH DELAY :   5.5 sec/veh  :  AVERAGE TOTAL INTERSECTION DELAY :  3.5 sec/veh
             LEVEL OF SERVICE :     B           :                  LEVEL OF SERVICE :  A
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
```

RECEIVED AS FOLLOWS

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ATA Inc.            STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS              1994 HCM
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
Major Street: MANAGER'S DRIVE
Minor Street:   ROAD Y                                                     Print Date:    21-Feb
   Peak Hour:       PM                                                       Analyst:        BC
    Scenario: YEAR 2000 - SCENARIO B                                       File Name:   MANRDY-P
                                                                        Intersection:        21
----------------------------------------------------------------------------------------------------
Peak Hour Factor:          1.00 :
--------MAJOR STREET-------- : V2     196 ----------->                (--------- 174     V5
    Num of Lanes - V2:        2 :
  Excl RT - V3 (Y/N):         N : V3      69 -----                          ----- 129     V4
Stop/Yield - V3 (Y/N):        N :               \                         /
     % Grade - V2,V3:         0 :                v                       v     MAJOR STREET:
                                :                                              MANAGER'S DRIVE
    Num of Lanes - V5:        2 :                      (          )
  Excl LT - V4 (Y/N):         N :                       \        /
     % Grade - V4,V5:         0 :                        :      :
                                :                        :      :
--------MINOR STREET-------- :                          111    203                 NORTH--->
 Num of Lanes - V7,V9:        2 :
   Shared Lane (Y/N):         N :                          V7     V9
     % Grade - V7&V9:         0 :                   MINOR STREET: ROAD Y
----------------------------------------------------------------------------------------------------
VOLUME ADJUSTMENTS
 MOVEMENT NO.                    2        3          4            5        7        9
 VOLUME, V (vph)                196       69        129          174      111      203
 VOLUME, v (pcph)               196       69        142          174      122      223
----------------------------------------------------------------------------------------------------
STEP 1: RT FROM MINOR STREET - V9
 Conflicting Flows:     : Vc,9 = 1/2*V3+V2 =          35  +  196       :        231  vph
 Potential Capacity:    : Cp,9 :                                               1050  pcph
 Movement Capacity:     : Cm,p = Cp,9 =                                         1050  pcph
----------------------------------------------------------------------------------------------------
STEP 2: LT FROM MAJOR STREET - V4
 Conflicting Flows:            : Vc,4 = V3+V2 =          69  +  196  :        265  vph
 Potential Capacity:           : Cp,4 :                                     1235  pcph
 Movement Capacity:            : Cm,4 = Cp,4 :                              1235  pcph
 Prob. of Queue-free State:    : po,4 = 1-v4/Cm,4 =                         0.89
 Major Left Shared Lane        :
  Prob. of Queue-free State:   : p*o,4 :                                    0.88
----------------------------------------------------------------------------------------------------
STEP 3: LT FROM MINOR STREET - V7
 Conflicting Flows:            : Vc,7 = 1/2V3+V2+V5+V4 :                    534  vph
 Potential Capacity:           : Cp,7 :                                     483  pcph
 Capacity Adjustment Factor    :
  Due To Impeding Movements:   : f7=po,4:                                  0.88
 Movement Capacity:            : Cm,7 = Cp,7 :                              424  pcph
----------------------------------------------------------------------------------------------------
DELAY AND LEVEL OF SERVICE SUMMARY
                                                      csh     AVG TOTAL
   Movement                  v(vcph)      cm(pcph)   (pcph)    DELAY      LOS
 ------------                -----------  --------   ------    -----     ------
 MINOR LEFT TURN   (7)          122          424     --NA--     11.9        C
 MINOR RIGHT TURN  (9)          223         1050     --NA--      4.3        A
 MAJOR LEFT TURN   (4)          142         1235     ------      3.3        A
----------------------------------------------------------------------------------------------------
  AVERAGE MINOR APPROACH DELAY :   7.0 sec/veh  :  AVERAGE TOTAL INTERSECTION DELAY :   3.1 sec/veh
            LEVEL OF SERVICE :     B            :                 LEVEL OF SERVICE :   A
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
```

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
17:13:39

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 9 - PAIWA ST & ROAD Y

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	-3.0	.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	260	678	0	0	0	0	0	393	45	4	0	68
WIDTHS	.0	24.0	.0	.0	.0	.0	.0	24.0	.0	12.0	.0	12.0
LANES	0	2	0	0	0	0	0	2	0	1	0	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3510	0	0	0	0	0	2560	0	1539	0	1539

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	38.26	13.74					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	12					
EXCESS	0						

RECEIVED AS FOLLOWS

MFAC - WAIPAHU TRAFFIC STUDY
000 - SCENARIO B
M PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
17:13:44

IGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

```
Intersection Averages for Int #   9 - PAIWA ST & ROAD Y
      Degree of Saturation (v/c)  .36  Vehicle Delay   3.3   Level of Service A

     -------------------------
Sq 11 ¦  Phase 1   ¦  Phase 2  ¦
**/** -------------------------
      ¦ * *        ¦           ¦
      ¦ * *        ¦           ¦
 /|\  ¦<* *        ¦           ¦
  |   ¦  v         ¦           ¦
  |   ¦       ^    ¦    ^      ¦
  |   ¦            ¦****       ¦
North ¦     <+ +   ¦           ¦
  |   ¦      + +   ¦++++       ¦
      ¦      + +   ¦    v      ¦
      -------------------------
      ¦ G/C= .638  ¦ G/C= .229 ¦
      ¦ G=  38.3"  ¦ G=  13.7" ¦
      ¦ Y+R= 4.0"  ¦ Y+R= 4.0" ¦
      ¦ OFF=  .0%  ¦ OFF=70.4% ¦
      -------------------------
      C= 60 sec    G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								3.0	A	
TH+RT	24/2	.298	.671	2355	2355	988	.420	3.0	*A	137 ft
NB Approach								2.6	A	
LT+TH	24/2	.207	.671	1718	1718	461	.268	2.6	A	64 ft
EB Approach								11.1	B	
RT	12/1	.007	.262	346	404	4	.010	10.6	B	25 ft
LT	12/1	.074	.262	346	404	72	.178	11.1	*B	45 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/21/96
17:15:18

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 9 - PAIWA ST & ROAD Y

METROAREA	NONCBD	
LOSTTIME		2.0
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	0	5	0
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	232	687	0	0	0	0	0	494	8	32	0	288
WIDTHS	.0	24.0	.0	.0	.0	.0	.0	24.0	.0	12.0	.0	12.0
LANES	0	2	0	0	0	0	0	2	0	1	0	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3526	0	0	0	0	0	3229	0	1539	0	1539

Phasing Parameters

SEQUENCES	11	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	29.00	23.00					
YELLOWTIMES	4.00	4.00					
CRITICALS	2	12					
EXCESS	0						

```
4FAC - WAIPAHU TRAFFIC STUDY
)00 - SCENARIO B                                          02/21/96
4 PEAK HOUR LEVEL OF SERVICE CALCULATIONS                 17:15:22

IGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

ntersection Averages for Int #  9 - PAIWA ST & ROAD Y
     Degree of Saturation (v/c)  .45  Vehicle Delay   6.5  Level of Service B+

------------------------
q 11 ¦ Phase 1   ¦ Phase 2 ¦
*/** ------------------------
     ¦ * *       ¦         ¦
     ¦ * *       ¦         ¦
 /|\ ¦<* *       ¦         ¦
  |  ¦   v       ¦    ^    ¦
  |  ¦       ^   ¦****     ¦
lorth¦     <+ +  ¦         ¦
  |  ¦      + +  ¦++++     ¦
     ¦      + +  ¦    v    ¦
     ------------------------
     ¦ G/C= .483 ¦ G/C= .383 ¦
     ¦ G=  29.0" ¦ G=  23.0" ¦
     ¦ Y+R= 4.0" ¦ Y+R= 4.0" ¦
     ¦ OFF=  .0% ¦ OFF=55.0% ¦
     ------------------------
     C= 60 sec    G= 52.0 sec = 86.7%  Y= 8.0 sec = 13.3%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph) @E		Adj Volume	v/c	HCM Delay	L S	90% Max Queue
3B Approach								6.5	B+	
TH+RT	24/2	.291	.517	1818	1822	967	.531	6.5	*B+	197 ft
4B Approach								5.4	B+	
LT+TH	24/2	.187	.517	1660	1669	528	.316	5.4	B+	108 ft
EB Approach								8.5	B+	
RT	12/1	.041	.417	595	641	34	.053	6.7	B+	25 ft
LT	12/1	.235	.417	595	641	303	.473	8.6	*B+	149 ft

ATA Austin, Tsutsumi & Associates, Inc. Civil Engineers • Surveyors

APPENDIX B

• YEAR 2000 BASE WITH BASE IMPROVEMENTS
LOS CALCULATIONS

RECEIVED AS FOLLOWS

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE + BASE MIT
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:18:52

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 2 - WAIPAHU ST & MOKUOLA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	0	0	0	625	484	229	0	78	153	363	0
WIDTHS	.0	.0	.0	.0	12.0	12.0	12.0	.0	12.0	.0	12.0	.0
LANES	0	0	0	0	1	1	1	0	1	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	0	0	0	1825	1770	1219	0	1524	0	1557	0

Phasing Parameters

SEQUENCES	12	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	6.53	15.61	25.86				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	9	6	11				
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE + BASE MIT
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:18:57

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 2 - WAIPAHU ST & MOKUOLA ST
Degree of Saturation (v/c) .61 Vehicle Delay 8.2 Level of Service B+

```
Sq 12 | Phase 1    | Phase 2    | Phase 3    |
**/** --------------------------------------
      |            |            |            |
 /|\  |            |     <++++  |     <++++  |
  |   |            |      ****  |      ++++  |
  |   |            |      v     |      v     |
North |  <*     +> |        +>  |****>       |
  |   |   *     +  |        +   |****        |
      |   *     +  |        +   | v          |
      --------------------------------------
      | G/C= .109  | G/C= .260  | G/C= .431  |
      | G=   6.5"  | G=  15.6"  | G=  25.9"  |
      | Y+R= 4.0"  | Y+R= 4.0"  | Y+R= 4.0"  |
      | OFF=  .0%  | OFF=17.5%  | OFF=50.2%  |
      --------------------------------------
      C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped= .0 sec = .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
NB Approach								9.3	B+	
RT	12/1	.242	.469	530	572	241	.421	7.1	B+	108 ft
LT	12/1	.002	.142	163	215	82	.378	15.6	*C+	59 ft
WB Approach								6.4	B+	
TH	12/1	.308	.791	1444	1444	658	.456	1.5	A	116 ft
LT	12/1	.241	.294	604	644	589	.790	12.7	*B	199 ft
EB Approach								11.6	B	
TH+RT	12/1	.381	.464	682	723	543	.751	11.6	*B	245 ft

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE + BASE MIT
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:17:34

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 2 - WAIPAHU ST & MOKUOLA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	0	0	0	708	302	337	0	103	110	473	0
WIDTHS	.0	.0	.0	.0	12.0	12.0	12.0	.0	12.0	.0	12.0	.0
LANES	0	0	0	0	1	1	1	0	1	0	1	0
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	0	0	0	1825	1770	1219	0	1524	0	1585	0

Phasing Parameters

SEQUENCES	12	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	8.58	9.87	29.55				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	7	7	11				
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE + BASE MIT
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:17:41

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 2 - WAIPAHU ST & MOKUOLA ST
Degree of Saturation (v/c) .64 Vehicle Delay 7.9 Level of Service B+

```
        ---------------------------------------
Sq 12 |  Phase 1   |  Phase 2   |  Phase 3   |
**/** ---------------------------------------
      |            |            |            |
  .   |            |            |            |
 /|\  |            |      <****|      <****|
  |   |            |       ****|       ****|
  |   |            |      v     |      v     |
North |   <*    *> |         *> |****>       |
  |   |    *    *  |         *  |****        |
      |    *    *  |         *  |   v        |
        ---------------------------------------
      | G/C= .143  | G/C= .164  | G/C= .492  |
      | G=    8.6" | G=    9.9" | G=  29.5"  |
      | Y+R=  4.0" | Y+R=  4.0" | Y+R=  4.0" |
      | OFF=   .0% | OFF=21.0%  | OFF=44.1%  |
        ---------------------------------------
      C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
NB Approach								13.3	B	
RT	12/1	.334	.408	450	497	355	.714	12.9	*B	177 ft
LT	12/1	.103	.176	212	269	108	.401	14.7	B	75 ft
WB Approach								4.4	A	
TH	12/1	.432	.757	1382	1382	745	.539	2.3	A	153 ft
LT	12/1	.131	.198	432	474	318	.671	9.5	B+	110 ft
EB Approach								9.8	B+	
TH+RT	12/1	.422	.526	800	833	622	.747	9.8	*B+	249 ft

RECEIVED AS FOLLOWS

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AMFAC - WAIPAHU TRAFFIC STUDY                                       02/25/96
2000 - BASE CONDITIONS WITH MIT                                     13:53:06
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

   Intersection Parameters for Int #    3 - WAIPAHU ST & PAIWA ST

METROAREA              NONCBD
LOSTTIME                  2.0
LEVELOFSERVICE          C     S
NODELOCATION            0     0

   Approach Parameters

APPLABELS              SB               WB               NB               EB
GRADES                 .0               .0               .0               .0
PEDLEVELS           MODER            MODER            MODER            MODER
PARKINGSIDES         NONE             NONE             NONE             NONE
PARKVOLUMES            20               20               20               20
BUSVOLUMES              5                5                5                5
RIGHTTURNONREDS       300                0                0                0

   Movement Parameters

MOVLABELS          RT   TH   LT    RT   TH   LT    RT   TH   LT    RT   TH   LT
VOLUMES           786  409   47    62  397  155    93  201   18    83  241  309
WIDTHS           11.0 12.0 12.0    .0 12.0 12.0    .0 12.0 12.0    .0 12.0 12.0
LANES               1    1    1     0    1    1     0    1    1     0    1    1
UTILIZATIONS     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
TRUCKPERCENTS     2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0
PEAKHOURFACTORS   .95  .95  .95   .95  .95  .95   .95  .95  .95   .95  .95  .95
ARRIVALTYPES        3    3    3     3    3    3     3    3    3     3    3    3
ACTUATIONS        YES  YES  YES   YES  YES  YES   YES  YES  YES   YES  YES  YES
REQCLEARANCES     4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0
MINIMUMS          5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0
IDEALSATFLOWS    1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
FACTORS          1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
DELAYFACTORS     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
NSTOPFACTORS     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
GROUPTYPES       NORM NORM NORM  NORM NORM NORM  NORM NORM NORM  NORM NORM NORM
SATURATIONFLOWS  1332 1863  490     0 1765 1770     0 1684  368     0 1711 1770

   Phasing Parameters

SEQUENCES          15   ALL
PERMISSIVES       YES   YES   YES   YES          LEADLAGS     NONE    NONE
OVERLAPS          YES   YES   YES   YES          OFFSET        .00       1
CYCLES             60   120    10                PEDTIME        .0       0
GREENTIMES      18.27  8.22   .00 21.51
YELLOWTIMES      4.00  4.00   .00  4.00
CRITICALS           2    12     0     5
EXCESS              0
```

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AMFAC - WAIPAHU TRAFFIC STUDY                                       02/25/96
2000 - BASE CONDITIONS WITH MIT                                     13:53:11
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int #    3 - WAIPAHU ST & PAIWA ST
      Degree of Saturation (v/c)  .63   Vehicle Delay  10.6    Level of Service B

        ---------------------------------------------------
Sq 15 |  Phase 1   |  Phase 2   |  Phase 3   |  Phase 4   |
**/** ---------------------------------------------------
      | + * +      | +          |        -   |        -   |
      | + * +      | +          |        ++++|        ++++|
 /|\  |(+ * +)     |(+          |       (++++|       (++++|
  |   |  v         |    -   ++++|        ++++|    -   ++++|
  |   |        -   |++++   v    |        v   |++++   v    |
North |    (+ + +) |            |            |++++)       |
  |   |     + + +  |            |            |++++        |
      |     + + +  |            |            |   v        |
        ---------------------------------------------------
      | G/C= .305  | G/C= .137  | G/C= .000  | G/C= .358  |
      | G=  18.3"  | G=   8.2"  | G=    .0"  | G=  21.5"  |
      | Y+R= 4.0"  | Y+R= 4.0"  | Y+R=  .0"  | Y+R= 4.0"  |
      | OFF=  .0%  | OFF=37.1%  | OFF=57.5%  | OFF=57.5%  |
        ---------------------------------------------------
      C= 60 sec    G= 48.0 sec = 80.0%   Y=12.0 sec = 20.0%   Ped=  .0 sec =   .0%

--------------------------------------------------------------------------------------
| Lane  |Width/|     g/C      | Service Rate|  Adj  |      |  HCM  | L |90% Max|
| Group | Lanes| Reqd   Used  | @C (vph) @E |Volume|  v/c  | Delay | S | Queue |
--------------------------------------------------------------------------------------
SB Approach                                                 10.8   B
======================================================================================
|  RT   | 11/1 | .419 | .542 |  687 |  721 |  512 | .710 |   8.9 | B+| 198 ft|
|  TH   | 12/1 | .264 | .338 |  575 |  629 |  431 | .685 |  13.2 |*B | 241 ft|
|  LT   | 12/1 | .000 | .338 |  129 |  163 |   49 | .295 |   9.7 | B+|  27 ft|
--------------------------------------------------------------------------------------
NB Approach                                                 11.1   B
======================================================================================
| TH+RT| 12/1 | .220 | .338 |  515 |  569 |  310 | .545 |  11.3 | B | 173 ft|
|  LT  | 12/1 | .000 | .338 |   92 |  118 |   19 | .153 |   9.0 | B+|  25 ft|
--------------------------------------------------------------------------------------
WB Approach                                                 10.0   B
======================================================================================
| TH+RT| 12/1 | .306 | .392 |  643 |  692 |  483 | .698 |  12.0 |*B | 248 ft|
|  LT  | 12/1 | .011 | .170 |  456 |  485 |  163 | .336 |   4.2 | A |  56 ft|
--------------------------------------------------------------------------------------
EB Approach                                                 10.6   B
======================================================================================
| TH+RT| 12/1 | .235 | .392 |  622 |  671 |  341 | .508 |   9.5 | B+| 175 ft|
|  LT  | 12/1 | .133 | .170 |  388 |  425 |  325 | .765 |  11.8 |*B | 123 ft|
--------------------------------------------------------------------------------------
```

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS W/ MIT
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS
02/25/96
14:04:06

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int 0 3 - WAIPAHU ST & PAIWA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	300	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	693	216	34	60	364	33	64	226	29	54	331	442
WIDTHS	11.0	12.0	12.0	.0	12.0	12.0	.0	12.0	12.0	.0	12.0	12.0
LANES	1	1	1	0	1	1	0	1	1	0	1	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1332	1863	464	0	1762	1770	0	1727	679	0	1762	1770

Phasing Parameters

SEQUENCES	15	ALL		
PERMISSIVES	YES	YES	YES	YES
OVERLAPS	YES	YES	YES	YES
CYCLES	60	180	10	
GREENTIMES	14.07	14.24	.00	19.68
YELLOWTIMES	4.00	4.00	.00	4.00
CRITICALS	8	12	0	5
EXCESS	0			

LEADLAGS	NONE	NONE
OFFSET	.00	1
PEDTIME	.0	0

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS W/ MIT
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS
02/25/96
14:04:13

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int 0 3 - WAIPAHU ST & PAIWA ST
Degree of Saturation (v/c) .62 Vehicle Delay 11.2 Level of Service B

```
Sq 15 | Phase 1    | Phase 2    | Phase 3    | Phase 4    |
**/** |            |            |            |            |
      | + + +      | +          |        -   |        -   |
      | + + +      | +          |        ++++|        ++++|
 /|\  |(+ + +)     |(+          |       <++++|       <++++|
  |   |  v         |            |        ++++|    -   ++++|
  |   |       -    |++++ -  ++++|            |++++        |
North |   (+ + +)  |        v   |        v   |++++>   v   |
  |   |    + + +   |            |            |++++        |
      |    + + +   |            |            |   v        |
      | G/C= .235  | G/C= .237  | G/C= .000  | G/C= .328  |
      | G= 14.1"   | G= 14.2"   | G=    .0"  | G= 19.7"   |
      | Y+R= 4.0"  | Y+R= 4.0"  | Y+R=  .0"  | Y+R= 4.0"  |
      | OFF= .0%   | OFF=30.1%  | OFF=60.5%  | OFF=60.5%  |
C= 60 sec   G= 48.0 sec = 80.0%   Y=12.0 sec = 20.0%   Ped= .0 sec = .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								8.3	B+	
RT	11/1	.350	.572	732	762	414	.543	5.8	B+	149 ft
TH	12/1	.155	.268	439	499	227	.455	12.3	B	140 ft
LT	12/1	.000	.268	90	118	36	.290	11.6	B	25 ft
NB Approach								14.6	B	
TH+RT	12/1	.212	.268	404	463	385	.659	15.0	*C+	188 ft
LT	12/1	.000	.268	140	179	31	.170	10.9	B	25 ft
WB Approach								12.2	B	
TH+RT	12/1	.286	.361	585	637	446	.700	13.0	*B	240 ft
LT	12/1	.000	.271	565	603	35	.058	2.9	A	25 ft
EB Approach								11.5	B	
TH+RT	12/1	.264	.361	585	637	405	.636	11.0	B	210 ft
LT	12/1	.214	.271	566	603	465	.771	11.2	*B	181 ft

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS W/MIT
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/26/96
13:10:14

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 8 - PAIWA ST & LUMIAINA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	.0	2.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	0	195	30	32	75	961	360	87	119	357	87	9
WIDTHS	.0	24.0	12.0	.0	24.0	12.0	12.0	24.0	12.0	.0	24.0	12.0
LANES	0	2	1	0	2	1	1	2	1	0	2	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	DOPT	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3691	1395	0	3277	1770	1364	3600	1041	0	2962	1770

Phasing Parameters

SEQUENCES	17	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	120	10		PEDTIME	.0	0
GREENTIMES	20.73	16.17	11.09				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	7	5	11				
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS W/MIT
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/26/96
13:10:20

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 8 - PAIWA ST & LUMIAINA ST
Degree of Saturation (v/c) .63 Vehicle Delay 13.7 Level of Service B

```
-----------------------------------------------
Sq 17 |   Phase 1   |   Phase 2   |   Phase 3   |
**/** -----------------------------------------
      | + + +       |      -      |             |
  .   | + + +       |   ++++|     |             |
 /|\  |<+ + +>      |  <++++|     |             |
  |   |   v         |   ++++|  -  |             |
  |   |       -     |      v      |++++         |
North |    <+ + +>  |             |++++>        |
  |   |     + + +   |             |++++         |
      |     + + +   |             |   v         |
-----------------------------------------------
      | G/C= .346   | G/C= .270   | G/C= .185   |
      | G= 20.7"    | G= 16.2"    | G= 11.1"    |
      | Y+R= 4.0"   | Y+R= 4.0"   | Y+R= 4.0"   |
      | OFF= .0%    | OFF=41.2%   | OFF=74.8%   |
-----------------------------------------------
C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped= .0 sec = .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								7.9	B+	
TH+RT	24/2	.077	.379	1359	1398	213	.152	7.9	B+	56 ft
LT	12/1	.000	.379	478	528	32	.061	7.7	B+	25 ft
NB Approach								11.9	B	
RT	12/1	.317	.379	468	517	379	.733	14.0	*B	199 ft
TH	24/2	.039	.379	1358	1397	92	.066	7.7	B+	25 ft
LT	12/1	.165	.379	347	394	125	.317	8.7	B+	65 ft
WB Approach								14.7	B	
TH+RT	24/2-	.253	.303	934	992	763	.769	14.9	*B	224 ft
LT	12/1+	.239	.303	479	536	362	.675	14.2	B	213 ft
EB Approach								16.8	C+	
TH+RT	24/2	.183	.218	576	646	468	.724	16.9	*C+	154 ft
LT	12/1	.013	.218	325	386	9	.023	11.9	B	25 ft

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS W/MIT
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:08:54

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int 0   8 - PAIWA ST & LUMIAINA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	.0	2.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	8	195	30	32	75	961	360	87	119	357	87	9
WIDTHS	.0	24.0	12.0	.0	24.0	12.0	12.0	24.0	12.0	.0	24.0	12.0
LANES	0	2	1	0	2	1	1	2	1	0	2	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	DOPT	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3691	1395	0	3277	1770	1364	3688	1041	0	2962	1770

Phasing Parameters

SEQUENCES	17	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	120	10		PEDTIME	.0	0
GREENTIMES	20.73	16.17	11.09				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	7	5	11				
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - BASE CONDITIONS W/MIT
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:09:01

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int 0   8 - PAIWA ST & LUMIAINA ST
Degree of Saturation (v/c) .63 Vehicle Delay 13.7 Level of Service B

```
       --------------------------------------
Sq 17 |  Phase 1  |  Phase 2  |  Phase 3  |
**/** --------------------------------------
      | + + +     |        ^  |           |
  .   | + + +     |      ****|           |
 /|\  |<+ + +>    |    <****|           |
  |   |   v       |     ****|    ^      |
  |   |        ^  |       v  |++++       |
North |     <+ + ^>|          |****>      |
  |   |      + + ^|          |****       |
      |      + + ^|          |    v      |
       --------------------------------------
      | G/C= .346 | G/C= .270 | G/C= .185 |
      | G=  20.7" | G=  16.2" | G=  11.1" |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=41.2% | OFF=74.8% |
       --------------------------------------
```

C= 60 sec   G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								7.9	B+	
TH+RT	24/2	.077	.379	1359	1398	213	.152	7.9	B+	56 ft
LT	12/1	.000	.379	478	528	32	.061	7.7	B+	25 ft
NB Approach								11.9	B	
RT	12/1	.317	.379	468	517	379	.733	14.0	*B	199 ft
TH	24/2	.039	.379	1358	1397	92	.066	7.7	B+	25 ft
LT	12/1	.165	.379	347	394	125	.317	8.7	B+	65 ft
WB Approach								14.7	B	
TH+RT	24/2-	.253	.303	934	992	763	.769	14.9	*B	224 ft
LT	12/1+	.239	.303	479	536	362	.675	14.2	B	213 ft
EB Approach								16.8	C+	
TH+RT	24/2	.183	.218	576	646	468	.724	16.9	*C+	154 ft
LT	12/1	.013	.218	325	386	9	.023	11.9	B	25 ft

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 SCENARIO A W/BASE MIT
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:27:18

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 2 - WAIPAHU ST & MOKUOLA ST
Degree of Saturation (v/c) .54 Vehicle Delay 9.1 Level of Service B+

```
---------------------------------------------------------
Sq 16 |  Phase 1  |  Phase 2  |  Phase 3  |  Phase 4  |
**/** ---------------------------------------------------
      | + + +     | +         | +         |        -  |
  .   | + + +     | +         | +         |      ++++|
 /|\  |(+ + +)    |(+         |(+         |     (++++|
  |   |   v       |      **** |      -    |      ++++|
  |   |       -   |++++   v   |++++       |++++   v   |
North |    (* * +)|         +)|++++)      |****)      |
  |   |     * * + |         + |++++       |****       |
      |     * * + |         + |   v       |   v       |
      ---------------------------------------------------
      | G/C= .171 | G/C= .211 | G/C= .000 | G/C= .418 |
      | G=  10.3" | G=  12.7" | G=    .0" | G=  25.1" |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R=  .0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=23.8% | OFF=51.5% | OFF=51.5% |
      ---------------------------------------------------
      C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								9.1	B+	
RT	12/1	.156	.482	703	742	184	.248	5.9	B+	80 ft
LT+TH	12/1	.104	.285	306	360	133	.361	13.5	B	89 ft
NB Approach								9.6	B+	
RT	12/1	.223	.482	548	588	218	.371	6.5	B+	95 ft
LT+TH	12/1	.143	.285	190	242	122	.504	15.1	*C+	82 ft
WB Approach								9.4	B+	
TH+RT	12/1	.318	.451	779	828	521	.635	9.3	B+	241 ft
LT	12/1	.173	.244	517	556	391	.703	9.4	*B+	144 ft
EB Approach								8.4	B+	
TH+RT	12/1	.319	.451	735	776	492	.634	9.4	*B+	228 ft
LT	12/1	.000	.244	515	556	83	.149	2.7	A	25 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A W/BASE MIT
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:31:13

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 2 - WAIPAHU ST & MOKUOLA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	5
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	200	66	15	14	536	248	281	58	106	125	464	63
WIDTHS	12.0	12.0	.0	.0	12.0	12.0	12.0	12.0	.0	.0	12.0	11.0
LANES	1	1	0	0	1	1	1	1	0	0	1	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1539	1695	0	0	1817	1770	1219	1397	0	0	1758	1711

Phasing Parameters

SEQUENCES	14	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	100	10		PEDTIME	.0	0
GREENTIMES	11.27	7.54	29.19				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	8	6	11				
EXCESS	0						

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

APPENDIX B

• YEAR 2000 WITH PHASE I AND BASE IMPROVEMENTS LOS CALCULATIONS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 SCENARIO A W/BASE MIT
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:27:10

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 2 - WAIPAHU ST & MOKUOLA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	175	115	11	11	484	371	207	33	83	156	312	79
WIDTHS	12.0	12.0	.0	.0	12.0	12.0	12.0	12.0	.0	.0	12.0	12.0
LANES	1	1	0	0	1	1	1	1	0	0	1	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1539	1800	0	0	1818	1770	1219	1182	0	0	1720	1770

Phasing Parameters

SEQUENCES	16	ALL		
PERMISSIVES	YES	YES	YES	YES
OVERLAPS	YES	YES	YES	YES
CYCLES	60	100	10	
GREENTIMES	10.27	12.65	.00	25.07
YELLOWTIMES	4.00	4.00	.00	4.00
CRITICALS	8	6	0	11
EXCESS	0			

LEADLAGS	NONE	NONE
OFFSET	.00	1
PEDTIME	.0	0

RECEIVED AS FOLLOWS

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A W/BASE MIT
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:39:07

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 3 - WAIPAHU ST & PAIWA ST
Degree of Saturation (v/c) .66 Vehicle Delay 11.3 Level of Service B

```
       ----------------------------------------
Sq 14 |  Phase 1   |  Phase 2   |  Phase 3   |
**/** ----------------------------------------
      | + * +      | +          |        -   |
  .   | + * +      | +          |        ****|
 /|\  |(+ * +)     |(+          |     - <****|
  |   |   v        |    -   ****|        ****|
  |   |        -   |****    v   |****    v   |
North |     (+ + +)|            |****>       |
  |   |      + + + |            |****        |
      |      + + + |            |   v        |
       ----------------------------------------
      | G/C= .284  | G/C= .121  | G/C= .395  |
      | G=  17.0"  | G=   7.3"  | G=  23.7"  |
      | Y+R= 4.0"  | Y+R= 4.0"  | Y+R= 4.0"  |
      | OFF=  .0%  | OFF=35.0%  | OFF=53.8%  |
       ----------------------------------------
```

C= 60 sec G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								11.3	B	
RT	11/1	.322	.505	634	672	376	.560	7.4	B+	157 ft
TH	12/1	.263	.317	533	590	420	.725	14.8	*B	247 ft
LT	12/1	.000	.317	105	134	47	.338	10.7	B	27 ft
NB Approach								12.3	B	
TH+RT	12/1	.226	.317	479	535	321	.600	12.5	B	105 ft
LT	12/1	.000	.317	92	118	32	.258	10.1	B	25 ft
WB Approach								12.9	B	
TH+RT	12/1	.356	.429	716	760	577	.759	12.5	*B	278 ft
LT	12/1	.120	.154	439	467	391	.837	13.5	*B	126 ft
EB Approach								8.0	B+	
TH+RT	12/1	.250	.429	686	730	365	.500	8.5	B+	176 ft
LT	12/1	.082	.154	359	397	235	.592	7.2	B+	76 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A W/ BASE MIT
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:49:51

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 3 - WAIPAHU ST & PAIWA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	235	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	455	226	37	57	376	33	64	221	43	72	356	341
WIDTHS	11.0	12.0	12.0	.0	12.0	12.0	.0	12.0	12.0	.0	12.0	12.0
LANES	1	1	1	0	1	1	0	1	1	0	1	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1332	1863	455	0	1767	1770	0	1726	661	0	1750	1770

Phasing Parameters

SEQUENCES	15	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	120	10		PEDTIME	.0	0
GREENTIMES	15.31	10.63	.00	22.06			
YELLOWTIMES	4.00	4.00	.00	4.00			
CRITICALS	8	12	0	5			
EXCESS	0						

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A W/BASE MIT
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:31:19

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 2 - WAIPAHU ST & HOKUOLA ST
Degree of Saturation (v/c) .57 Vehicle Delay 8.8 Level of Service B+

```
        --------------------------------------------
Sq 14 | Phase 1  | Phase 2  | Phase 3  |
**/** --------------------------------------------
      | + + +    | +        |      -   |
  .   | + + +    | +        |     ++++|
 /|\  |(+ + +)   |(+        |    (++++|
  |   |   v      |     -   ****|  -  ++++|
  |   |       -  |++++  v  |++++   v  |
North |   (* * +)|        +)|****)    |
  |   |    * * + |        + |****     |
      |    * * + |        + |   v     |
        --------------------------------------------
      | G/C= .188 | G/C= .126 | G/C= .486 |
      | G=  11.3" | G=   7.5" | G=  29.2" |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=25.5% | OFF=44.7% |
        --------------------------------------------
C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped= .0 sec = .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								9.2	B+	
RT	12/1	.174	.414	589	636	211	.332	7.8	B+	104 ft
LT+TH	12/1	.076	.221	315	375	85	.227	12.4	B	56 ft
NB Approach								12.0	B	
RT	12/1	.287	.414	458	504	296	.587	10.1	B	146 ft
LT+TH	12/1	.162	.221	253	309	173	.560	15.1	*C+	114 ft
WB Approach								7.8	B+	
TH+RT	12/1	.348	.520	914	945	579	.613	7.4	B+	234 ft
LT	12/1	.097	.159	365	405	261	.644	8.5	*B+	80 ft
EB Approach								7.8	B+	
TH+RT	12/1	.381	.520	882	914	620	.678	8.3	*B+	251 ft
LT	11/1	.000	.159	352	392	66	.168	2.9	A	25 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A W/BASE MIT
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:39:02

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 3 - WAIPAHU ST & PAIWA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	156	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	513	407	45	65	484	371	93	212	30	95	252	223
WIDTHS	11.0	12.0	12.0	.0	12.0	12.0	.0	12.0	12.0	.0	12.0	12.0
LANES	1	1	1	0	1	1	0	1	1	0	1	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1332	1863	438	0	1773	1770	0	1689	392	0	1703	1770

Phasing Parameters

SEQUENCES	14	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	120	10		PEDTIME	.0	0
GREENTIMES	17.01	7.26	23.73				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	2	6	5				
EXCESS	0						

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A W/BASE MIT
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:57:06

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 8 - PAIWA ST. & LUMIAINA ST
Degree of Saturation (v/c) .64 Vehicle Delay 14.2 Level of Service B

```
--------------------------------------------
Sq 17 | Phase 1   | Phase 2   | Phase 3   |
**/** --------------------------------------
      | + + +     |     ^     |           |
      | + + +     |   ****    |           |
 /|\  |(+ + +)    |  <****    |           |
  |   |  v        |   ****    |  ^        |
  |   |       ^   |   v       |****       |
North |   (+ + *) |           |****>      |
  |   |    + + *  |           |****       |
      |    + + *  |           |  v        |
--------------------------------------------
      | G/C= .356 | G/C= .269 | G/C= .175 |
      | G= 21.4"  | G= 16.1"  | G= 10.5"  |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
      | OFF= .0%  | OFF=42.3% | OFF=75.8% |
--------------------------------------------
```

C= 60 sec G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								7.6	B+	
TH+RT	24/2	.077	.390	1401	1438	213	.148	7.7	B+	55 ft
LT	12/1	.000	.390	494	543	32	.059	7.4	B+	25 ft
NB Approach								12.3	B	
RT	12/1	.335	.390	482	531	404	.761	14.7	*B	208 ft
TH	24/2	.039	.390	1400	1437	92	.064	7.4	B+	25 ft
LT	12/1	.161	.390	359	406	121	.298	8.3	B+	62 ft
WB Approach								15.2	C+	
TH+RT	24/2-	.260	.302	931	990	784	.792	15.5	*C+	231 ft
LT	12/1+	.245	.302	478	535	372	.695	14.7	B	219 ft
EB Approach								17.5	C+	
TH+RT	24/2	.179	.208	547	618	457	.739	17.6	*C+	153 ft
LT	12/1	.013	.208	307	368	9	.024	12.2	B	25 ft

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO A W/BASE MIT
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
14:53:20

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 8 - PAIWA ST & LUMIAINA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	.0	2.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	5	139	58	40	130	1161	745	190	266	170	63	1
WIDTHS	.0	24.0	12.0	.0	24.0	12.0	12.0	24.0	12.0	.0	24.0	12.0
LANES	0	2	1	0	2	1	1	2	1	0	2	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	DOPT	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3695	1107	0	3310	1770	1364	3688	1197	0	3027	1770

Phasing Parameters

SEQUENCES	17	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	100	10		PEDTIME	.0	0
GREENTIMES	24.55	16.62	6.83				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	7	6	11				
EXCESS	0						

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY 02/25/96
2000 - SCENARIO A W/ BASE MIT 14:49:57
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 3 - WAIPAHU ST & PAIWA ST
Degree of Saturation (v/c) .57 Vehicle Delay 10.4 Level of Service B

```
Sq 15 | Phase 1   | Phase 2   | Phase 3   | Phase 4   |
**/** -------------------------------------------------
      | + + +     | +         |        -  |        -  |
      | + + +     | +         |     ++++  |     ++++  |
 /|\  |(+ + +)    |(+         |    <++++  |    <++++  |
  |   |   v       |    -  ++++|     ++++  |  -  ++++  |
  |   |       -   |++++   v   |     v     |++++ v     |
North |   (+ + +) |           |           |++++>      |
  |   |    + + +  |           |           |++++       |
      |    + + +  |           |           |  v        |
      -------------------------------------------------
      | G/C= .255 | G/C= .177 | G/C= .000 | G/C= .368 |
      | G= 15.3"  | G= 10.6"  | G=   .0"  | G= 22.1"  |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R=  .0" | Y+R= 4.0" |
      | OFF= .0%  | OFF=32.2% | OFF=56.6% | OFF=56.6% |
      -------------------------------------------------
```

C= 60 sec G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								8.7	B+	
RT	11/1	.216	.532	674	709	232	.327	5.2	B+	92 ft
TH	12/1	.161	.288	478	537	238	.443	11.6	B	143 ft
LT	12/1	.000	.288	97	125	39	.298	11.1	B	25 ft
NB Approach								13.0	B	
TH+RT	12/1	.210	.288	440	498	300	.602	13.4	*B	180 ft
LT	12/1	.000	.288	149	189	45	.236	10.6	B	27 ft
WB Approach								10.3	B	
TH+RT	12/1	.291	.401	661	708	456	.644	10.8	*B	230 ft
LT	12/1	.000	.210	457	496	35	.071	3.3	A	25 ft
EB Approach								10.4	B	
TH+RT	12/1	.291	.401	654	702	451	.642	10.8	B	228 ft
LT	12/1	.153	.210	458	496	359	.724	9.9	*B+	134 ft

AMFAC - WAIPAHU TRAFFIC STUDY 02/25/96
2000 - SCENARIO A W/BASE MIT 14:56:58
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 8 - PAIWA ST & LUMIAINA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	.0	2.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	8	195	30	32	75	991	384	87	115	347	87	9
WIDTHS	.0	24.0	12.0	.0	24.0	12.0	12.0	24.0	12.0	.0	24.0	12.0
LANES	0	2	1	0	2	1	1	2	1	0	2	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	OOPT	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3691	1395	0	3276	1770	1364	3688	1043	0	2966	1770

Phasing Parameters

SEQUENCES	17	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	21.37	16.13	10.49				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	7	5	11				
EXCESS	0						

```
AMFAC - WAIPAHU TRAFFIC STUDY                                    02/25/96
2000 SCENARIO B W/ BASE MIT                                      15:08:54
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

   Intersection Parameters for Int #   2 - WAIPAHU ST & MOKUOLA ST

METROAREA              NONCBD
LOSTTIME                  2.0
LEVELOFSERVICE         C    S
NODELOCATION           0    0

   Approach Parameters

APPLABELS              SB             WB             NB             EB
GRADES                 .0             .0            2.0             .0
PEDLEVELS             LOW            LOW            LOW            LOW
PARKINGSIDES         NONE           NONE           BOTH           NONE
PARKVOLUMES            20             20             20             20
BUSVOLUMES              0              5              0              5
RIGHTTURNONREDS         0              0              0              0

   Movement Parameters

MOVLABELS           RT   TH   LT    RT   TH   LT    RT   TH   LT    RT   TH   LT
VOLUMES             93  130   48    55  467  359   198   46   83   156  284   29
WIDTHS            12.0 12.0   .0    .0 12.0 12.0  12.0 12.0   .0    .0 12.0 12.0
LANES                1    1    0     0    1    1     1    1    0     0    1    1
UTILIZATIONS      1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
TRUCKPERCENTS      2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0   2.0  2.0  2.0
PEAKHOURFACTORS    .95  .95  .95   .95  .95  .95   .95  .95  .95   .95  .95  .95
ARRIVALTYPES         3    3    3     3    3    3     3    3    3     3    3    3
ACTUATIONS         YES  YES  YES   YES  YES  YES   YES  YES  YES   YES  YES  YES
REQCLEARANCES      4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0   4.0  4.0  4.0
MINIMUMS           5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0   5.0  5.0  5.0
IDEALSATFLOWS     1900 1900 1900  1900 1900 1900  1900 1900 1900  1900 1900 1900
FACTORS           1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
DELAYFACTORS      1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
NSTOPFACTORS      1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
GROUPTYPES        NORM NORM NORM  NORM NORM NORM  NORM NORM NORM  NORM NORM NORM
SATURATIONFLOWS   1539 1608    0     0 1792 1770  1219 1065    0     0 1713  290

   Phasing Parameters

SEQUENCES           12   ALL
PERMISSIVES        YES   YES   YES   YES       LEADLAGS     NONE   NONE
OVERLAPS           YES   YES   YES   YES       OFFSET        .00      1
CYCLES              60   100    10             PEDTIME        .0      0
GREENTIMES       12.36 11.97 23.67
YELLOWTIMES       4.00  4.00  4.00
CRITICALS            8     6    11
EXCESS               0
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AMFAC - WAIPAHU TRAFFIC STUDY                                          02/25/96
2000 SCENARIO B W/ BASE MIT                                            15:09:00
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int #   2 - WAIPAHU ST & MOKUOLA ST
     Degree of Saturation (v/c)  .52  Vehicle Delay   8.3  Level of Service B+

        ---------------------------------------------
Sq 12 |  Phase 1   |  Phase 2   |  Phase 3   |
**/** ---------------------------------------------
       | + + +     |         ^  |         ^  |
   .   | + + +     |      ++++  |      ++++  |
  /|\  |(+ + +)    |     (++++  |     (++++  |
   |   |   v       |      ****  |    ^  ++++  |
   |   |       ^   |         v  |++++    v   |
North  |    (* * +)|        +)  |****)       |
   |   |     * * + |         +  |****        |
       |     * * + |         +  |   v        |
        ---------------------------------------------
       | G/C= .206 | G/C= .199 | G/C= .395 |
       | G=  12.4" | G=  12.0" | G=  23.7" |
       | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
       | OFF=  .0% | OFF=27.3% | OFF=53.9% |
        ---------------------------------------------
       C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								13.0	B	
RT	12/1	.094	.239	310	368	98	.266	12.1	B	63 ft
LT+TH	12/1	.152	.239	326	385	188	.488	13.5	B	121 ft
NB Approach								9.2	B+	
RT	12/1	.215	.505	578	616	208	.338	5.8	B+	87 ft
LT+TH	12/1	.171	.239	285	255	135	.529	14.5	*B	87 ft
WB Approach								5.6	B+	
TH+RT	12/1	.337	.694	1242	1244	550	.442	2.8	A	142 ft
LT	12/1	.165	.233	496	536	378	.785	9.8	*B+	140 ft
EB Approach								9.8	B+	
TH+RT	12/1	.304	.428	689	733	463	.632	10.0	*B+	223 ft
LT	12/1	.000	.428	95	119	31	.250	7.3	B+	25 ft

RECEIVED AS FOLLOWS

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IMFAC - WAIPAHU TRAFFIC STUDY                                    02/25/96
2000 - SCENARIO A W/BASE MIT                                     14:53:34
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int #   8 - PAIWA ST & LUMIAINA ST
      Degree of Saturation (v/c)  .83  Vehicle Delay  26.50 Level of Service D+
         @ expect more delay due to extreme v/c's (see EVALUATE)
      -----------------------------------------------
Sq 17 |  Phase 1   |  Phase 2  |  Phase 3  |
**/** -----------------------------------------------
      | + + +      |        -  |           |
  .   | + + +      |     ++++|           |
 /|\  |(+ + +)     |    (++++|           |
  |   |   v        |     ****|   -       |
  |   |     -      |      v  |++++       |
North |      (+ + *)|          |****)      |
  |   |       + + *|          |****       |
      |       + + *|          |   v       |
      -----------------------------------------------
      | G/C= .409  | G/C= .277 | G/C= .114 |
      | G=  24.6"  | G=  16.6" | G=   6.8" |
      | Y+R= 4.0"  | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0%  | OFF=47.6% | OFF=82.0% |
      -----------------------------------------------
      C= 60 sec    G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								6.3	B+	
TH+RT	24/2	.058	.443	1612	1635	151	.092	6.3	B+	35 ft
LT	12/1	.000	.443	446	490	61	.124	6.4	B+	29 ft
NB Approach								36.70	D	
RT	12/1	.595	.443	560	604	784	1.298	54.50	*E	369 ft
TH	24/2	.073	.443	1609	1632	200	.123	6.4	B+	47 ft
LT	12/1	.279	.443	486	530	200	.528	8.7	B+	132 ft
WB Approach								22.1	C	
TH+RT	24/2-	.307	.310	970	1027	956	.931	23.4	C	278 ft
LT	12/1+	.290	.310	492	549	454	.827	19.4	*C+	264 ft
EB Approach								16.5	C+	
TH+RT	24/2	.104	.147	372	445	245	.551	16.5	*C+	88 ft
LT	12/1	.002	.147	202	260	1	.004	14.1	B	25 ft

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

APPENDIX B

• YEAR 2000 WITH PHASES I AND II WITH BASE IMPROVEMENTS LOS CALCULATIONS

RECEIVED AS FOLLOWS

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B W/ BASE MIT
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
15:22:49

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 3 - WAIPAHU ST & PAIWA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	130	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	484	402	40	58	444	155	93	205	46	111	273	186
WIDTHS	11.0	12.0	12.0	.0	12.0	12.0	.0	12.0	12.0	.0	12.0	12.0
LANES	1	1	1	0	1	1	0	1	1	0	1	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1332	1863	473	0	1774	1770	0	1686	374	0	1696	1770

Phasing Parameters

SEQUENCES	14	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	120	10		PEDTIME	.0	0
GREENTIMES	17.90	6.93	23.17				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	2	6	5				
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B W/ BASE MIT
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
15:22:55

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 3 - WAIPAHU ST & PAIWA ST
Degree of Saturation (v/c) .59 Vehicle Delay 9.9 Level of Service B+

```
Sq 14 | Phase 1  | Phase 2  | Phase 3  |
**/** |----------|----------|----------|
      | + * +    | +        |        * |
      | + * +    | +        |     **** |
 /|\  |(+ * +)   |(+       |    (**** |
  |   |  v       |    ****  |     **** |
  |   |          |****   v  |****  v   |
North |   (+ + +)|          |****)     |
  |   |    + + + |          |****      |
      |    + + + |          |  v       |
      |----------|----------|----------|
      | G/C= .298| G/C= .115| G/C= .386|
      | G= 17.9" | G=  6.9" | G= 23.2" |
      | Y+R= 4.0"| Y+R= 4.0"| Y+R= 4.0"|
      | OFF=  .0%| OFF=36.5%| OFF=54.7%|
```

C= 60 sec G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								10.4	B	
RT	11/1	.320	.514	647	684	373	.545	7.1	B+	153 ft
TH	12/1	.260	.332	563	618	423	.684	13.4	*B	238 ft
LT	12/1	.000	.332	121	153	42	.268	9.7	B+	25 ft
NB Approach								11.5	B	
TH+RT	12/1	.222	.332	504	559	314	.562	11.6	B	177 ft
LT	12/1	.000	.332	92	118	40	.387	11.0	B	27 ft
WB Approach								9.8	B+	
TH+RT	12/1	.329	.420	699	744	528	.710	11.5	*B	258 ft
LT	12/1	.025	.149	387	419	163	.389	4.5	*A	55 ft
EB Approach								8.3	B+	
TH+RT	12/1	.273	.420	666	711	484	.568	9.4	B+	198 ft
LT	12/1	.059	.149	350	387	196	.506	6.1	B+	66 ft

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B W/ BASE MIT
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
15:14:32

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 2 - WAIPAHU ST & MOKUOLA ST

METROAREA	NONCBD	
LOSTTIME		2.0
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	2.0	.0
PEDLEVELS	LOW	LOW	LOW	LOW
PARKINGSIDES	NONE	NONE	BOTH	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	0	5	0	20
RIGHTTURNONREDS	0	0	0	5
				0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	76	91	112	120	514	230	269	85	106	125	371	59
WIDTHS	12.0	12.0	.0	.0	12.0	12.0	12.0	12.0	.0	.0	12.0	11.0
LANES	1	1	0	0	1	1	1	1	0	0	1	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1539	1124	0	0	1766	1770	1219	1065	0	0	1745	276

Phasing Parameters

SEQUENCES	12	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	16.69	7.19	24.12				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	2	6	11				
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY
2000 - SCENARIO B W/ BASE MIT
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

02/25/96
15:14:44

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 2 - WAIPAHU ST & MOKUOLA ST
Degree of Saturation (v/c) .59 Vehicle Delay 8.7 Level of Service B+

```
       ---------------------------------------
Sq 12 |  Phase 1  |  Phase 2  |  Phase 3  |
**/** ---------------------------------------
      | + * *     |      -    |      -    |
  .   | + * *     |      ++++|      ++++|
 /|\  |(+ * *)    |     (++++|     (++++|
  |   |   v       |      ****|   -  ++++|
  |   |      -    |      v   |++++  v   |
North |    (+ + +)|        +)|****)     |
  |   |     + + + |        + |****      |
      |     + + + |        + |   v      |
       ---------------------------------------
      | G/C= .278 | G/C= .120 | G/C= .402 |
      | G=  16.7" | G=   7.2" | G=  24.1" |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=34.5% | OFF=53.1% |
       ---------------------------------------
       C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped=  .0 sec =   .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								12.5	B	
RT	12/1	.000	.311	424	479	80	.167	9.7	B+	46 ft
LT+TH	12/1	.237	.311	299	350	214	.611	13.6	*B	124 ft
NB Approach								9.6	B+	
RT	12/1	.276	.498	560	687	283	.466	6.0	B+	120 ft
LT+TH	12/1	.236	.311	282	332	201	.605	13.6	B	117 ft
WB Approach								5.8	B+	
TH+RT	12/1	.405	.622	1083	1090	667	.607	5.2	B+	213 ft
LT	12/1	.090	.153	357	395	251	.635	7.6	*B+	80 ft
EB Approach								10.7	B	
TH+RT	12/1	.331	.435	717	760	523	.688	10.7	*B	249 ft
LT	11/1	.000	.435	92	115	62	.517	11.1	B	30 ft

RECEIVED AS FOLLOWS

AMFAC - WAIPAHU TRAFFIC STUDY 02/25/96
2000 - SCENARIO B W/BASE MIT 15:33:25
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 8 - PAIWA ST & LUMIAINA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	.0	2.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	8	195	30	32	110	971	365	87	91	210	120	9
WIDTHS	.0	24.0	12.0	.0	24.0	12.0	12.0	24.0	12.0	.0	24.0	12.0
LANES	0	2	1	0	2	1	1	2	1	0	2	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	DOPT	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3691	1395	0	3347	1770	1364	3688	1046	0	3112	1770

Phasing Parameters

SEQUENCES	17	ALL					
PERMISSIVES	NO	NO	NO	NO	LEADLAGS	NONE	NONE
OVERLAPS	NO	NO	NO	NO	OFFSET	.00	1
CYCLES	60	180	10		PEDTIME	.0	0
GREENTIMES	22.28	17.49	8.23				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	7	5	11				
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY 02/25/96
2000 - SCENARIO B W/BASE MIT 15:33:31
AM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 8 - PAIWA ST & LUMIAINA ST
Degree of Saturation (v/c) .59 Vehicle Delay 12.6 Level of Service B

```
        -------------------------------------------
Sq 17 |  Phase 1   |  Phase 2   |  Phase 3   |
**/** -------------------------------------------
      | + + +      |     ^      |            |
      | + + +      |    ++++|   |            |
 /|\  |(+ + +)     |   (++++|   |     ^      |
  |   |  v         |    ++++|   |            |
  |   |        ^   |    v       |++++        |
North |    (+ + +) |            |++++)       |
  |   |     + + +  |            |++++        |
      |     + + +  |            |   v        |
      -------------------------------------------
      | G/C= .371  | G/C= .291  | G/C= .137  |
      | G=  22.3"  | G=  17.5"  | G=   8.2"  |
      | Y+R= 4.0"  | Y+R= 4.0"  | Y+R= 4.0"  |
      | OFF=  .0%  | OFF=43.8%  | OFF=79.6%  |
      -------------------------------------------
```

C= 60 sec G= 48.0 sec = 80.0% Y=12.0 sec = 20.0% Ped= .0 sec = .0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								7.3	B+	
TH+RT	24/2	.077	.405	1461	1494	213	.143	7.3	B+	53 ft
LT	12/1	.000	.405	517	564	32	.057	7.0	B+	25 ft
NB Approach								10.6	B	
RT	12/1	.321	.405	505	552	384	.696	12.2	*B	193 ft
TH	24/2	.039	.405	1460	1493	92	.062	7.0	B+	25 ft
LT	12/1	.133	.405	377	423	96	.227	7.6	B+	48 ft
WB Approach								13.3	B	
TH+RT	24/2-	.257	.325	1033	1087	795	.731	13.4	*B	226 ft
LT	12/1+	.247	.325	520	575	377	.656	13.1	B	215 ft
EB Approach								16.9	C+	
TH+RT	24/2	.135	.171	457	531	347	.653	17.0	*C+	121 ft
LT	12/1	.013	.171	242	302	9	.030	13.4	B	25 ft

RECEIVED AS FOLLOWS

IMFAC - WAIPAHU TRAFFIC STUDY 02/25/96
2000 - SCENARIO B W/BASE MIT 15:20:44
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 3 - WAIPAHU ST & PAIWA ST

METROAREA	NONCBD	
LOSTTIME	2.0	
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	.0	.0	.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	170	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	423	222	33	52	448	33	64	216	77	101	424	243
WIDTHS	11.0	12.0	12.0	.0	12.0	12.0	.0	12.0	12.0	.0	12.0	12.0
LANES	1	1	1	0	1	1	0	1	1	0	1	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	1332	1863	467	0	1779	274	0	1723	673	0	1740	1770

Phasing Parameters

SEQUENCES	13	ALL					
PERMISSIVES	YES	YES	YES	YES	LEADLAGS	NONE	NONE
OVERLAPS	YES	YES	YES	YES	OFFSET	.00	1
CYCLES	60	120	10		PEDTIME	.0	0
GREENTIMES	15.13	7.69	25.19				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	8	12	5				
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY 02/25/96
2000 - SCENARIO B W/BASE MIT 15:20:51
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 3 - WAIPAHU ST & PAIWA ST
Degree of Saturation (v/c) .53 Vehicle Delay 8.4 Level of Service B+

```
        ---------------------------------------
Sq 13  | Phase 1  | Phase 2  | Phase 3  |
**/**  ---------------------------------------
       | + + +    | +        |        ^ |
       | + + +    | +        |     ****|
 /|\   |(+ + +)   |(+        |   (<****|
  |    |  v       |   ^      |   ^ ****|
  |    |     ^    |****      |****  v  |
North  |   (+ * *)|++++)     |++++)    |
  |    |    + * * |++++      |++++     |
       |    + * * |   v      |   v     |
        ---------------------------------------
       | G/C= .252 | G/C= .128 | G/C= .420 |
       | G= 15.1"  | G=  7.7"  | G= 25.2"  |
       | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
       | OFF= .0%  | OFF=31.9% | OFF=51.4% |
        ---------------------------------------
       C= 60 sec   G= 48.0 sec = 80.0%   Y=12.0 sec = 20.0%   Ped= .0 sec = .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								9.2	B+	
RT	11/1	.241	.400	600	640	266	.416	6.8	B+	117 ft
TH	12/1	.159	.285	473	532	234	.440	11.7	B	141 ft
LT	12/1	.000	.285	98	127	35	.263	11.0	B	25 ft
NB Approach								13.1	B	
TH+RT	12/1	.206	.285	434	492	294	.598	13.4	*B	177 ft
LT	12/1	.143	.285	150	190	81	.422	12.2	B	49 ft
WB Approach								9.4	B+	
TH+RT	12/1	.327	.453	765	806	527	.654	9.6	*B+	243 ft
LT	12/1	.000	.453	96	119	35	.282	7.0	B+	25 ft
EB Approach								4.8	A	
TH+RT	12/1	.348	.648	1115	1127	552	.490	3.8	A	164 ft
LT	12/1	.092	.161	371	410	256	.624	7.1	*B+	76 ft

AMFAC - WAIPAHU TRAFFIC STUDY 02/25/96
2000 - SCENARIO B W/BASE MIT 15:31:17
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Summary of Parameter Values

Intersection Parameters for Int # 8 - PAIWA ST & LUMIAINA ST

METROAREA	NONCBD	
LOSTTIME		2.0
LEVELOFSERVICE	C	S
NODELOCATION	0	0

Approach Parameters

APPLABELS	SB	WB	NB	EB
GRADES	-2.0	.0	2.0	.0
PEDLEVELS	MODER	MODER	MODER	MODER
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	20	20	20	20
BUSVOLUMES	5	5	5	5
RIGHTTURNONREDS	0	0	0	0

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	5	139	58	48	223	1155	735	190	241	108	152	1
WIDTHS	.0	24.0	12.0	.0	24.0	12.0	12.0	24.0	12.0	.0	24.0	12.0
LANES	0	2	1	0	2	1	1	2	1	0	2	1
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
PEAKHOURFACTORS	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95	.95
ARRIVALTYPES	3	3	3	3	3	3	3	3	3	3	3	3
ACTUATIONS	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REQCLEARANCES	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	DOPT	NORM	NORM	NORM	NORM	NORM	NORM
SATURATIONFLOWS	0	3695	1107	0	3405	1770	1364	3600	1197	0	3312	1770

Phasing Parameters

SEQUENCES	17	ALL			LEADLAGS	NONE	NONE
PERMISSIVES	NO	NO	NO	NO	OFFSET	.00	1
OVERLAPS	NO	NO	NO	NO	PEDTIME	.0	0
CYCLES	60	120	10				
GREENTIMES	24.00	17.36	6.64				
YELLOWTIMES	4.00	4.00	4.00				
CRITICALS	7	6	11				
EXCESS	0						

AMFAC - WAIPAHU TRAFFIC STUDY 02/25/96
2000 - SCENARIO B W/BASE MIT 15:31:23
PM PEAK HOUR LEVEL OF SERVICE CALCULATIONS

SIGNAL94/TEAPAC[V1 L1.4] - Capacity Analysis Summary

Intersection Averages for Int # 8 - PAIWA ST & LUMIAINA ST
Degree of Saturation (v/c) .84 Vehicle Delay 26.30 Level of Service D+
@ expect more delay due to extreme v/c's (see EVALUATE)

```
      -----------------------------------------
Sq 17 |  Phase 1  |  Phase 2  |  Phase 3  |
**/** -----------------------------------------
      | + + +     |        -  |           |
  .   | + + +     |     ++++|           |
 /|\  |(+ + +)    |    (++++|           |
  |   |   v       |     ****|   -       |
  |   |      -    |    v    |++++       |
North |   (+ + *)|           |****)      |
  |   |    + + *  |           |****       |
      |    + + *  |           |   v       |
      -----------------------------------------
      | G/C= .400 | G/C= .289 | G/C= .111 |
      | G=  24.0" | G=  17.4" | G=   6.6" |
      | Y+R= 4.0" | Y+R= 4.0" | Y+R= 4.0" |
      | OFF=  .0% | OFF=46.7% | OFF=82.3% |
      -----------------------------------------
      C= 60 sec   G= 48.0 sec = 80.0%  Y=12.0 sec = 20.0%  Ped= .0 sec = .0%
```

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	90% Max Queue
SB Approach								6.5	B+	
TH+RT	24/2	.058	.433	1576	1601	151	.094	6.5	B+	36 ft
LT	12/1	.000	.433	436	480	61	.127	6.6	B+	29 ft
NB Approach								37.50	D	
RT	12/1	.580	.433	546	591	774	1.310	55.00	*E	370 ft
TH	24/2	.073	.433	1573	1598	200	.125	6.6	B+	48 ft
LT	12/1	.257	.433	474	519	254	.489	8.5	B+	121 ft
WB Approach								21.6	C	
TH+RT	24/2-	.316	.323	1044	1098	1018	.927	22.3	C	291 ft
LT	12/1+	.306	.323	515	571	484	.848	20.2	*C	276 ft
EB Approach								16.7	C+	
TH+RT	24/2	.105	.144	402	477	274	.574	16.7	*C+	99 ft
LT	12/1	.002	.144	197	255	1	.004	14.2	B	25 ft