Stephen K. Yamashiro
Mayor

Jiro A. Sumada
Deputy Chief Engineer

County of Hawaii

DEPARTMENT OF PUBLIC WORKS

25 Aupuni Street, Room 202 · Hilo, Hawaii 96720-4252
(808) 961-8321 · Fax (808) 961-8630

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September 8, 1999

GENEVIEVE SALMONSON, DIRECTOR
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET, SUITE 702
HONOLULU, HI 96813

SUBJECT: FINAL ENVIRONMENTAL ASSESSMENT & FINDING OF NO SIGNIFICANT IMPACT - Kawailani Street Improvements, Iwalani Street to Pohakulani Street

The Hawaii County Department of Public Works has reviewed the comment letters received during the 30-day public comment period which began on 8 June 1999. The agency has determined that this project will not have significant environmental effects and has issued a Finding of No Significant Impact (FONSI). Please publish this notice in the next edition of the OEQC Environmental Notice.

We have enclosed a completed OEQC Environmental Notice Publication Form and four copies of the final EA. Please contact Galen Kuba, Engineer, at 961-8327 if you have any questions.

JIRO A. SUMADA
Deputy Chief Engineer

Attachments

c: Ron Terry

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KAWAILANI STREET IMPROVEMENTS
IWALANI TO POHAKULANI STREET
SOUTH HILO, HAWAII

FINAL ENVIRONMENTAL ASSESSMENT

September 1999

Submitted Pursuant to the National Environmental Policy Act (NEPA),
42 U.S.C. 4332 (2)(c), Section 4(f) of the Department of Transportation Act (DOT)
49 U.S.C. 303, and Chapter 343, Hawaii Revised Statutes (HRS)

U.S. Department of Transportation, Federal Highway Administration (FHWA)
State of Hawaii, Department of Transportation, Highways Division
County of Hawaii, Department of Public Works

KAWAILANI STREET IMPROVEMENTS
IWALANI TO POHAKULANI STREET
SOUTH HILO, HAWAII

ENVIRONMENTAL ASSESSMENT

Submitted Pursuant to the National Environmental Policy Act (NEPA),
42 U.S.C. 4332 (2)(c), 49 U.S.C. 303, and Chapter 343, Hawaii Revised Statutes (HRS)

U.S. Department of Transportation, Federal Highway Administration (FHWA)
State of Hawaii, Department of Transportation, Highways Division
County of Hawaii, Department of Public Works

AUG 1 6 1999
Date of Approval

Jiro A. Sumada, Deputy Chief Engineer
Hawaii County Department of Public Works

8/17/99
Date of Approval

Kazu Hayashida, Director
Hawaii State Department of Transportation

8/20/99
Date of Approval

Abraham Wong, Division Administrator
Federal Highway Administration

The following persons may be contacted for additional information concerning this document:

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Highways Division
869 Punchbowl Street
Honolulu, Hawaii 96813
(808) 587-2220

Mr. Robert Yanabu, Chief Engineer
Hawaii County Dept. of Public Works
25 Aupuni Street
Hilo, Hawaii 96720
(808) 961-8321

The proposed project would provide widening, channelized lanes, and traffic signals at the intersections of Ainaola Drive and Iwalani Street with Kawailani Street, in Hilo, Hawaii. The purpose of the project is to redesign the intersections in such a way as to maximize traffic safety and minimize peak hour traffic congestion. Noise impacts would occur but can be largely mitigated through noise reduction barriers. Air quality would benefit as a result of the improvements. Right-of-way taking would affect adjacent residences, public use structures, and businesses.

SUMMARY

PROJECT DESCRIPTION, PURPOSE AND NEED, AND ALTERNATIVES

The proposed project would improve two closely spaced intersections on Kawailani Street - Iwalani Street and Ainaola Drive/Pohakulani Street - in Hilo, Island of Hawaii (See Fig. 1-1). Ainaola Drive, Kawailani Street and Iwalani Streets function as collector roads conducting most of the traffic from Hilo's upland suburb of Waiakea Uka to and from schools, workplaces and shopping areas. Therefore, these roads exhibit high peak hour traffic counts relative to other County roads in Hilo and are often congested during AM and/or PM peak hours. The less than optimal geometry and spacing of these intersections have led to greater than normal accident rates. A recent comprehensive study of problem intersections in Hilo determined that the Kawailani-Iwalani Street intersection ranked high in accidents among Hilo intersections and met warrants for traffic signal installation.

There are four Build Alternatives for the project: 1A, 1B, 2A, and 2B (See Fig. 2-1). Common to all Build Alternatives are the following elements:

- o Signalization of the intersections of Ainaola Drive and Iwalani Street with Kawailani Street;
- o Provision of additional through and turn lanes on sections of Kawailani Street and on Ainaola Drive approaching the intersections, including full opposed left-turn lanes on Kawailani Street at both intersections.
- o Travel lanes 3.4 m (11.0 ft.) in width, a paved shoulder 1.5 m (5.0 ft.) in width, and paved swales 1.5 m (5.0 ft.) in width.
- o Replacement and upgrade of street lighting and drainage structures in conformance with federal and County standards.

Alternatives 1A/2A differ from Alternatives 1B/2B in the treatment of turning movements at the intersections. Alternatives 1A/1B involve realignment of the southern leg of Pohakulani Street 110 m (360 ft.) to the south; Alternatives 2A/2 B would place a cul-de-sac at the former intersection of Pohakulani Street and Ainaola Drive and provide a new access way to Ainaola Drive through a vacant lot.

Alternatives 1A/1B differ from Alternatives 2B/2A in the treatment of various turning lanes on Kawailani Street.

The purpose of the project is to redesign the intersections in such a way as to maximize traffic safety and minimize peak hour traffic congestion. The project would not, and is not intended to, increase the capacity of the general roadway system that feeds the intersections, as most segments of this system operate at acceptable Levels of Service.

COST AND SCHEDULE

Depending on the Alternative selected, the project would cost between $2.12 and $2.42 million. With necessary approvals, the project would begin construction in early 2000 and would last approximately 1 year.

LEAD AGENCIES AND ACCEPTING AUTHORITY

The Federal Highway Administration (FHWA), the Hawaii State Department of Transportation (HDOT) and the Hawaii County Department of Public Works (DPW) are serving as joint lead agencies to prepare an Environmental Assessment (EA) in compliance with federal and State of Hawaii requirements. The approving authorities for the EA are the Hawaii Division Administrator of FHWA and the Director of HDOT.

AFFECTED ENVIRONMENT

Project Location and Neighborhood Character

The project is located within the city of Hilo, which encloses about 50 square km (20 square mi.) (See Fig. 1-1). Locations potentially affected by the physical characteristics of the road (pavement, noise, runoff, carbon monoxide gas, etc.) are restricted to a zone within about 200 m (650 ft.) of the Ainaola Drive/Kawailani Street intersection. The project site is a residential neighborhood in the Waiakea area with a small commercial center comprising a convenience store, a video store and a gas station. Census data reveal that the project site is near the average for Hilo in most demographic measures, except for its somewhat higher home values, incomes and rents.

Floodplain Status and Water Quality

No floodways or floodplain are present, and the entire area is mapped as Zone X, defined as areas of moderate or minimal flood hazard on the Flood Insurance Rate Maps. No streams are located near the project site. Runoff generated from the site is typical of urban areas.

Air Quality and Noise

Regional air quality is good, and there are no concentrations of pollutants exceeding state or federal standards. The entire State of Hawaii is an attainment area with respect to federal regulations. Traffic noise is fairly high for residences near the intersections (58-65 L_{eq}) but does not approach or exceed the federal Noise Abatement Criteria of 67 L_{eq} for residential or commercial areas.

Biology and Wetlands

The project area is completely urbanized and does not contain any natural vegetation, habitat for native species, streams, wetlands or aquatic sites, or other areas that might be of concern for biological impacts

Land Use Designation

The area is entirely within the State Land Use Urban District. County zoning is Residential and Village Commercial. The site is not located within or near the Special Management Area of the Hawaii Coastal Zone Management Program.

Historic Sites

All land in the project site has been completely altered by construction or clearing within the last 30 years. There are no known structures or remains dating from before this period. No historic sites appear to be present, and none are listed in the U.S. or Hawaii Registers of Historic Places in or near the project site.

Public Facilities and Services

The Waiakea Fire Station is located near the Iwalani Street intersection. No other public parks or facilities are present in the area.

Agricultural Resources

Soil on the project site is classified as Olaa Extremely Stony Silty Clay Loam. This soil is rapidly permeable with slow runoff, and erosion hazard is thus slight. Areas of this soil type in the project area were formerly farmed in sugar cane and now support some pasture or diversified tree crops.

Traffic Circulation and Safety

Currently, these unsignalized intersections are congested during AM and/or PM peak hours. The less than optimal geometry and spacing of these intersections have led to greater than normal accident rates.

Bicycle and Pedestrian Facilities

No sidewalks or bicycle facilities are currently present at the project site. The *Bike Plan Hawaii* designates Kawailani Street as a future proposed bike route, and Ainaola Drive is a future proposed bike lane.

ENVIRONMENTAL IMPACTS

The expected environmental impacts of the project and proposed mitigation are presented below and summarized in Table S-1. Except for impacts related to construction, the discussion considers impacts from 1998 through the year 2018. In this summary, the Build Alternatives are distinguished only where differences in impacts exist.

Floodplain and Water Quality Impacts

As no floodplains are present, no impacts are expected to occur. There would be negligible impact to water quality, as the area is already completely urbanized. No sensitive resources such as streams, ponds or wetlands are present on or near the project site.

Air Quality

The No-Build Alternative would lead to a slight exceedance of state air quality standards for carbon monoxide during the afternoon peak traffic hour.

Under the Build Alternative, impacts to regional (mesoscale) and onsite (microscale) air quality would be somewhat beneficial because of the predicted decrease in congestion and queuing. No exceedance of State of Hawaii or federal air quality standards would occur, and therefore no mitigation is necessary.

Noise

Under the No Build Alternative, no home or business would would experience noise increases exceeding 15 dB or absolute levels above 66 L_{eq} at either the AM or PM peak hours. Therefore no noise impacts of a magnitude large enough to necessitate consideration of mitigation measures would occur. By contrast, all Build Alternatives would cause noise impacts: 1A: 4 residences; 2A: 5; 1B and 2B: 6 residences each. The magnitude of the impact is in all cases small, with the maximum predicted noise level at any receptor less than 68.0 L_{eq}. A series of noise absorbing walls with heights between 1.7 m and 2.1 m (5.5 to 7.0) would be able to achieve sound reductions greater than 5.0 dBA at all impacted residences. However, a cost of over $35,000 per protected property at one of the residences exceeds the cost considered reasonable and precludes their use at this location.

Biology and Wetlands

The U.S. Fish and Wildlife Service has determined that no threatened or endangered species are known to occur in the project area and no significant adverse impacts to fish and wildlife resources are expected to result from the proposed project.

Consistency With Planning

The proposed project is consistent with all planning. No rezoning, reclassification or use permits are required.

Socioeconomic Impacts and Relocation

The project is not expected to adversely impact the identity or cohesion of this community. Although the widened profile will increase the "barrier effect" of Kawailani Street, traffic signals and crosswalks will promote safer use by pedestrians.

No minority or low-income groups would experience disproportionately high adverse impacts either directly or indirectly through construction-phase impacts, right-of-way taking, long-term noise and air quality effects, or other adverse effects.

No relocations would occur as a result of the project.

Historic Sites

The SHPO issued a letter on 13 July 1998 stating that no effects to significant historic sites would likely occur as a result of the road construction (see Appendix 4 for coordination letter).

Table S-1
Summary of Impacts and Proposed Mitigation Measures
Build Versus No-Build Alternatives

Impact Category	No-Build Alternative	Build Alternative			
		1A	1B	2A	2B
Floodplains & Water Quality	No impact.	Negligible impact to urbanized area, no floodplains. [No difference among Build Alternatives]			
Air Quality	Carbon monoxide exceeding state standards	No exceedance of state standards [No difference among Build Alternatives]			
Noise	Noise increase not great enough to produce noise impacts.	Noise increase approaching or exceeding 67 L_{eq} 4 residences, mitigable through noise barriers at 3 residences	6 res.; 4 res.	5 res.; 3 res.	6 res.; 4 res.
Biology/Wetlands	No impact.	No impact.			
Planning	No impact.	No impact.			
Relocation	No impact.	No impact.			
Socioeconomic	No impact.	Negligible impact to community cohesion.			
Historic Sites	No impact.	No impact.			
Public Facilities	No impact.	Acquisition of frontage at Waiakea Fire Station.			
Agricultural Land	No impact.	No impact.			
Traffic Circulation & Safety	Worsened congestion, inefficient circulation & high accident rate. LOS of C or worse at peak hours for most turning movements.	Improvement in traffic and increased safety. LOS of C or better at peak hours for nearly all movements. Each Alternative has advantages and disadvantages; none clearly superior.			
Pedestrian and Bicycle Facilities	No provision of shoulder for sidewalk & bike use.	Provision of shoulder to accommodate both pedestrians and bicycles.			
Energy	Inefficient travel/ increased energy consumption.	Efficient travel leading to decreased energy consumption.			
Construction	No impact.	Noise, vehicle emission, traffic & access impacts, affecting mostly houses with frontage on project. Mitigable through scheduling limitations & noise permit conditions. [No substantial difference among Build Alternatives]			
Growth/Cumulative/Secondary	No impact.	No impact.			

Public Facilities and Services

In general, police, fire and emergency medical services will benefit from the project because it will reduce accidents and congestion at the intersection. However, widening would require taking of about 3 m (10 ft.) in front of the Waiakea Fire Station.

Agricultural Resources

The area is classified in the *Agricultural Lands of Importance to the State of Hawaii* (ALISH) map series as urban, and no Prime, Unique, or Other Important Lands are present.

Traffic Circulation and Safety

The selection of any Build Alternative would lead to generally adequate or better Levels of Service for all movements of the two project intersections at both the AM and PM peak hours. The No Build Alternative would lead to unacceptable Levels of Service for most movements of both intersections. Level of Service in Alternatives 1A/2A differs in a number of ways from that for 1B/2B at individual turning movements, but each scheme has its advantages and disadvantages. Alternatives 2A/2B lengthen (and thus improve) the separation of the now closely-spaced intersections of Kawailani Street and Pohakulani Street with Ainaola Drive by 110 m (360 ft.).

Bicycle and Pedestrian Facilities

There is insufficient width to allow construction of separate bicycle and pedestrian facilities. The project will therefore involve provision of 1.5 m (5.0 ft.) shoulders on Kawailani Street and Ainaola Drive to accommodate both pedestrians and bicyclists.

Energy

The No Build Alternative would perpetuate inefficient engine operation, leading to increased energy consumption. The Build Alternative would decreased energy consumption.

Secondary, Cumulative and Growth-Inducing Impacts

There is negligible potential for growth-induction in the project area because of a safety related improvement such as the proposed project. The adverse effects of the project are very limited in severity and geographic scale. There are no projects being undertaken nearby which would combine with the Kawailani/Ainaola project to produce cumulative impacts.

Construction-Phase Impacts

Construction of the proposed project would last approximately one year. During this period construction vehicles, power tools and heavy equipment would generate noise, traffic congestion, exhaust emissions and the potential for soil erosion. Residents and others with property directly adjacent to the improvements would be the most directly affected by construction. This group includes a total of less than 30 residences, the small commercial center with a convenience store, a video store and a gas station. A number of mitigation measures will be incorporated into Special Contract Requirements or will be implemented as part of permits. The construction contractor will be required to:

- Adhere to a specific set of Best Management Practices for avoidance/reduction of soil erosion and off-site sediment transport;
- Develop and implement a Dust Control Plan, to be reviewed by the Hawaii State Department of Health;
- Move construction equipment and workers between the site and a nearby staging area during off-peak traffic hours;
- Conform with Title 11, Chapter 46, HAR (Community Noise Control) and obtain a permit with suitable mitigation measures;
- Utilize professional traffic control throughout construction and keep intersections open during the AM and PM peak hours, i.e., from 7:00-8:00 AM and between 4:30 - 5:30 PM; and
- Coordinate with utility companies to schedule disruption so as to minimize the inconvenience to utilities and their customers.

Coastal Zone Management Program

The entire State of Hawaii is considered to lie within the Coastal Zone. As such, all federal projects are subject to review for consistency with the policies and objectives of the Hawaii Coastal Zone Management Program. The Hawaii County Department of Public Works has determined that the project does not impact these coastal zone resources and is consistent with the objectives of the program. The EA was reviewed by the Hawaii Department of Business, Economic Development, and Tourism, Office of Planning, which concurred with this determination.

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1 PROJECT LOCATION, PURPOSE AND NEED

1.1 Project Location

The proposed project would improve two closely spaced intersections on Kawailani Street - Iwalani Street and Ainaola Drive/Pohakulani Street - in Hilo, Island of Hawaii (Fig. 1-1).

1.2 Lead Agencies

The Federal Highway Administration (FHWA), the Hawaii State Department of Transportation (HDOT) and the Hawaii County Department of Public Works (DPW) are serving as joint lead agencies to prepare an Environmental Assessment (EA) in compliance with federal and State of Hawaii requirements. The approving authorities for the EA are the Hawaii Division Administrator of FHWA and the Director of HDOT.

All the streets involved are County roads. The project will be included in the 1998-2000 federally approved Statewide Transportation Improvement Program.

1.3 Project Purpose and Need

The purpose of the project is to redesign the intersections in such a way as to maximize traffic safety and minimize peak hour traffic congestion. The project would not, and is not intended to, increase the capacity of the general roadway system that feeds the intersections, as most segments of this system operate at acceptable Levels of Service.

Ainaola Drive, Kawailani Street and Iwalani Streets function as collector roads conducting most of the traffic from Hilo's upland suburb of Waiakea Uka to and from schools, workplaces and shopping areas (Fig. 1-1), including the following areas:

- Downtown Hilo (via Komohana Street and Waianuenue Avenue or Ponahawai Street);
- Mid-town Hilo, the Hilo International Airport, and the University of Hawaii at Hilo (via Komohana Street and Kawili Street, or via Kanoelehua Avenue (State Highway 11);
- Waiakea residential and shopping districts (via Komohana Street, Iwalani Street, and Puainako Street).

TITLE

PROJECT LOCATION

FIGURE

1-1

PROJECT KAWAILANI STREET IMPROVEMENTS IWALANI TO POHAKULANI STREET
SOUTH HILO, HAWAII

DATE
9/8/98

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Therefore, these roads exhibit high peak hour traffic counts relative to other County roads in Hilo and are often congested during AM and/or PM peak hours.

The subject intersections are unsignalized and separated by 125 m (400 ft.). The Kawailani Street/Iwalani Street intersection is a right-angle, four-way intersection, with stop signs on the minor road, Iwalani Street. Ainaola Drive intersects Kawailani Street at an acute angle and creates essentially a five-leg intersection involving Pohakulani Street as well. Ainaola Drive traffic must stop to turn left and yield on right turns. Pohakulani Street has stop signs.

The less than optimal geometry and spacing of these intersections have led to greater than normal accident rates. A report on problem intersections in Hilo for the years 1991-1993 conducted by the Hawaii County Department of Public Works (Towill 1994) determined that among County road intersections in Hilo, the Kawailani-Iwalani Street intersection ranked high in accidents and met warrants for traffic signal installation. Although the other intersection was not covered in the report, it is well-known that traffic merging from Ainaola Drive onto Kawailani Street is a major contributor to accidents at both this intersection and at Iwalani Street as well.

2 DESCRIPTION OF ALTERNATIVES

The County of Hawaii considered several alternative approaches to address the project's purpose and need. Section 2.1 describes the alternatives that were advanced and are the subject of this EA. Section 2.2 discusses the No Build Alternative. Section 2.3 describes several initial alternatives that were studied and found unacceptable for various reasons and thus withdrawn from further consideration.

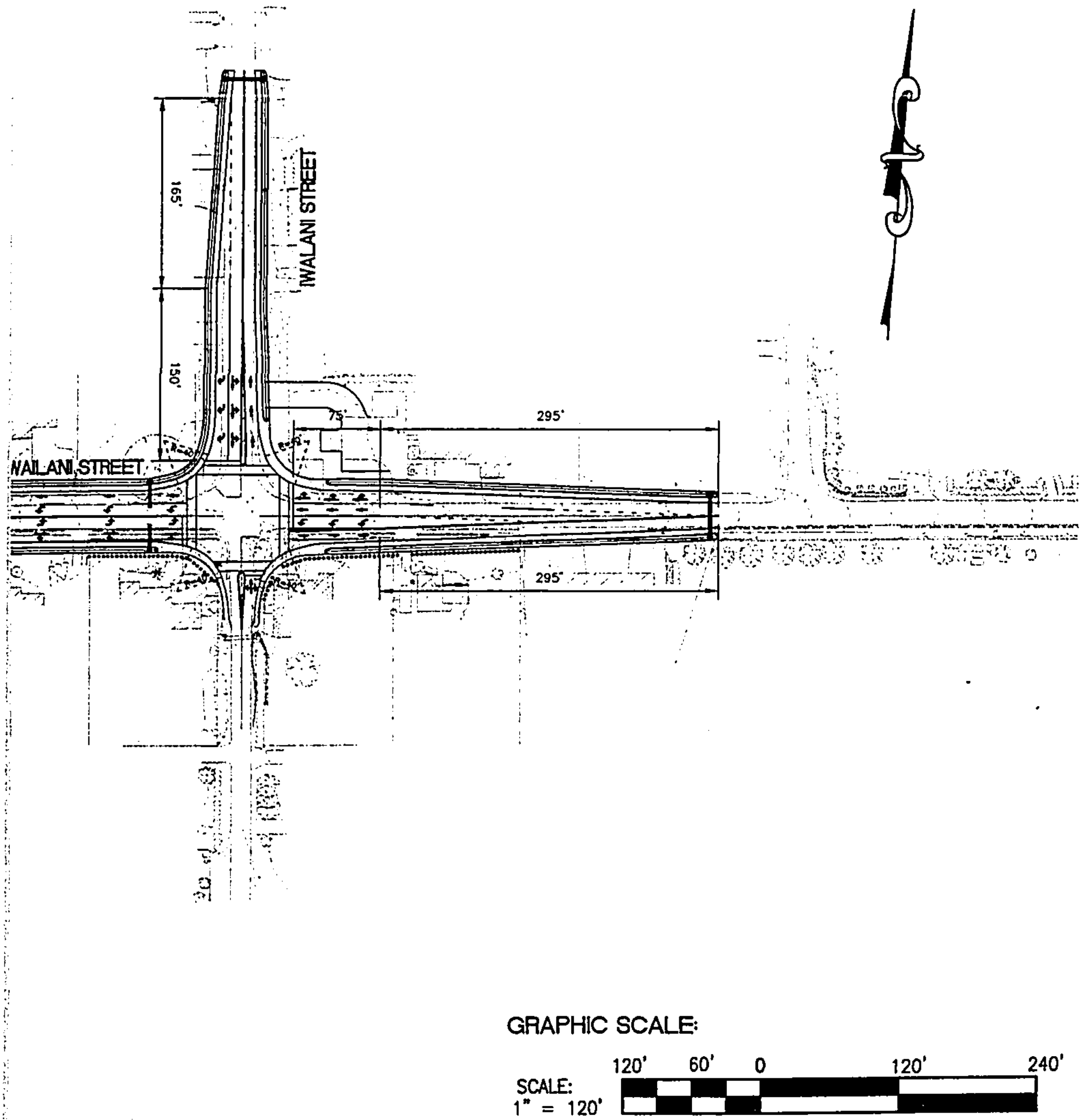
2.1 Build Alternatives: Description, Cost and Schedule

The Build Alternatives consist of four designs: 1A, 1B, 2A and 2B (Figs. 2-1a - 2-1d). Each satisfies the project's purpose and need of redesigning the intersections in such a way as to maximize traffic safety and minimize peak hour traffic congestion. They are basically combinations of two alternative designs for Kawailani Street with two alternative designs for the Pohakulani Street intersection. Common to all Build Alternatives are the following:

Traffic Signals:	Signalization of the intersections of Ainaola Drive and Iwalani Street with Kawailani Street.
Lanes:	Provision of additional through and turn lanes on Kawailani Street between near Kaneolani Street and Kuhilani Street (a distance of 370 m [1,200 ft.]), and on Ainaola Drive within 92 m (300 ft.) of its intersection with Kawailani Street. Full opposed left-turn lanes on Kawailani Street at both intersections.
Design Standards:	Travel lanes 3.4 m (11.0 ft.) in width, a paved shoulder 1.5 m (5.0 ft.) in width, and paved swales 1.5 m (5.0 ft.) in width (Fig. 2-2).
Accessory Features:	Replacement and upgrade of street lighting and drainage structures in conformance with federal and County standards.
Schedule:	With necessary approvals, the project would begin construction in 2000 and would last approximately 1 year.

The major differences between the Alternatives can be seen by comparing variants 1 vs 2 and "A" vs "B" (see Fig 2-1):

Variant "A" and "B" differ subtly in their treatment of turning lanes at the two major intersections; these differences are best appreciated by viewing Fig. 2-1; most obvious are the use of narrow traffic islands in "A", and the provision of double left-turn lanes at Kawailani St. westbound at Ainaola Dr. in "B", which satisfies peak PM demand by commuters returning to Waiakea Uka. Variant "1" would realign the southern portion of Pohakulani St. 110 m (360 ft.) to the south; Variant "2" would cul-de-sac the former intersection of Pohakulani St. and Ainaola Dr., and provide a new access way to Ainaola Dr. through two vacant lots.



TITLE

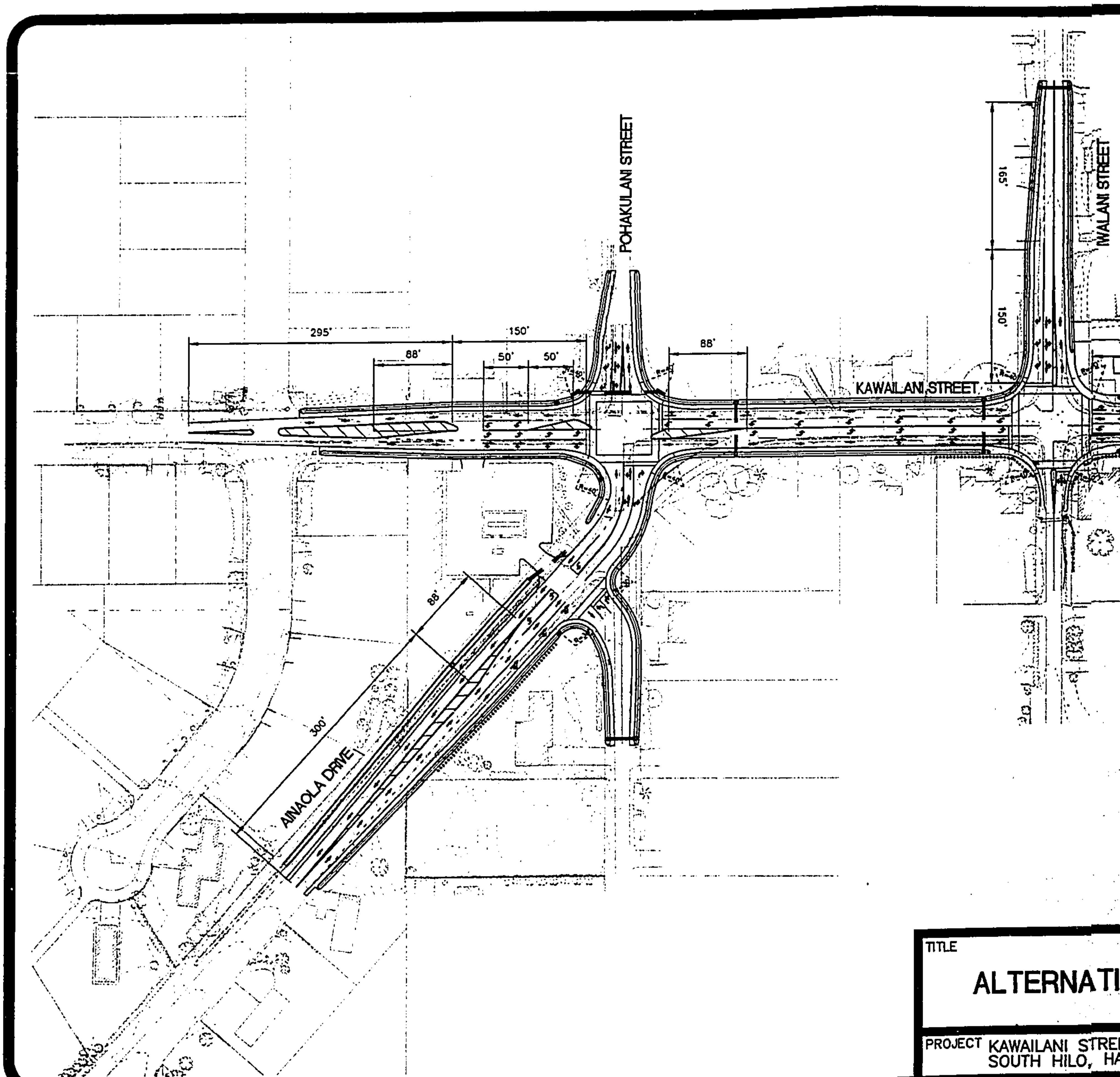
ALTERNATIVE 1A

FIGURE

2-1a

PROJECT KAWAILANI STREET IMPROVEMENTS IWALANI TO POHAKULANI STREET
SOUTH HILO, HAWAII

DATE
4/9/99



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ALTERNATI

PROJECT KAWAILANI STRE
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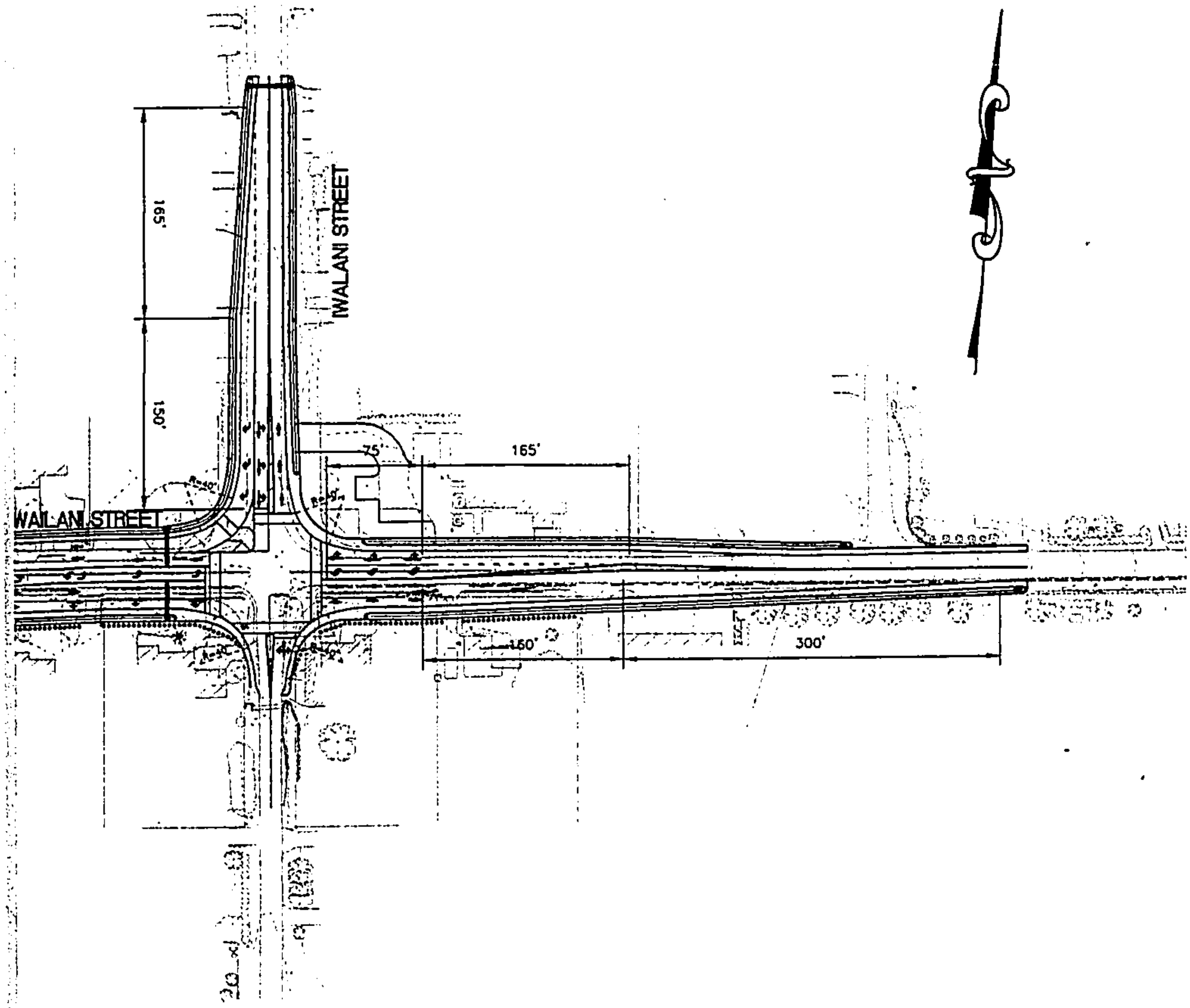


GRAPHIC SCALE:

SCALE:
1" = 120'

120' 60' 0 120' 240'

TITLE

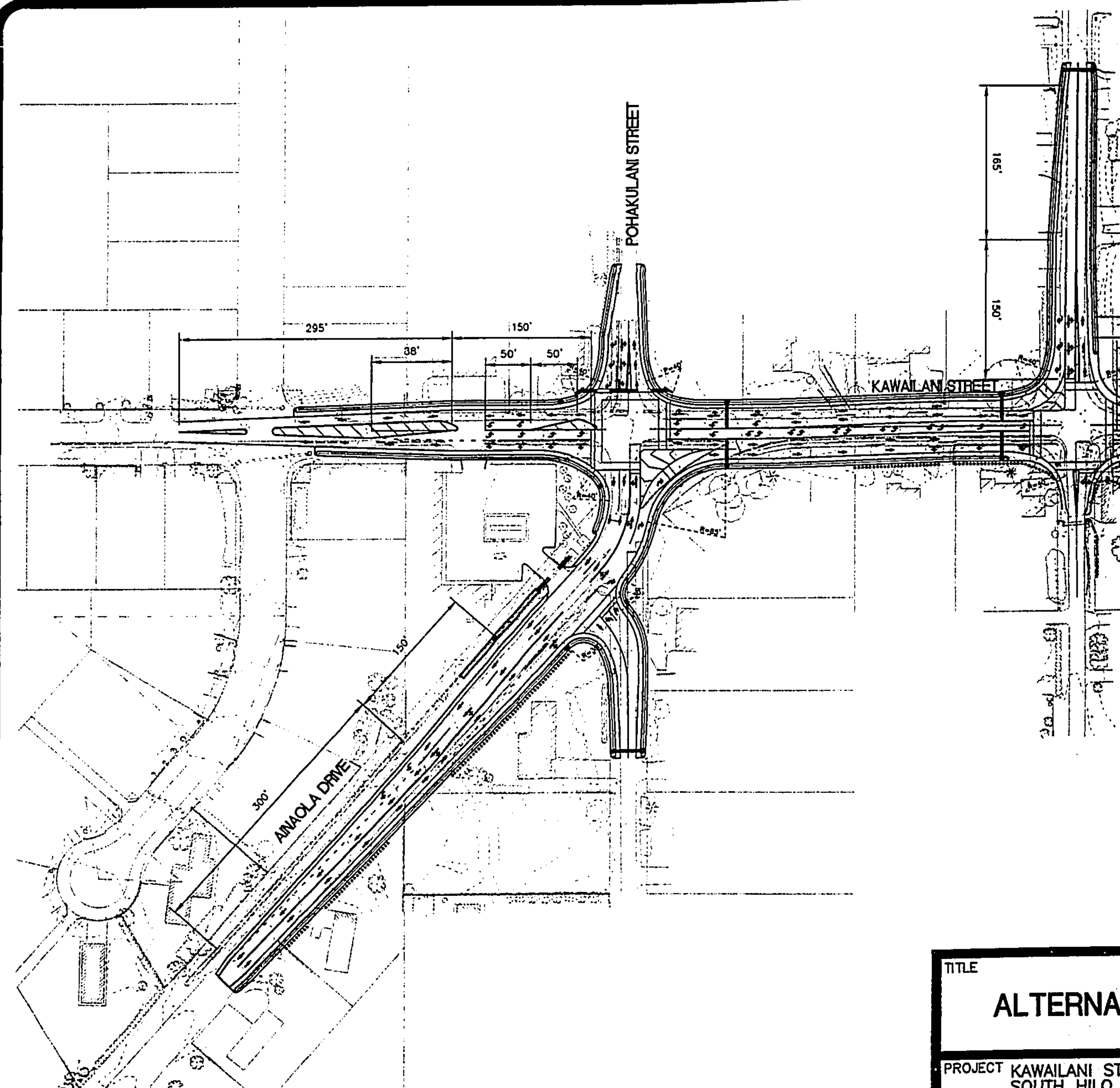
ALTERNATIVE 1B

FIGURE

2-1b

PROJECT KAWAILANI STREET IMPROVEMENTS IWALANI TO POHAKULANI STREET
SOUTH HILO, HAWAII

DATE
4/9/99



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ALTERNA

PROJECT KAWAILANI ST
SOUTH HILO,

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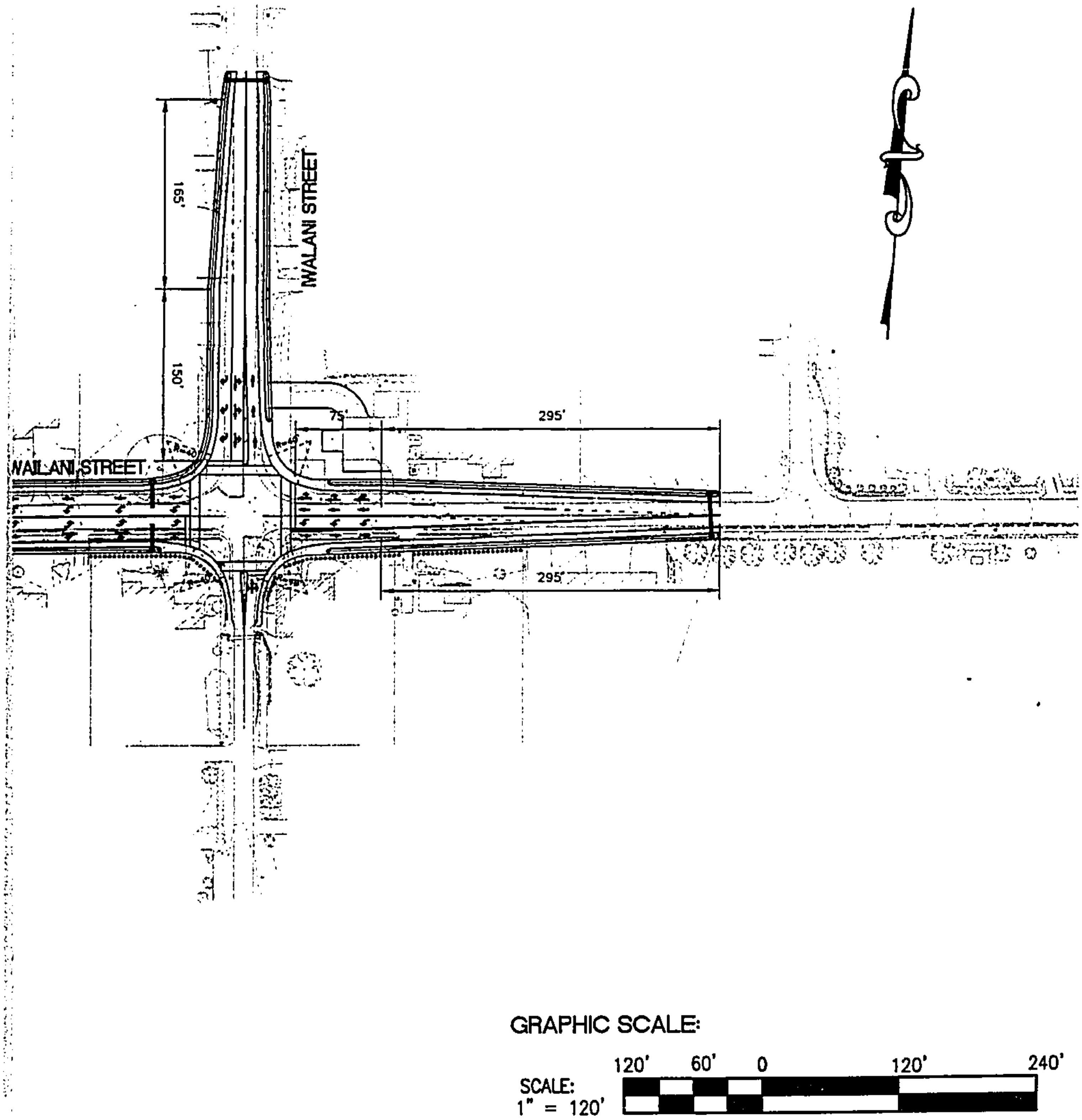


TITLE

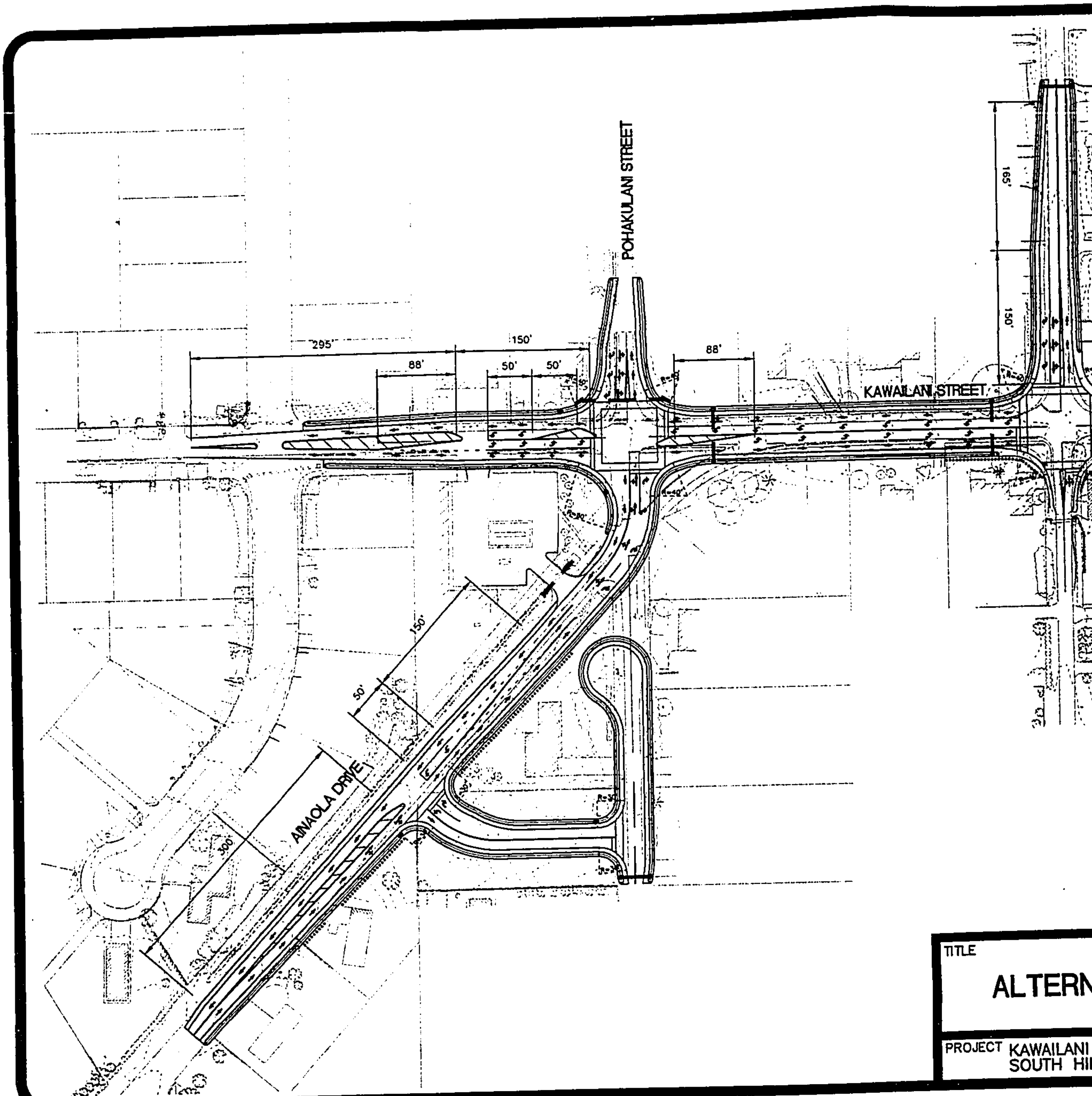
ALTERNATIVE 2A

FIGURE

2-1c

PROJECT KAWAILANI STREET IMPROVEMENTS IWALANI TO POHAKULANI STREET
SOUTH HILO, HAWAII

DATE
4/9/99


POHAKULANI STREET
KAWAILANI STREET
AINAOLA DRIVE
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150'
88'
50'
50'
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165'
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PROJECT KAWAILANI
SOUTH HI

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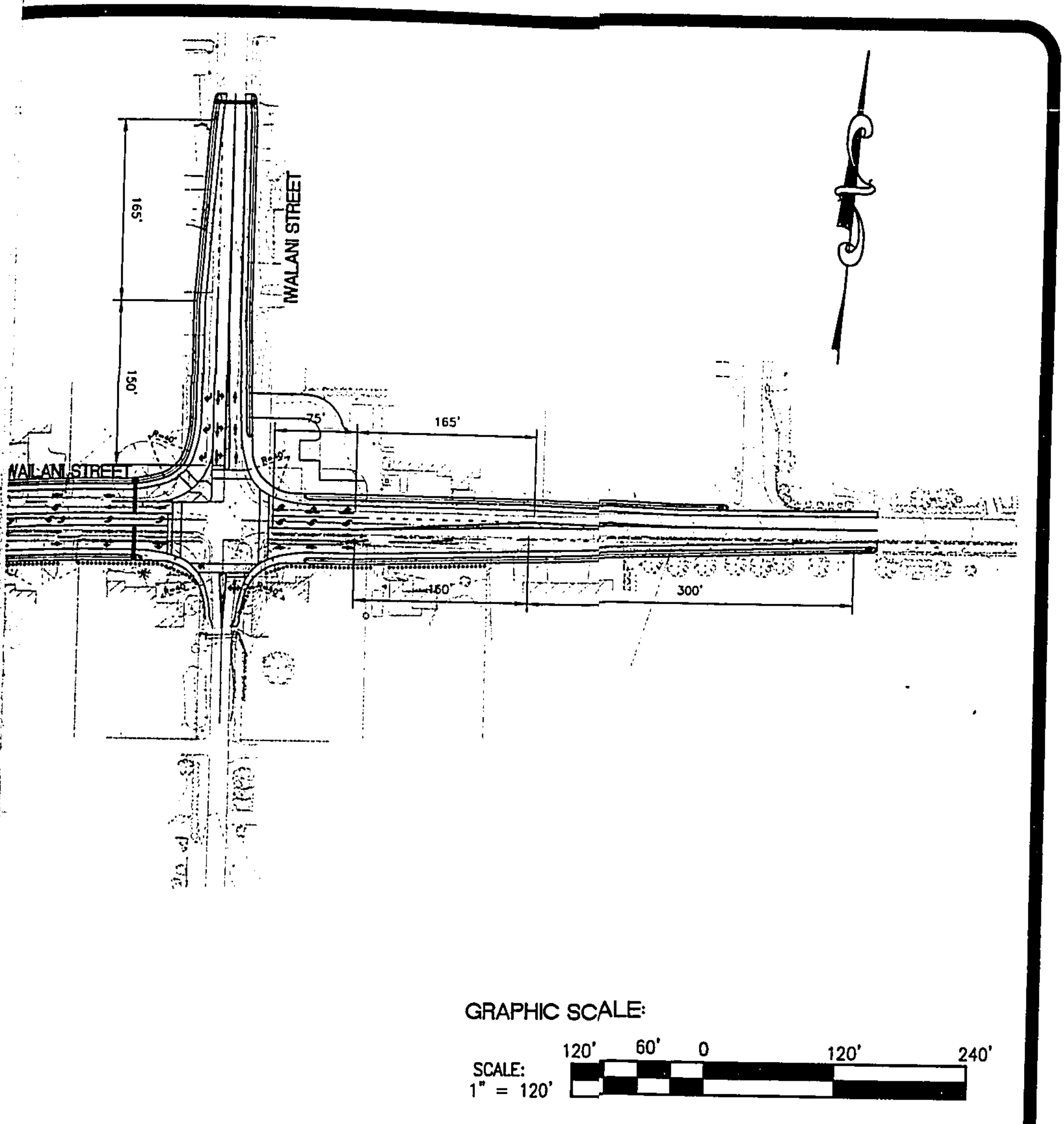


TITLE

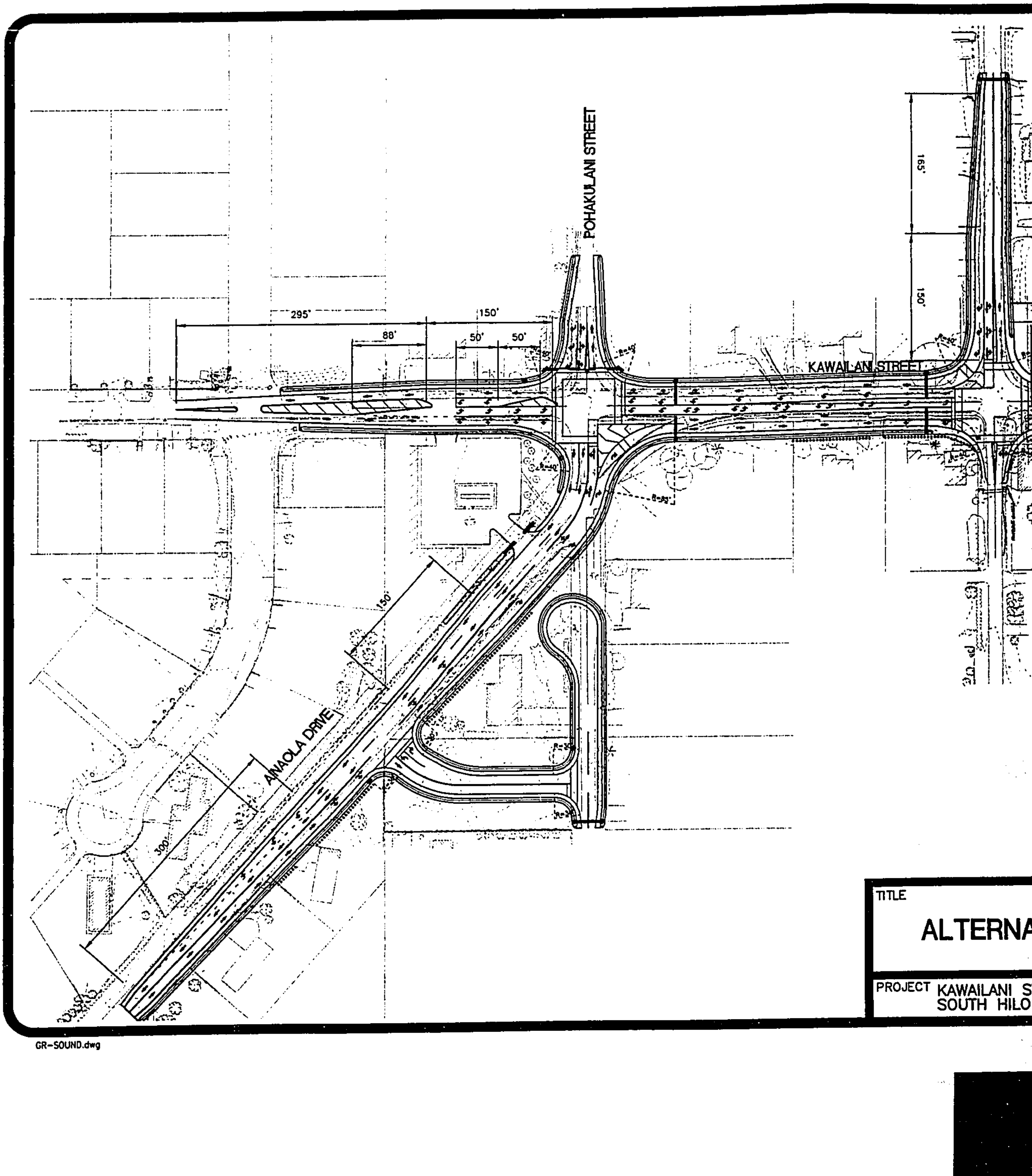
ALTERNATIVE 2B

FIGURE

2-1d

PROJECT KAWAILANI STREET IMPROVEMENTS IWALANI TO POHAKULANI STREET
SOUTH HILO, HAWAII

DATE
4/9/99


POHAKULANI STREET
KAWAILANI STREET
AINAOLA DRIVE
295'
150'
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PROJECT KAWAILANI S
SOUTH HILO

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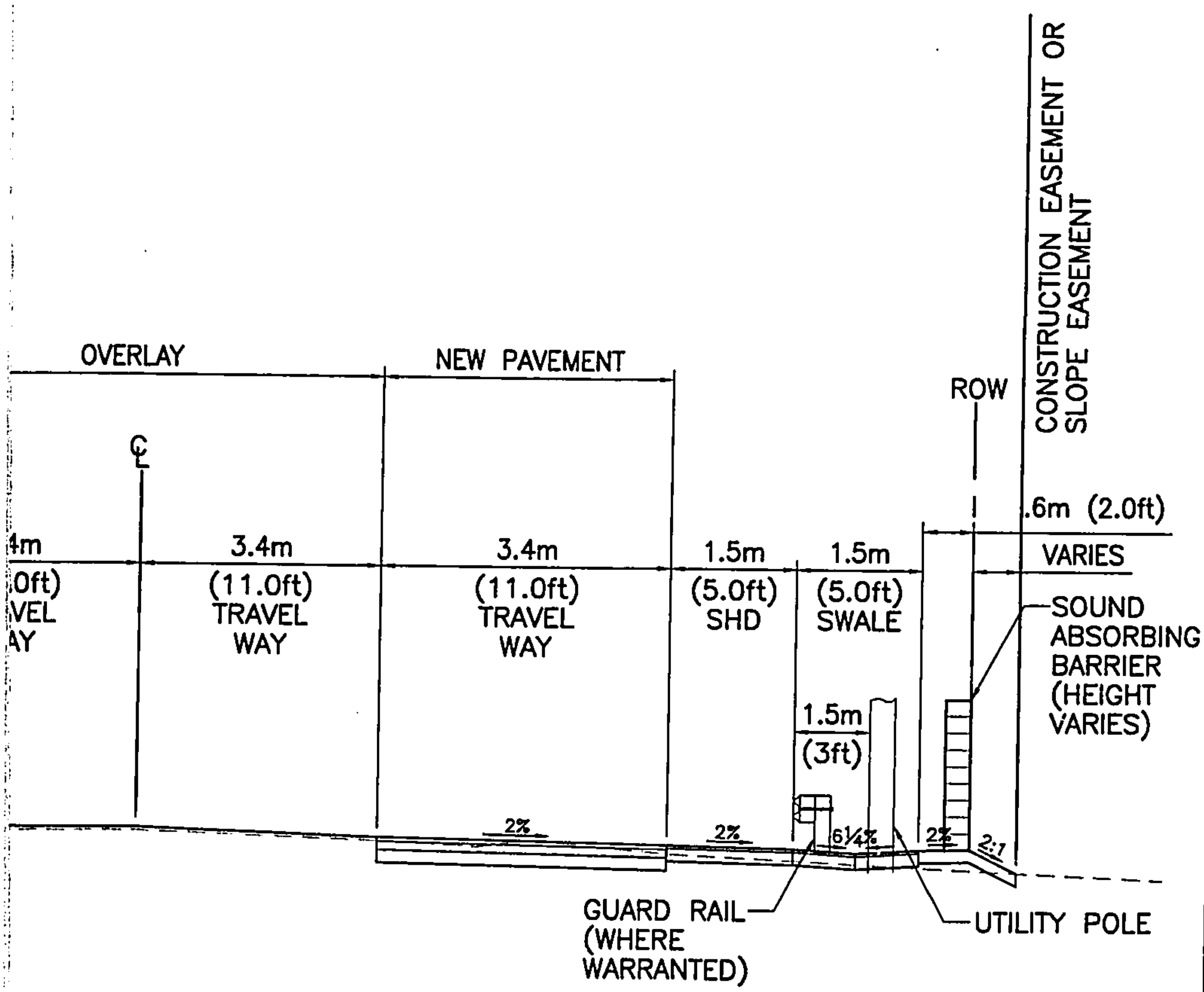
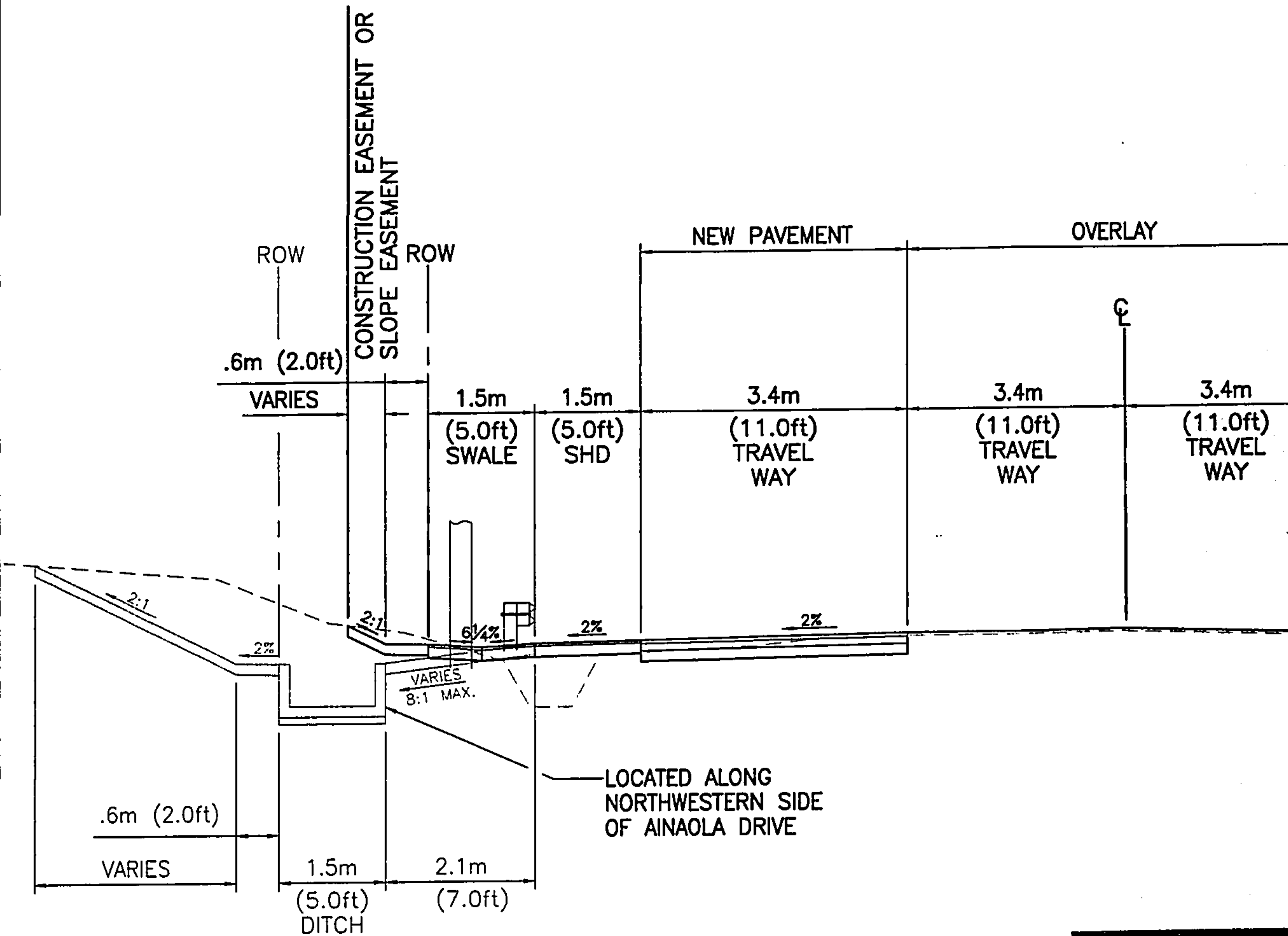


NOTE:
MAXIMUM SIDE SLOPE SHALL BE 2:1

TITLE **TYPICAL CROSS SECTION**	FIGURE **2-2**
PROJECT KAWAILANI STREET IMPROVEMENTS IWALANI TO POHAKULANI STREET SOUTH HILO, HAWAII	DATE 4/9/99



TITLE

TYPICAL

PROJECT KAWAILANI ST
SOUTH HILO,

GR-SOUND.dwg

Table 2-1 compares the Alternatives on the basis of cost and right-of-way take.

Table 2-1
Comparison of Costs & Right-of-Way Take for Build Alternatives

Alternative	Construction Cost	Right of Way Acquisition (ha/ac.)	Right of Way Cost	Total Cost
1A	$2.12M	0.32/0.79	$0.14M	$2.26M
1B	$2.28M	0.42/1.03	$0.18M	$2.46M
2A	$2.24M	0.53/1.31	$0.23M	$2.47M
2B	$2.42M	0.61/1.52	$0.27M	$2.69M

Note: Properties affected by right-of-way take are listed in Appendix 5.

All four Build Alternatives and the No Build Alternative are under consideration at this time. The lead agencies will not select the preferred alternative until after consideration of public and agency comments on the information contained in the EA.

2.2 The No-Build Alternative

The No-Build Alternative is the baseline for comparing traffic circulation and the impacts to the social and physical environment. The No-Build Alternative does not address current and future deficiencies in traffic safety and congestion at the subject intersections. However, by definition the No-Build Alternative also avoids environmental impacts associated construction-phase and permanent impacts to noise, air quality levels, and socioeconomic values.

2.3 Alternatives Evaluated and Withdrawn from Further Consideration

In addition to the alternatives that were advanced and are described below, several road realignments were considered (see Fig. 1-1). In one, Ainaola Drive would be realigned to connect with Ehehene Place, which currently ends in a cul-de-sac. This would lengthen the spacing of the intersections of Ainaola Drive and Iwalani Street with Kawailani Street 125 m (400 ft.). However, it would have involved the direct taking of at least three homes and disruption to the other homes on Ehehene Street. Also considered was a cul-de-sac at the intersection of Pohakulani Street at Ainaola Drive (as in Alternatives 2A/2B) and building a new block-long road east towards Iwalani Street. However, even the least disruptive location of such a road would have resulted in direct taking of two homes. Because the Build Alternatives in Section 2.1 could accomplish the project's purpose and need without this level of community disruption, the other alternatives were withdrawn from further consideration.

3 ENVIRONMENTAL SETTING AND IMPACTS

This section describes the existing social, economic, cultural, and environmental conditions surrounding the proposed project along with the probable impacts of the proposed action and mitigation measures designed to reduce or eliminate adverse environmental impacts. For most categories of impact, the No Build Alternative would result in no impacts. Therefore, unless explicitly mentioned, discussion of impacts and mitigation relates to the Build Alternatives only.

The island of Hawaii, home to 120,317 residents in 1990 (U.S. Bureau of the Census 1991), is largely rural. Major divisions include West Hawaii and East Hawaii. West Hawaii's dry climate and calm ocean waters support a major tourism industry in the Kona and Kohala districts. East Hawaii has an economy based on agriculture and the business and government functions headquartered in Hilo, the major city on the island.

The project would take place within the city of Hilo (Fig. 1-1), which encloses about 50 square km (20 square mi.). For purposes of the environmental analysis in this document, the **project site** is defined as all property enclosed by a circle with a radius of 200 m (about 650 feet) centered on the Ainaola Drive/Kawailani Street intersection. The project site includes all areas potentially affected by the physical characteristics of the road: pavement, noise, runoff, carbon monoxide gas, etc.

Surrounding the project site is a larger area bounded by State Highway 11 on the east, Komohana Street and Kupulau Street on the west, and portions of Kawailani Street and Puainako Street on the north (see Fig. 1-1). Residents of this area frequently traverse the subject intersections and would thus be affected and served by the proposed improvements. This larger unit will be referred to in the EA as the **project area.**

Because the most noticeable impacts are those related to traffic safety and congestion, and discussion of related other impacts benefits from an understanding of changes in traffic patterns, traffic impacts are presented first in Section 3.1. This is followed by discussions of the physical environment (Section 3.2), the Biological Environment (3.3), the Socioeconomic and Cultural Environment (Section 3.4), and impacts that can result from Construction (Section 3.5). The permits and approvals required for the project are listed by granting agency in Section 3.6.

3.1 Motorized Vehicle Transportation Patterns and Traffic Safety

Introduction

Traffic engineers use several methods to measure the amount of traffic on a road and the efficiency with which road segments and intersections handle that traffic.

Average Daily Traffic (ADT) is simply a measure of the number of motor vehicles that pass a given road segment on an average day.

Peak Hour Traffic Volume measures the vehicles that pass a point or perform a turning movement during the busiest hour in terms of traffic for both the morning (AM) and afternoon (PM).

Level of Service (LOS) can be used to rate signalized and unsignalized intersections. LOS is determined by comparing the amount of traffic using a roadway and the amount that the road is designed to carry (its capacity). LOS has values between A (Free Flow, when traffic flows without congestion) and F (Forced Flow, when traffic must frequently come to a stop). LOS A, B, and C are considered acceptable. LOS D is considered a "desirable minimum" operating level of service. LOS E is an undesirable condition, and "F" is unacceptable.

Current traffic data for the road segments and intersections were collected in late 1997 and early 1998. This data set was also used as the basis for future traffic projections, which were generated by a traffic engineer through modeling procedures based on the *Highway Capacity Manual* (Transportation Research Board 1994). The reader is referred to Appendix 1 for the full traffic assessment.

Traffic volumes for the major project site roadways and ratings at the two subject intersections for the year 2018 were modeled for all Build Alternative and the No-Build Alternative (refer to Section 2 for discussion of Alternatives). The goals were to determine the overall effect of the project on future traffic patterns and to provide data for designing road features such as turning lanes and traffic signals.

3.1.1 Peak Hour Traffic Volumes and Level of Service

The Level of Service for each movement of the two major intersections at the AM and PM peak hour, for 1998 and the year 2018 under both the No Build and all Build Alternatives, is depicted in Table 3-1. Currently, most turning movements operate at LOS E or F in the AM or PM peak hours.

Regional traffic is forecasted to rise substantially in Hilo as a result of growth in both population and tourism (HDOT 1998). Accordingly, as illustrated by Table 3-1, peak hour traffic Level of Service on Kawailani Street and Ainaola Drive will also decline without improvements. (The reader is referred to Appendix 1 for detailed maps of traffic volumes).

Table 3-1
Current and Future Level of Service at Major Project Intersections

Roadway Intersections	Year/Alternative							
	1998/Present		2018 Without Project		2018 Build 1A/2A		2018 Build 1B/2B	
	AM	PM	AM	PM	AM	PM	AM	PM
Iwalani St. Kawailani St.								
N-bound	F	E	F	F	C	B	D	C
E-bound	B	B	C	B	B/C	B/C	A/C	B/C
S-bound	F	F	F	F	B	B	C/A	C/A
W-bound	A	A	B	A	B/C	B	C	B/C
Ainaola Dr./ Kawailani St.								
N-bound	E	F	F	F	B/C	B/A	C/A	C/A
E-bound	A	A	A	A	B/C	C	B/C	B/C
S-bound	F	F	F	F	C	B	C	C
W-bound	B	C	B	F	A/B	A/C	B/C	A/B

Source: Appendix 1. Multiple LOS is listed (thru lane/left lane)where separate lanes will be provided and LOS differs between them. The major movement of such pairs is bolded.

Without any traffic signal improvements, peak AM volumes are forecasted to rise between about 10 and 30 percent, depending on the location. This will produce declining Levels of Service, which will be particularly bad for the minor approaches at intersections (Table 3-1). For example, most approaches at the Iwalani Street/Kawailani Street intersection at peak hours will be at LOS F (Unacceptable).

With improvements, regardless of the Alternative, peak hour traffic also rises, although the traffic model predicts some variation in total volumes and turning movements.[1] However, Level of Service in Alternatives 1A/2A (Variant A) differ to some degree from 1B/2B (Variant B). For example, right-turn movements at the AM peak perform with a slightly better LOS with Variant A as opposed to B. Conversely, east-bound traffic on Kawailani Street in the PM peak has slightly better LOS with Variant B.

In conclusion, the selection of any Build Alternative would lead to adequate or better Levels of Service for all movements of the two project intersections at both the AM and PM peak hours. The selection of the No Build Alternative would lead to unacceptable Levels of Service for most movements of both intersections.

3.1.2 Current and Future Safety Conditions

As mentioned in Section 1.3, the less than optimal geometry and spacing of these unsignalized intersections have led to greater than normal accident rates. A report on problem intersections in Hilo for the calendar years 1991-1993 conducted by the Hawaii County Department of Public Works (Towill 1994) determined that among County road intersections in Hilo, the Kawailani-Iwalani Street intersection ranked sixth in number of accidents (14), fourth in injury accidents (5), third in accident rate per 24-hour volume count (0.000785), and second in accidents per peak hour volume (0.00919). The intersection met four warrants for traffic signal installation. Although the other intersection was not covered in the report, it is well-known that traffic merging from Ainaola Drive onto Kawailani Street is a major contributor to accidents at both this intersection and at Iwalani Street as well.

Under the No Build Alternative, traffic safety conditions (as measured in accidents, injuries, and fatalities) can be expected to worsen in the future.

Either Build Alternative would in all likelihood reduce accidents substantially, as is normally the case when unsafe intersections are signalized. Any Build Alternative would result in safer overall intersections. Although no major differences with regard to safety exists among the Build Alternatives, Variant 2 lengthens (and thus improves) the separation of the now closely-spaced intersections of Kawailani Street and Pohakulani Street with Ainaola Drive by 110 m (360 ft.).

[1] In terms of Level of Service, there is no difference with respect to Variant 1 or 2, which is exclusively concerned with the treatment of the minor intersection of the south segment of Pohakulani Street with Ainaola Drive. Therefore, the important comparison is between 1A-2A and 1B-2B.

3.2 Physical Environment

3.2.1 Geology and Hazards

Existing Environment

The island of Hawaii, youngest and largest of the Hawaiian chain, formed from the coalescence of five volcanoes during the last million years. Hilo lies just on the Mauna Loa side of the divide between lavas from Mauna Kea, which has not erupted for 10,000 years, and Mauna Loa, which is still active.

The project site is located at an elevation of approximately 91 m (300 ft.) above mean sea level. The natural surface consists of an extremely stony soil that overlies lava flows from early-Holocene eruptions (ca. 9,000 ka) of the Northeast Rift Zone of Mauna Loa (Wolfe and Morris 1996; U.S. Soil Conservation Service 1973). The surface also has variable quantities of imported soil. Slopes range from 2 to 10 degrees, and local relief across this generally uniform slope is minor. No known lava tube or other caves pass under or near the project site. The surface is highly permeable and runoff is slow, leading to low erosion hazard. The engineering properties of the soils present are reasonably adaptable to road construction (Cross-Reference: Section 3.4.6: Agricultural Land and Soils).

This project (as all development in Hilo) would be subject to volcanic hazard, particularly lava inundation. According to the United States Geological Survey (USGS) hazard classifications, the entire project area is contained in Lava Flow Hazard Zone 3, on a scale of ascending risk 9 to 1. Zone 3 is considered "less hazardous than [Z]one 2 [which is adjacent to and downslope of active risk zones] because of greater distance from recently active vents and/or because the topography makes it less likely that flows will cover these areas" (Heliker 1990:23).

According to the USGS, the Northeast Rift Zone of Mauna Loa has erupted many times in the last century, sending flows towards Hilo in the years 1880, 1899, 1935, and 1942. A 22-day eruption in 1984 again threatened Hilo, approaching within 10 km (6 mi.) of the Kaumana neighborhood before halting. The 1881 lava flows penetrated the area now occupied by the City of Hilo, but did not approach closer than 2.4 km (1.5 mi.) of the subject intersections.

In terms of seismic risk, the entire Island of Hawaii is rated Zone 4 Seismic Probability Rating (Uniform Building Code, Appendix Chapter 25, Section 2518). Zone 4 areas are at risk from major earthquake damage, especially to structures that are poorly designed or built. Partly owing to the lack of unconsolidated sediments in the local substrate, the several earthquakes of Richter magnitude 6.0 or greater that have occurred in Hilo since 1950 have caused little damage to well-engineered roads, bridges or other roadway structures.

Impacts and Proposed Mitigation Measures

Any roadway that serves Hilo south of the Wailuku River is subject to the hazard of lava flows. There are no practical measures to avoid this impact. In the event of a volcanic emergency that required evacuation of Waiakea Uka, the intersection improvements would prove valuable in allowing efficient escape.

3.2.2 Hydrology, Floodplains and Water Quality

Existing Environment

Floodplain status for the project site has been determined by the Federal Emergency Management Agency (FEMA), which has mapped the area as part of the National Flood Insurance Program's Flood Insurance Rate Maps (FIRM). No floodways or floodplain are present, and the entire area is mapped as Zone X, defined as areas identified in the community flood insurance study as areas of moderate or minimal hazard from the principal source of flood in the area. Area runoff is handled via flood channels and drywells, and has water quality characteristics typical of low-density urban areas.

Impacts and Mitigation Measures

Road construction projects have the potential, if unmitigated, to adversely and permanently impact drainage and water quality. Construction activities such as clearing and grubbing, excavation, and paving alter the natural hydrology. Earthwork may leave soils susceptible to erosion due to rainfall runoff and can cause erosion and sediment pollution. Water quality may suffer during construction. Roadway paving increases the amount of impervious surface area, which has the potential to increase rainfall runoff. In addition, unregulated activities within a floodplain may raise flood levels or alter floodplain boundaries.

Properly designed drainage structures can usually mitigate impacts to essentially zero. Government agencies regulate road construction through various permits to ensure that adverse effects are avoided or mitigated. The following permit procedures will ensure proper mitigation of drainage and water quality impacts generated by the project:

> **County Approval of Drainage Plan.** The drainage plan for the road will undergo review, revision and approval by the Hawaii County Department of Public Works (DPW) to ensure compliance with standards related to storm runoff containment. The review will require that all storm runoff is contained onsite as required in the County's *Storm Drainage Standards* (1970). The drainage plan will be finalized during final roadway design and is expected to consist of drywells to handle road runoff.

NPDES. It is currently expected that a National Pollutant Discharge Elimination System permit, which would be issued by the Hawaii State Department of Health, will not be required for the project because of the relatively small land area that would be disturbed by project activities. The NPDES permit include specific and enforceable conditions to reduce sediment pollution, such as temporary silt fencing, channels, and sedimentation ponds. Regardless of the requirement for a permit, Best Management Practices for sediment reduction would be implemented. Section 3.5.1 describes mitigation measures in more detail.

As there are no floodplains present near the project site or affected by project activities, there would be no impacts to the natural and beneficial aspects of floodplains.

3.2.3 Climate and Air Quality

Existing Environment

The climate of Hilo can be described as humid and tropical. Average high temperatures in Hilo vary from approximately 26° Centigrade (C) (78° Fahrenheit [F]) in the winter to 28° C (82° F) in the summer. Temperature lows average approximately 18° C (65° F) in the winter and 21° C (70° F) in the summer. Freezing temperatures, frost and fog do not occur in the project area. Mean annual rainfall in Hilo is estimated at 330 mm (130 in.) Wind is important for its effect on dispersion or concentration of pollutants. Trade winds with an east to northeast direction occur on up to 90 percent of summer days and 50 percent of winter days. These winds are generally light, and seldom exceed an average daily speed of 16 km (10 mi.) per hour. At night, a shallow mountain drainage wind from the southwest is usually present except during episodes of strong regional wind. Trades are occasionally replaced by light and variable "kona" winds, most often in winter (UH-Manoa Dept. of Geog. 1983).

Regional and local climate along with the type and amount of human activity generally dictate air quality of a given location. Federal and state air quality standards seek to limit ambient concentrations of pollutants produced by motor vehicles. These include particulate matter, sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone O_3, and lead. These ambient air quality standards (AAQS) are specified in Section 40, Part 50 of the Code of Federal Regulations (CFR) and Chapter 11-59 of the Hawaii Administrative Rules. Each regulated air pollutant has the potential to create or exacerbate some form of adverse health effect or to produce environmental degradation when present in sufficiently high concentration for prolonged periods of time.

The state and federal governments periodically monitor air quality to determine whether it meets AAQ standards. Areas that do not meet standards are termed non-attainment areas and are subject to Conformity Rules. These rules were issued by the Environmental Protection Agency (EPA) in response to Section 176 of the 1977 Clean Air Act. Conformity Rules prohibit any federal agency from engaging in any actions that do not conform to a state's plan to correct nonattainment situations. The entire State of Hawaii is considered to have acceptable air quality and is thus an attainment area not subject to Conformity Rules.

Air quality in the project area is currently mostly affected by emissions from motor vehicles, industry and natural sources. Volcanic emissions of sulfur dioxide convert into particulate sulfate which causes a volcanic haze (vog) to blanket the area during occasional episodes when trade winds are not present. The major industrial source is oil-fired power plants which emit SO_2, nitrogen oxides (NO_x), and particulate matter. Motor vehicles emit CO, NO_x, hydrocarbons (an ozone precursor), as well as smaller amounts of other pollutants.

The State of Hawaii operates a network of air quality monitoring stations around the state. Very little data are available for the Hilo area. In general, these data indicate that concentrations are well within state and federal air quality standards. The excellent air quality in Hilo is mainly influenced by the dispersive effects of the trade winds and the isolation of the island from any outside sources of pollution. The more stringent state standards pertaining to CO are probably exceeded on occasion near high-volume intersections during periods when traffic congestion and poor dispersion conditions coincide.

Impacts and Mitigation Measures

The intersection improvements are not expected to generate any additional traffic in the Hilo area. Impacts to regional air quality (which is currently excellent) would probably be somewhat beneficial because of the predicted decrease in congestion and queuing.

However, wherever vehicles are present - and particularly at intersections - there is the potential for what air quality specialists call microscale impacts. To evaluate the potential impact, an air quality specialist employed computerized emission and atmospheric dispersion models that estimate ambient carbon monoxide (CO) concentrations along roadways leading to and from the project. CO was selected for modeling because it is the most stable and abundant of the pollutants generated by vehicles (see Appendix 2).

The main objective of the modeling study was to estimate maximum 1-hour and 8-hour CO concentrations for the two intersections at the present date (1997) and the future (2018) for all alternatives. Maximum concentrations were calculated for both morning and afternoon peak hours, using the MOBIL5A computer model. The model incorporates terms for traffic volume, average speed, vehicle mix (i.e., different types of motor vehicles and engines), cold/hot start modes (i.e., whether most vehicles will be "warmed up" and burning fuel efficiently), and other factors. After emissions were calculated, a dispersion model (CAL3QHC) was used to determine how CO would disperse away from the intersection. "Worst case" meteorological conditions (wind speeds of less than 1 meter/second, blowing towards the most sensitive areas) were used in order to arrive at a conservative estimate. Tables 3-2 and 3-3 provide the results of the analysis.

Table 3-2
Estimated Worst-Case 1-Hour Carbon Monoxide Concentrations
(milligrams per cubic meter)

Roadway Intersections with Kawailani St.	Year/Alternative							
	1997/Present		2018 Without Project		2018 Build 1A/2A		2018 Build 1B/2B	
	AM	PM	AM	PM	AM	PM	AM	PM
Iwalani St.	5.0	6.0	6.6	6.0	7.0	5.9	6.4	5.8
Ainaola Dr. - Pohakulani St	6.9	7.5	9.3	13.7	6.4	5.4	7.5	6.7

Source: Appendix 2
Notes: Concentrations are estimated for areas 3 m away from traveled portion of roadway at 1.8 m height.
Hawaii State Ambient Air Quality Standard for CO: 10
Federal Ambient Air Quality Standard for CO: 40

As shown in Table 3-2, worst-case carbon monoxide levels at peak hours do not exceed federal or State of Hawaii standards. The 2018 No-Build Alternative would find CO levels increasing above State standards at the PM peak hour. CO levels would remain below standards for All Build Alternatives, and would in some cases actually improve relative to current levels. This is because the project would provide better Level of Service (see Section 3.1)

Table 3-3 supplies the worst-case 8-hour concentrations for these intersections. No exceedances occur under any Build Alternative, and CO levels would remain about the same as now. Again, the No Build Alternative would produce CO levels in excess of state standards.

Table 3-3
Estimated Worst-Case 8-Hour Carbon Monoxide Concentrations
(milligrams per cubic meter)

Roadway Intersections with Kawailani St.	Year/Alternative			
	1997/Present	2018 Without Project	2018 Build 1A/2A	2018 Build 1B/2B
Iwalani St.	3.0	3.3	3.5	3.2
Ainaola Dr. - Pohakulani St	3.8	6.8	3.2	3.8

Source: Appendix 2
Notes: Concentrations are estimated for areas 3 m away from traveled portion of roadway at 1.8 m height.
Hawaii State Ambient Air Quality Standard for CO: 5
Federal Ambient Air Quality Standard for CO: 10

Mitigation Measures

In essence, the Build Alternative would improve air quality. No exceedance of State of Hawaii or federal air quality standards would occur, and therefore no mitigation is necessary.

3.2.4 Noise Levels

Existing Environment

A study of the acoustic environment of the project corridor along with estimates of the effects of all alternatives was conducted for this EA (Appendix 3).

Noise may be defined as unwanted sound. Evaluation of noise requires a consideration of loudness at various pitches. Loudness is measured in units called decibels (dB). Since the human ear does not perceive all pitches or frequencies equally, noise levels are adjusted (or weighted) to correspond to human hearing. This adjustment is known as the A-weighted scale, abbreviated dBA. The specific sound level descriptor used in this study is the hourly energy equivalent sound level (L_{eq}) in decibels (dB), which considers the combined effects of all noises near and far and includes background noise and noise fluctuation. Noise levels over 70 decibels are considered unpleasant by most individuals; levels under 50 decibels are generally perceived as acceptably quiet.

To assess existing noise and the potential for impacts, existing traffic and background ambient A-weighted noise levels were measured at various locations near the intersections (Fig. 3-1). Measurements determined that existing traffic noise levels varied between 58 and 65 L_{eq} at typical house setback distances from the roadway centerline (i.e.,16-32 m [50-100 ft.]). Local traffic and household noises tend to be the dominant noise sources.

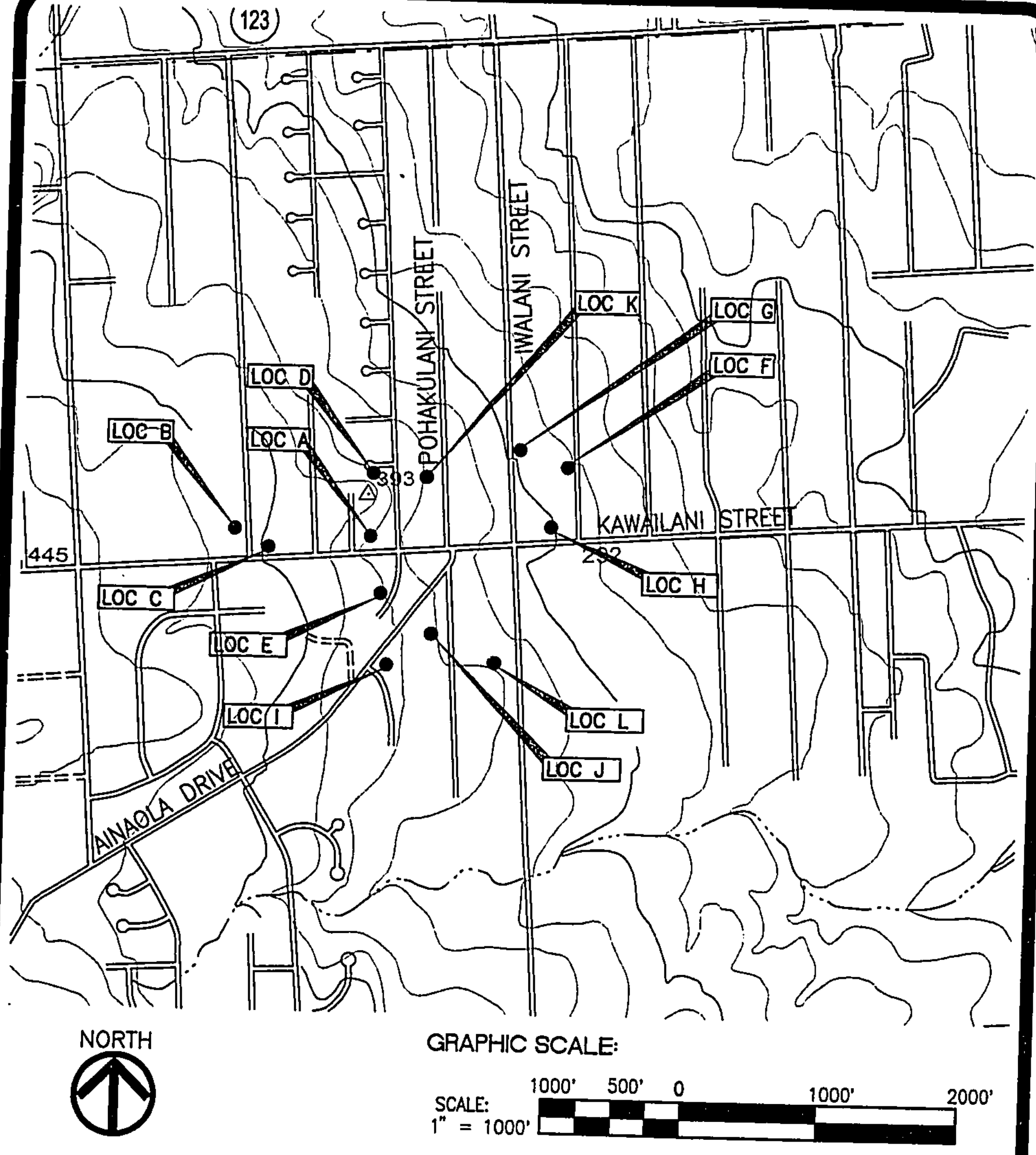
The acoustical study used existing traffic noise measurements to develop and calibrate a model that projected future traffic noise levels associated with the proposed project under the No-Build and various improvement alternatives. The FHWA Traffic Noise Prediction Model was the primary method. The model incorporates parameters for terrain, ground cover, and local shielding conditions. The agreement between measured and predicted traffic noise levels is illustrated in Table 3-4. The agreement confirmed that the traffic model could consistently and accurately predict future traffic noise levels.

Table 3-4
Traffic Noise Measurements and Model Predictions, Selected Sites

LOCATION	Measured L_{eq}	Predicted L_{eq}	LOCATION	Measured L_{eq}	Predicted L_{eq}
A: 11 m (35 ft.) from Kawailani St. centerline; Time: 07:30-08:00	62.4	62.7	E: 15 (50 ft.) from Ehehene Pl. centerline; Time: 12:00-13:00	44.0	41.6
D: 11 m (35 ft.) from Kuhilani St. centerline; Time: 10:45-11:45	56.5	55.2	I: 11 m (35 ft.) from Ainaola Dr. centerline; Time: 10:30-10:53	64.9	65.3

Source: Appendix 3, Table 1; See Fig. 3-1 of EA for letter symbol locations.

Analysis of airphotos and project plans determined that fifteen noise-sensitive properties - each a single-family residence - were sufficiently close to the 66 L_{eq} sound contour that they might potentially experience noise impacts. Detailed study of future noise levels under the Build and No Build Alternatives were undertaken at these locations.



TITLE

NOISE MEASUREMENT SITES

FIGURE 3-1

PROJECT KAWAILANI STREET IMPROVEMENTS IWALANI TO POHAKULANI STREET
SOUTH HILO, HAWAII

DATE 9/8/98

GR-NOISE.dwg

Impacts and Mitigation Measures

In residential/business districts such as the project site, two measures are used to determine whether noise impacts have occurred and noise mitigation measures should be considered. One is whether the FHWA noise abatement criterion of 67 L_{eq} for residences, schools, churches, and similar land uses (U.S. DOT Policy and Procedure Memorandum 90-2) is exceeded or "approached," which is defined in Hawaii as 66 L_{eq} or greater. The second measure is the State DOT policy that defines any difference of 15 dB or greater between existing and predicted noise levels at the project year of 2018 as a "substantial" increase.

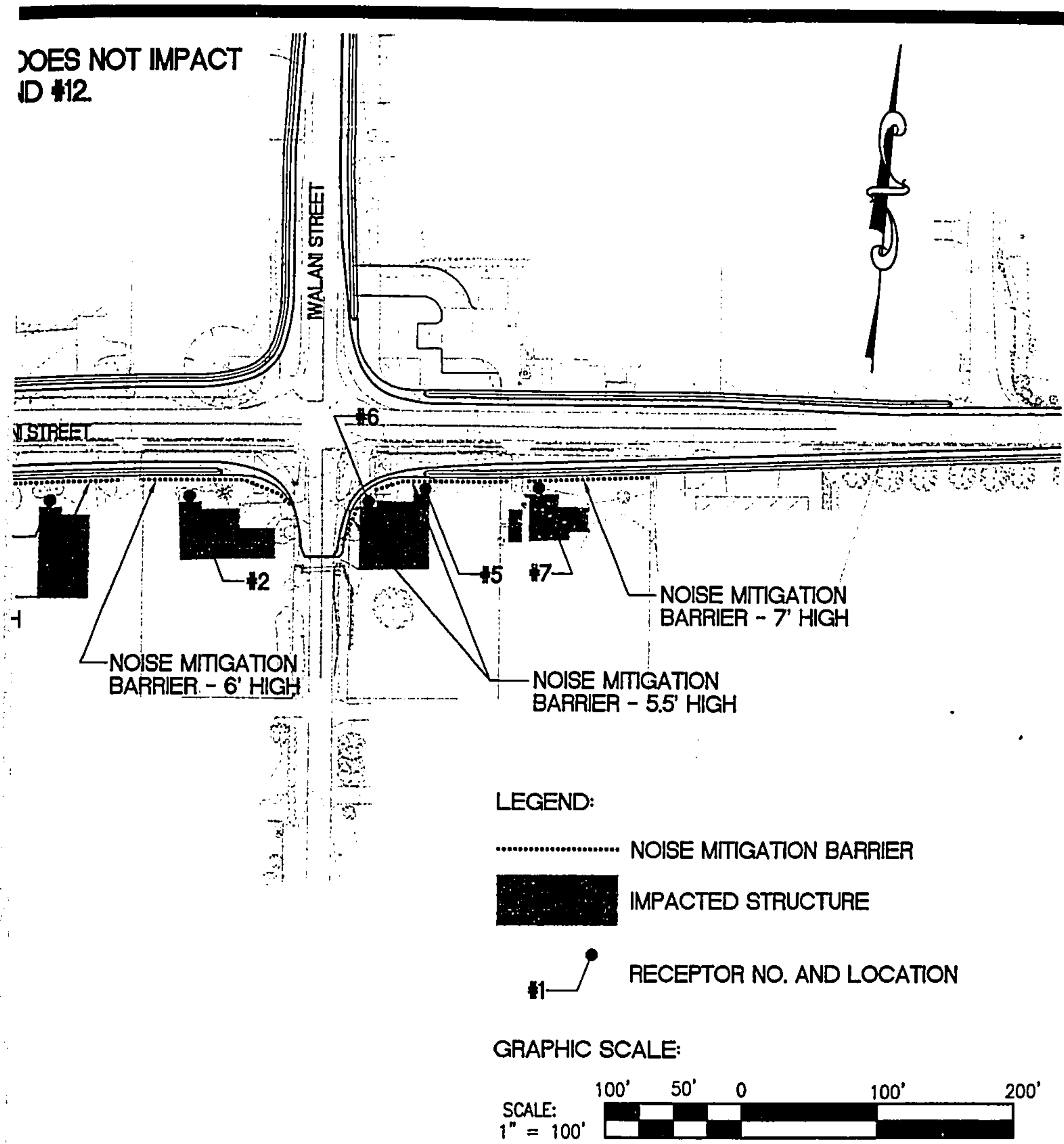
If either condition is met, a noise impact is considered to have occurred. When noise impacts occur, reasonable and feasible mitigation measures must be considered. A noise mitigation measure is considered feasible and reasonable if it accomplishes a substantial noise reduction (at least 5 dBA) while meeting constraints of cost, safety, drainage, access, maintenance, viewplane preservation, etc. According to current State policy, the price of mitigation should not exceed $35,000 per affected residence. It is also important to weigh the overall magnitude of noise impacts and the contribution of other noise sources, as well as the benefit to all nearby residences (not just those defined as impacted by noise increases above criteria), when judging if a mitigation measure is "reasonable". Furthermore, State policy stresses that the opinion of impacted residents will be a major consideration in determining the reasonableness of the noise abatement measures. Finally, it is recognized that it is the policy of Hawaii County to discourage walls higher than 1.8 meters (6.0 ft) in order to preserve viewplanes. According to Section 25-4-43 of the Hawaii County Code, any proposed wall higher than 1.8 meters (6.0 ft) requires a building permit and is subject to 9 m (30 ft) setback requirements. Exceptions to such setback require variance applications on a property-by-property basis.

Impacts of the No-Build Alternative

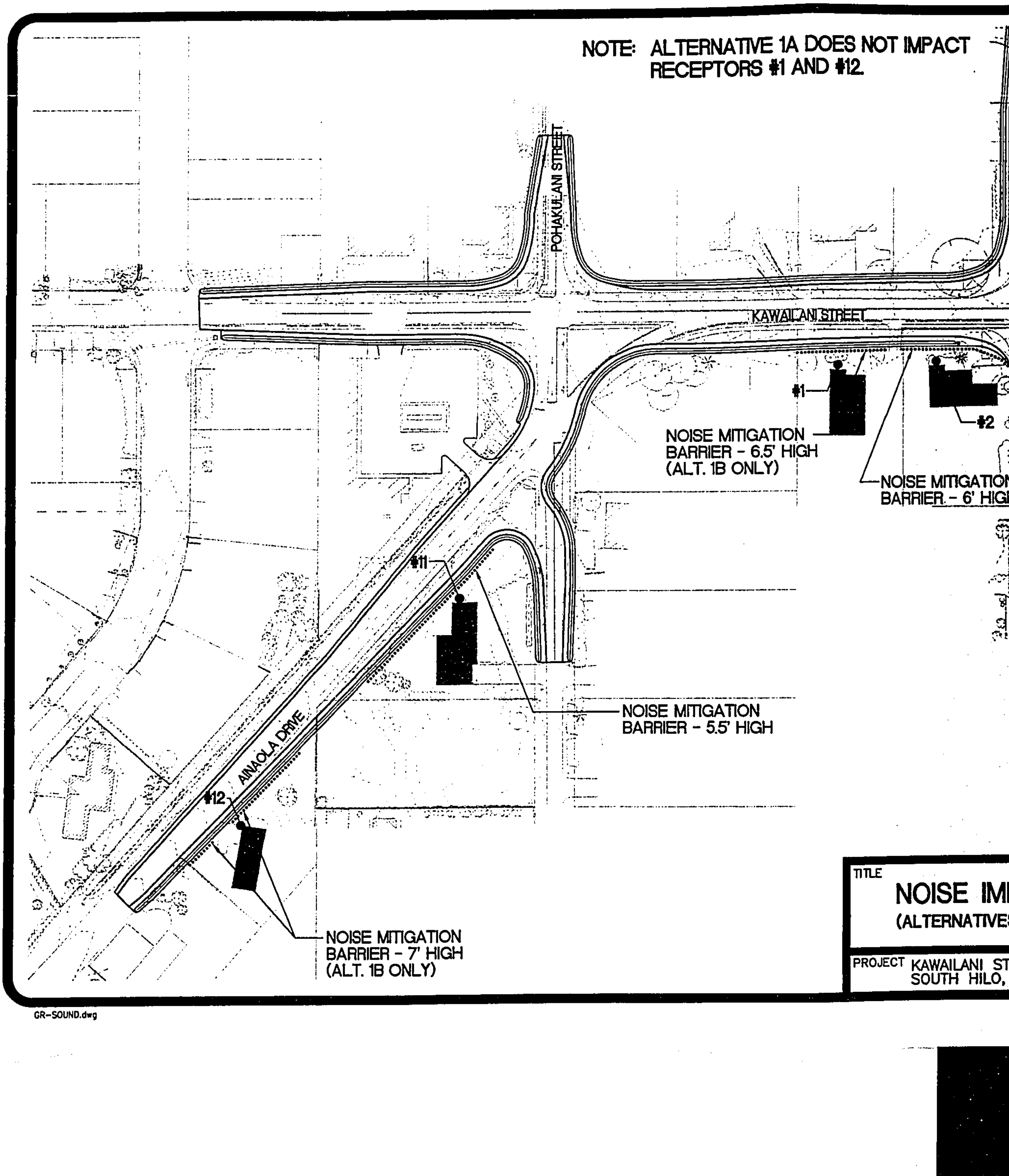
According to the acoustic analysis, although noise would increase at all locations in the project site by 0.8-2.7 dB by the project year 2018, none of the noise-sensitive properties would experience noise increases exceeding 15 dB or absolute levels above 66 L_{eq} at either the AM or PM peak hours. Therefore, according to state and federal policy, no noise impacts of a magnitude large enough to necessitate consideration of mitigation measures would occur.

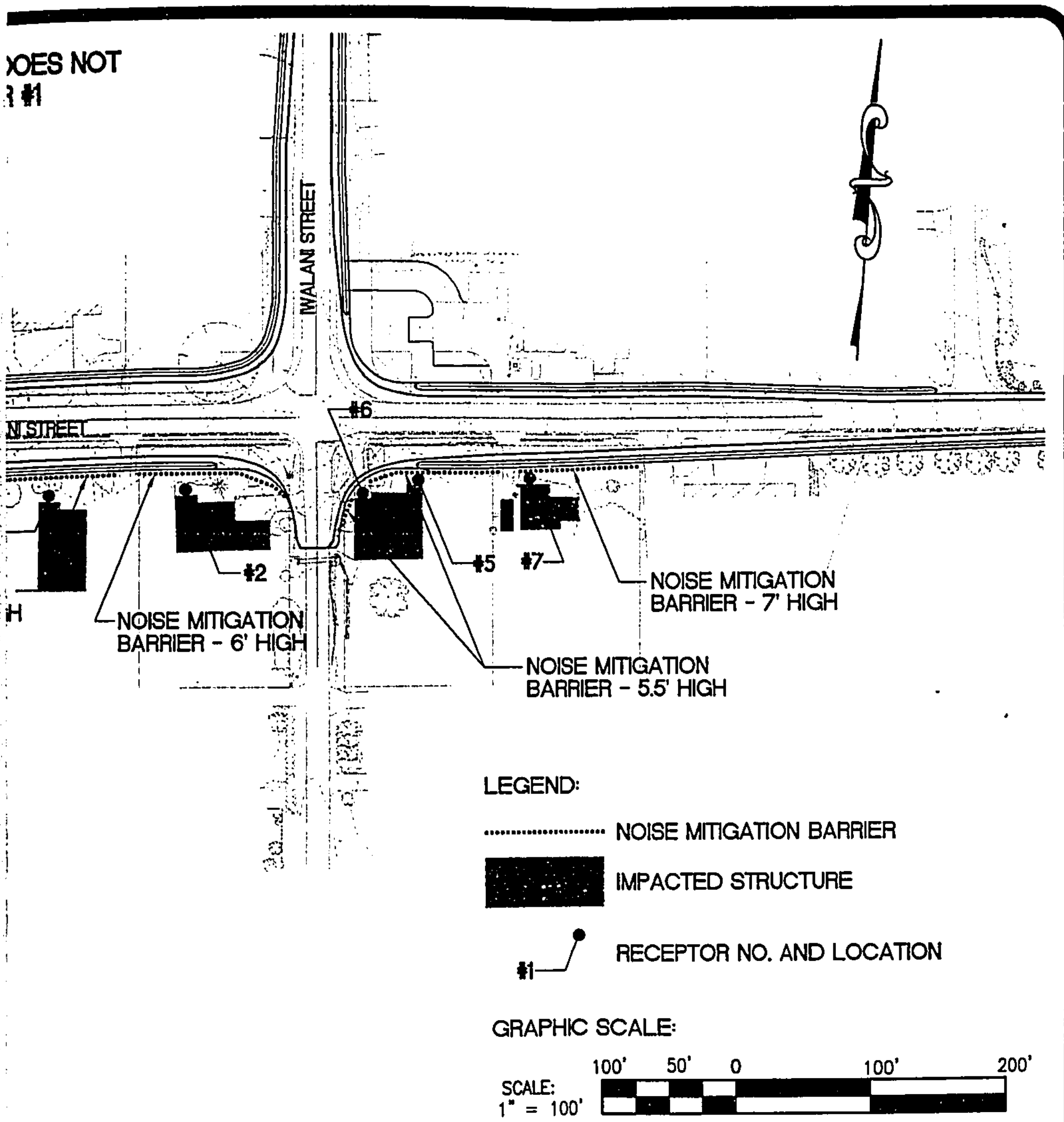
Impacts of the Build Alternatives

By contrast, all Build Alternatives would cause noise impacts for at least 4 residences (Fig. 3-2a-b; Table 3-5). Little difference exists among Alternatives: 1A would impact 4 residences; 2A would impact 5; 1B and 2B would each impact 6 residences. The magnitude of the impact is in all cases small, with the maximum predicted noise level at any receptor less than 68.0 L_{eq}.



TITLE **NOISE IMPACTS AND MITIGATION** (ALTERNATIVES 1A AND 1B)	FIGURE **3-2a**
PROJECT KAWAILANI STREET IMPROVEMENTS IWALANI TO POHAKULANI STREET SOUTH HILO, HAWAII	DATE 4/9/99


NOTE: ALTERNATIVE 1A DOES NOT IMPACT RECEPTORS #1 AND #12.
POHAKULANI STREET
KAWAILANI STREET
AINAOLA DRIVE
#1
#2
#11
#12
NOISE MITIGATION BARRIER - 6.5' HIGH (ALT. 1B ONLY)
NOISE MITIGATION BARRIER - 6' HIG
NOISE MITIGATION BARRIER - 5.5' HIGH
NOISE MITIGATION BARRIER - 7' HIGH (ALT. 1B ONLY)
TITLE
NOISE IM
(ALTERNATIVES
PROJECT KAWAILANI ST
SOUTH HILO,
GR-SOUND.dwg



TITLE

NOISE IMPACTS AND MITIGATION

(ALTERNATIVES 2A AND 2B)

FIGURE **3-2b**

PROJECT KAWAILANI STREET IMPROVEMENTS IWALANI TO POHAKULANI STREET
SOUTH HILO, HAWAII

DATE 4/9/99

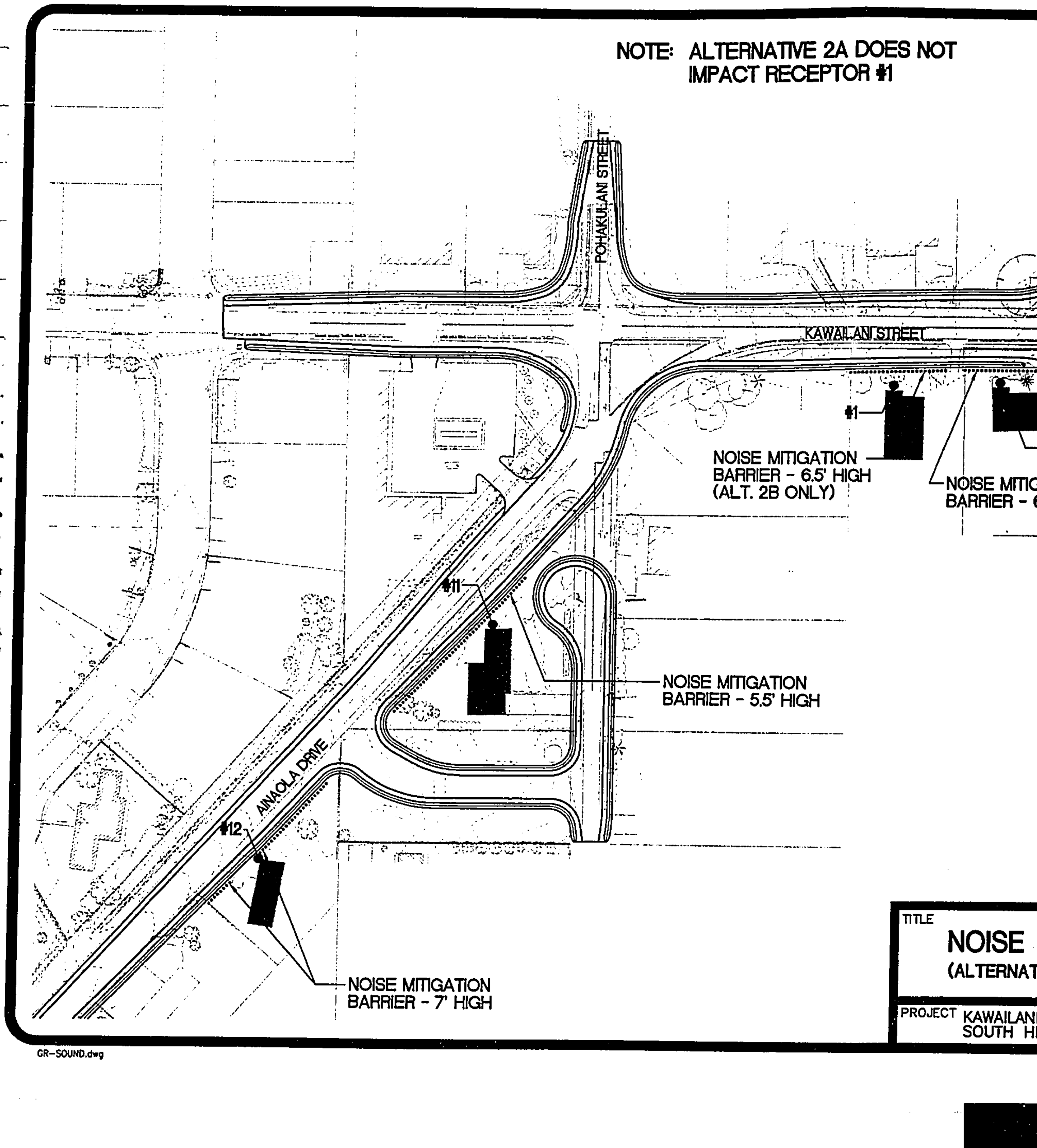

NOTE: ALTERNATIVE 2A DOES NOT IMPACT RECEPTOR #1
POHAKULANI STREET
KAWAILANI STREET
#1
NOISE MITIGATION BARRIER - 6.5' HIGH (ALT. 2B ONLY)
#11
NOISE MITIGATION BARRIER - 5.5' HIGH
AINAOLA DRIVE
#12
NOISE MITIGATION BARRIER - 7' HIGH
TITLE
NOISE
(ALTERNAT
PROJECT KAWAILAN
SOUTH H
GR-SOUND.dwg

Table 3-5
Noise Impacts and Mitigation

PROP. ID	EXISTING (1997) L_{eq}	2018 L_{eq} BUILD (by Alternative) 1A	2A	1B	2B	Sound Reduction Achieved Through Barriers (dBA)
1	63.8	n/i	n/i	66.2	66.2	1A/2A: n/i 1B/2B: 5.0
2	64.1	66.1	66.1	66.6	66.6	1A/2A: 5.4 1B/2B: 5.8
5/6*	64.2	67.0	67.0	67.8	67.8	1A/2A: 5.5 1B/2B: 5.6
7	64.2	66.5	66.5	67.2	67.1	1A/2A: 5.0 1B/2B: 5.0
11	63.0	66.2	67.0	67.2	67.1	1A/2A: 6.0 1B/2B: 6.3
12	63.6	n/i	66.8	66.8	67.9	1A/2A: 5.0 1B/2B: 5.0

Source: Appendix 3, Tables 9A-B.
Notes: For Property ID locations and noise barrier specifications and locations, refer to Figure 3-2; Existing noise levels, impacts and mitigation are listed for AM peak hour, which has greater impacts than PM peak hour at all locations under all alternatives in all cases. n/i = No Impact; * is one residence.

Modeling of the potential sound reduction that could be provided by noise mitigation barriers was undertaken as part of the acoustic analysis. As shown in Table 3-5, it was determined that a series of barriers with heights between 1.7 m and 2.1 m (5.5 to 7.0 ft. - See Figs. 3-2a-b for location and heights) could achieve sound reductions greater than 5.0 dBA at all impacted residences under any Alternative. The cost of such walls are shown below in Table 3-6.

Table 3-6
Noise Mitigation Barrier Cost

Receptor/ Alternative	1	2	5/6	7	11	12
WALL HT.	6.5 ft.	6 ft.	6 ft.	7 ft.	5.5 ft.	7 ft.
Alternatives with Noise Impacts	1B, 2B	All	All	All	All	1B, 2A, 2B
WALL COST ($)	23,000	24,725	26,875	22,800	37,310	33,600

Sources: Wall height: Appendix 3, Table 10. Notes: calculations based on square feet of noise absorbing surface @ approx. $215 linear foot (based on 6-foot wall); n/i = no impact; for noise barrier heights and locations, refer to Figures 3-2a-b.

On the basis of cost exceeding $35,000 per residence, noise mitigation measures do not appear to be reasonable for the home identified as receptor 11 under any Build Alternative. For all receptors, the walls would detract to some degree from the visual quality of the neighborhood, in which yards are often not separated by fences from each other or the roads and provide pleasant, continuous landscapes of lawns and tropical ornamental vegetation. This would be particularly true for the 2.1 m (7.0 ft.) high walls. However, the visual impact would be minor in relation to the marked benefit of noise reduction. Weighing the substantial noise reduction and cost below the threshold of $35,000 per residence, the use of mitigation measures would appear both reasonable and feasible for the homes identified as receptors 1, 2, 5/6, 7 and 12 for all Build Alternatives. A final decision on the installation of these mitigation measures will be made upon completion of project design and the public involvement process. If during final design conditions substantially change in such a way as to render mitigation unreasonable or infeasible, these mitigation measures may be modified.[2]

3.3 Biological Environment and Wetlands

The County of Hawaii consulted the U.S. Fish and Wildlife Service (USF&WS) for information on the distribution of rare, endangered or threatened plants and animals and for advice on mitigation of impacts (see Appendix 4 for coordination letter).

The project area is completely urbanized and does not contain any natural vegetation, streams, wetlands or aquatic sites, or other areas that might be of concern for biological impacts. Accordingly, the USF&WS concluded in a letter of 26 June 1998 that:

> "...no threatened or endangered species are known to occur in the vicinity of the proposed intersection improvements and no significant adverse impacts to fish and wildlife resources are expected to result from the proposed project" (see Appendix 1 for full text of consultation letter).

[2] Subsequent to the noise study, traffic volumes were recalculated. The effect of this change on future noise levels and potential mitigation measures is minor but has not been precisely modeled. The acoustic environment will be modeled again before construction, when design is finalized and detailed topography is available. Mitigation measures will be reconsidered in light of the information from that study, and they may thus differ from those proposed here.

3.4 Socioeconomic

3.4.1 Community Identity and Right-of-Way Acquisition

Existing Environment and Impacts

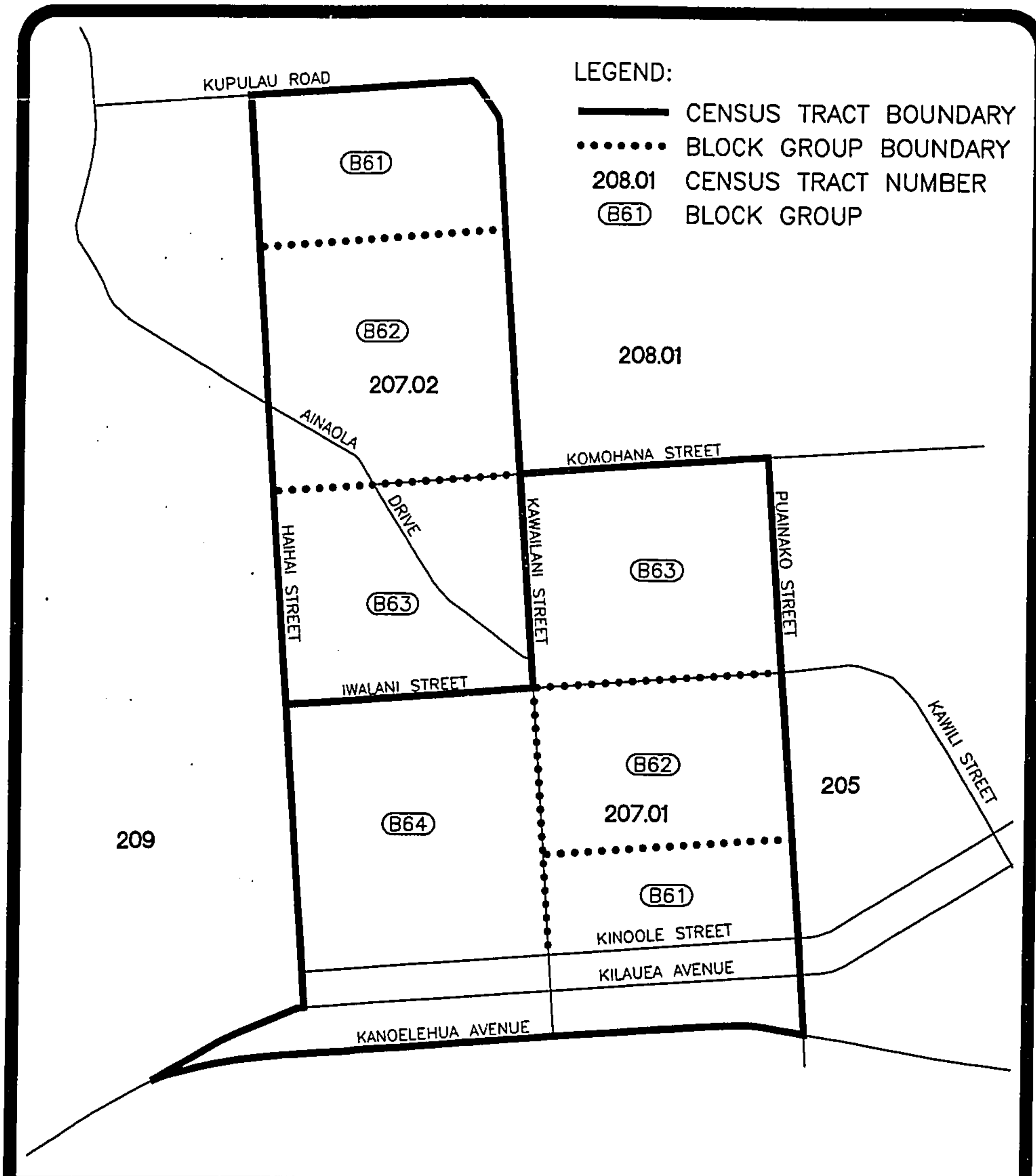
The intersections of the project site are in the upper part of the Waiakea neighborhood of Hilo and are at the boundary of Waiakea Uka (Fig. 3-3). The project area encompasses this latter area, which was formerly a somewhat separate rural community with mainly small farms and sugar cane camps, but is now essentially part of suburban Hilo. The project site is a residential neighborhood with a small commercial center housing a convenience store, a video store and a gas station. Although residential subdivisions dominate land use in Waiakea Uka, much land is still devoted to small farms and cattle ranches. No unique local government jurisdictions exist.

The 1990 U.S. Census of Population provides the most recent demographic information. The census data are still reasonably accurate for Hilo in the late 1990s, although many neighborhoods in the project area have expanded in population since that time.

Table 3-7 presents demographic data for the census tracts and block groups that contain the residents most directly affected by the project. The project site and project area are near the average in most measures except with somewhat higher home values, incomes and rents. Minority populations are in general distributed evenly around the island of Hawaii, and the neighborhoods affected by this project are similar to others on the island. Minority or low-income groups will not experience disproportionately high adverse impacts through construction-phase impacts, right-of-way taking, long-term noise and air quality effects, or other adverse effects.

The project is not expected to adversely impact the identity or cohesion of this community. Although the widened profile will increase the "barrier effect" of Kawailani Street, traffic signals and crosswalks will promote safer use by pedestrians.

The project will require acquisition of 0.32-0.61 ha (0.79-1.52 acres) of right-of-way from adjacent landowners (Appendix 4 lists all affected properties). Alternatives 2A and 2B would require taking two entire lots (both vacant of structures) for a new connector between Ainaola Drive and Pohakulani Street. Acquisition of property for right-of-way will be satisfied in conformance to the requirements of the Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended.



TITLE

CENSUS TRACTS AND BLOCK GROUPS

FIGURE

3-3

PROJECT KAWAILANI STREET IMPROVEMENTS IWALANI TO POHAKULANI STREET
SOUTH HILO, HAWAII

DATE
9/8/98

GR-CENSU.dwg

Table 3-7
1990 U.S. Census Data, Census Tracts/Block Groups

Trait/Unit	207.01 Lower Waiakea: Puainako to Haihai	207.01 Block Group 3 Iwalani to Puainako	207.02 Upper Waiakea: Kawailani to Kupulau	207.02 Block Group 3 Iwalani to Komohana	Hilo
PERSONS	4,399	1,294	4,693	1,468	37,808
FAMILIES	1,256	359	1,263	400	9,715
HOUSEHOLDS	1,559	418	1,460	452	13,234
%FEMALE	51.0	48.1	51.5	50.7	51.2
%Low Income	6.2	4.1	6.0	4.4	14.5
ETHNIC					
%CAUC	16.8	15.8	20.9	21.0	26.6
%FILI	9.2	9.9	11.9	12.6	9.5
%HAWA	15.6	15.4	12.7	11.9	20.0
%JAPA	51.8	51.9	47.2	46.5	35.2
%MINORITY	84.4	84.9	81.8	82.2	75.8
AGE					
%<18	22.5	26.3	32.5	25.0	27.3
%>59	27.9	21.2	11.8	14.4	19.9
%OWN-OCCU	74.6	85.6	98.9	86.7	56.7
%VACANT	1.7	0.0	2.1	2.2	5.7
$MED HOME VALUE	114,900	117,000	121,400	113,500	84,700
MED $RENT	412	488	546	511	371

Source: U.S. Census of Population, 1990 STF1-A. Note: Refer to Figure 3-3 for Census Tract boundaries. Key: ETHNIC: CAUC=Caucasian (includes Hispanic Caucasians, who are included in Minority category below), FILI=Filipino, HAWA=Hawaiian; JAPA=Japanese; RENT: MED=Median rent: Low income is defined as below Census Bureau poverty threshold.

3.4.2 Planning

Planning responsibility for the Island of Hawaii rests with the Hawaii County Planning Department and the State Land Use Commission.

Hawaii County General Plan

The General Plan for the County of Hawaii is a policy document expressing the broad goals and policies for the long-range development of the Island of Hawaii. The current General Plan was adopted by ordinance in 1989 (a revision is currently in early stages). The General Plan Facilities and LUPAG Maps are the map components of the General Plan that together establish the basic urban and non-urban form for areas within the planned public and cultural facilities, public utilities and safety features, and transportation corridors.

The Facilities Map identifies both Kawailani Street and Ainaola Drive as Secondary Arterials proposed for improvement. Secondary arterials are defined in the General Plan as streets of considerable continuity which are primarily traffic arteries for intercommunication between or through large areas. They interconnect with and augment primary systems.

The Land Use Pattern Allocation Guide (LUPAG) map is a graphic representation of the Plan's goals and policies. Land surrounding the project corridor is identified for Low Density and Medium Density Urban use.

County Zoning

County zoning for properties in the project site varies from 7,500 and 10,000 sq. ft. Residential (RS-7.5; RS-10) to commercial (CV). The proposed project is a permitted use in all these zones. Project activities must conform to the requirements of the Zoning Code relative to minimum building site area and yard setbacks.

State Land Use District

All land in the State of Hawaii is classified into one of four land use categories -- Urban, Rural, Agricultural, or Conservation -- by the State Land Use Commission. The project site is designated Urban. The proposed project would be an identified use in this district.

Impact of Project on Planning

The proposed project is consistent with all planning. No rezoning, reclassification or use permits are required. Widening or realignment that involves land acquisition would require compliance with Chapter 23, Hawaii County Code, relating to Subdivision.

3.4.3 Land Use

Existing Land Use

Existing land use in the project site consists primarily of residential and commercial uses.

Impacts and Mitigation Measures

No adverse impacts to existing or proposed land uses would result from the project.

3.4.4 Public Services and Facilities

Utilities

Waterlines and utility poles and lines providing for electricity, telephone and cable television service are present at the project site. Waterlines would not be affected, but a number of utility poles would require relocation to the edge of the new right-of-way.

Electricity for street lights and signal lights at intersections will be available from existing power lines at the intersections.

Police, Fire and Emergency

The Waiakea Fire Station is located approximately 80 m (250 ft.) east of the Iwalani Street intersection. Widening would require taking of about 3 m (10 ft.) in front of the station. The Hawaii County Fire Department has been notified of this project and invited to comment on the Environmental Assessment.

In general, police, fire and emergency medical services will benefit from the project because it will reduce accidents and congestion at the intersection.

Other Services

No recreational facilities are located in or near the project corridor, and no impact to recreation would occur. School traffic, including buses and parents taking children to and from school, represents a substantial portion of use at AM and PM peak hours. These users would benefit from increased safety and decreased congestion.

3.4.5 Historic Sites/Archaeological Resources

Section 106 of the National Historic Preservation Act provides protection for historic sites. This law designates the State Historic Preservation Officer (SHPO) in each state as the entity responsible for coordination and consultation on historic sites.

Accordingly, the SHPO was consulted. All land in the project site has been completely altered by construction or clearing within the last 30 years. There are no known structures or remains dating from before this period. No historic sites appear to be present, and none are listed in the U.S. or Hawaii Registers of Historic Places in or near the project site.

The SHPO issued a letter on 13 July 1998 stating that no effects to significant historic sites would likely occur as a result of the road construction (see App. 4 for coordination letter).

3.4.6 Agricultural Land and Soils

Soil on the project site is classified by the U.S. Natural Resources Conservation Service as Olaa Extremely Stony Silty Clay Loam. This soil is typically 30 cm in thickness and is underlain by a 25 cm subsoil, and then by `a`a (clinkery) lava. The soil is rapidly permeable with slow runoff, and erosion hazard is thus slight. Areas of this soil type in the project area were formerly farmed in sugar cane and now support some pasture or diversified tree crops.

The federal Farmland Protection Policy Act (FPPA) seeks to conserve farms and farmland by requiring assessment of a highway project's relative impact on farmland in a region, county and state. Consultation of maps of important farmland provided by the U.S. Natural Resources Conservation Service (USNRCS) determined that no lands identified as Prime, Unique, or Other Important Lands in the *Agricultural Lands of Importance to the State of Hawaii* (ALISH) map series are present. The project site is classified as urban and is thus not inventoried. Field inspection determined that no farms are present within the corridor. No farming operations would be adversely impacted by the project.

3.4.7 Pedestrian and Bicycle Transportation Patterns

Existing Conditions

No sidewalks or bicycle facilities are currently present at the project site. The *Bike Plan Hawaii* (HDOT 1994) serves as the guide for implementation of bikeways for the State of Hawaii. According to this plan, Kawailani Street is designated as a future proposed bike route, and Ainaola Drive is a future proposed bike lane.[3] Bicycle traffic is currently not monitored in

[3] The Hawaii State Department of Transportation defines a bike lane as "A portion of a roadway designated by striping, signing, and pavement markings for the preferential or exclusive use of bicycles." A bike

the project area but does not appear to be substantial. Some commuting by bicyclists may occur between the project area and Waiakea High School and the University of Hawaii at Hilo, which are adjacent to each other about 1.0 km (0.6 mi.) from the project site. Both Kawailani Street and Ainaola Drive currently lack not only bike lanes, but also sidewalks or paved shoulders. The County has no plans to provide these here in the foreseeable future.

Impacts and Proposed Mitigation Measures

Neither Kawailani Street nor Ainaola Drive can be made sufficiently wide to accommodate separate bicycle and pedestrian facilities and allow acceptable motor vehicle Levels of Service without the severe adverse impact of taking homes. Given this constraint, along with the light pedestrian and bicycle traffic in the area and the absence of current or future planned bike lanes or sidewalks in the streets involved, separate pedestrian and bicycles facilities are not proposed. However, the project design includes provision of 1.5 m (5.0 ft.) shoulders on Kawailani Street and Ainaola Drive to be shared by pedestrians and bicyclists.

3.4.8 Secondary, Growth-Inducing and Cumulative Impacts

When road construction projects create or substantially accelerate new opportunities for urban growth, secondary or induced physical and social impacts may also occur. These can include impacts to air quality, water quality, noise, open space, natural vegetation, historic sites, demands for public infrastructure, and other aspects of the environment. Because the project is not expected to generate growth, such secondary impacts would not occur. There is negligible potential for growth-induction along the project corridor because of a safety related improvement such as the proposed project.

Cumulative impacts result when implementation of several project that individually have limited impacts combine to produce broader or more severe impacts or conflicts in mitigation measures. The adverse effects of this project are confined to right-of-way take, localized noise impacts and construction-phase impacts, and are minor in severity and geographic scale. Of these impacts, only construction-phase traffic congestion has the potential to accumulate with other similar impacts from other projects. A review of development and facility construction projects being undertaken or planned for nearby, including the Puainako Street Widening and Extension, the Mohouli Street Extension, the Saddle Road, the Ponahawai Extension, UH-Hilo expansion and various residential subdivisions in Kaumana and Waiakea Uka indicates that none will have the tendency to combine with the proposed project to produce greater impacts in terms of scope or scale. Therefore, no adverse cumulative impacts are expected to result.

path, by contrast, is completely separated from the roadway and is normally exclusively for bicycles. A bike route is defined as "Any street or highway so designated, for the shared use of bicycles and motor vehicles or pedestrians or both."

3.4.9 Coastal Zone Management Act (CZMA)

The purpose of the federal Coastal Zone Management Act (CZMA) of 1972 (U.S.C. 1451-1464) is to preserve, protect, develop and where possible enhance the resources of the coastal zone. All projects with federal involvement that significantly affect areas under the control of a state's CZM Agency must undergo review for consistency with the State's approved coastal program. The entire State of Hawaii is included in the coastal zone for such purposes. The objectives of the Hawaii Coastal Zone Management Program are the following:

Recreational Resources: Provide coastal recreational opportunities accessible to the public.
Historic Resources: Protect, preserve, and where desirable, restore those natural and man-made historic and pre-historic resources in the coastal zone that are significant in Hawaiian and American history and culture.
Scenic and Open Space Resources. Protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.
Coastal Ecosystems. Protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems.
Economic Uses. Provide public or private facilities and improvements important to the State's economy in suitable locations.
Coastal Hazards. Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, and subsidence.
Managing Development. Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

The Hawaii County DPW's determination that the project does not impact these resources and is consistent with the objectives of the program was concurred with by the agency in charge of the Hawaii CZM Program, the Office of Planning within the Hawaii Department of Business, Economic Development, and Tourism (see Appendix 4, Part 5).

3.5 Construction-Phase Impacts

Construction of the proposed project would last approximately one year. During this period construction vehicles, power tools and heavy equipment would generate noise, traffic congestion, exhaust emissions and the potential for soil erosion.

Residents and others with property directly adjacent to the improvements would be the most directly affected by construction. This group includes a total of less than 30 residences, the small commercial center with a convenience store, a video store and a gas station, the Waiakea Fire Station, and a Hawaiian Telephone-GTE building.

3.5.1 Sediments, Water Quality and Flooding

Impacts

Uncontrolled excess sediment from soil erosion during and after road construction can impact natural watercourses, water quality and flooding potential. Contaminants associated with heavy equipment, etc., during construction may impact receiving stream, ocean and groundwater.

Proposed Mitigation Measures

Depending on aspects of the project that await final design for determination, a National Pollutant Discharge Elimination System (NPDES) permit may be required for the construction phase of the project. The permit, which would be issued by the Hawaii State Department of Health, would include specific and enforceable conditions to reduce sediment pollution.

Regardless of whether an NPDES permit is required, if the Build Alternative is selected, Special Contract Requirements developed as part of the construction documents will contain provisions to minimize the potential for soil erosion and off-site sediment transport. Soil erosion and sediment control standard management practices shall be implemented, as described in the *Erosion and Sediment Control Guide for Hawaii* (USSCS 1981). These management measures may include:

- o Limiting the amount of surface area graded at any given time to reduce the area subject to potential erosion;
- o Constructing temporary drainage ditches to divert runoff away from areas susceptible to soil erosion;
- o Utilizing soil erosion protective materials such as mulch or geotextiles on areas where soils have a high potential for erosion until permanent provisions such as lawns and grasses can be developed; and
- o Planting grass as soon as grading operations permit to minimize the amount of time soils are exposed to possible erosion.

3.5.2 Air Quality

Impacts

Short-term air quality impacts would occur either directly or indirectly during project construction. Short-term impacts from fugitive dust would likely occur, and increased emissions from traffic disruption may also affect air quality during construction. State air pollution control regulations prohibit visible emissions of fugitive dust.

Mitigation

An effective dust control plan is necessary to mitigate construction-related impacts. Special Contract Requirements developed as part of the construction documents will specify the following elements of the plan, the final provisions of which would be approved by DOH, and which would include some or all of the following:

- o Watering of active work areas;
- o Wind screens;

- o Cleaning adjacent paved roads affected by construction;
- o Covering of open-bodied trucks carrying soil or rock;
- o Limiting area to be disturbed at any given time;
- o Mulching or chemically stabilizing inactive areas that have been worked;
- o Paving and landscaping of affected areas of the project site as soon as practical in the construction schedule; and
- o If prolonged dry periods occur, watering of active work areas at least twice daily.

Construction vehicles and disrupted traffic due to construction activity can also produce increased exhaust emissions. To avoid this, Special Contract Requirements developed as part of the construction documents will specify that contractors will move construction equipment and workers on and off the site during off-peak traffic hours.

3.5.3 Noise

Impacts

Construction would result in noise from grading, blasting, compressors, vehicle and equipment engines, and other sources. Construction activities may exceed 95 decibels (dB) at the project boundary lines at times.

Mitigation

Special Contract Requirements developed as part of the construction documents will specify that the contractor conform with Title 11, Chapter 46, HAR (Community Noise Control). The Hawaii State Department of Health's (HDOH) Noise, Radiation and Indoor Air Quality Branch issues permits for construction activities which may generate noise. The permit is applied for during the construction phase by the contractor. HDOH will review the type of activity, location, equipment, project purpose, and timetable in order to decide upon conditions and mitigation measures. Possible measures include restriction of equipment type, maintenance requirements, restricted hours, and portable noise barriers. The precise combination of mitigation measures, if any, shall be specified by HDOH prior to construction.

3.5.4 Traffic Congestion

Impacts

For intervals during construction, operation of construction equipment, trucks, and worker vehicles may temporarily impede traffic at the subject intersections.

Mitigation

Special Contract Requirements developed as part of the construction documents will specify that during the construction period:

- o Professional traffic control shall be utilized throughout construction
- o Intersections will remain open during the AM and PM peak hours, i.e., from 7:00-8:00 AM and between 4:30 - 5:30 PM.

Additionally, it should be noted that noise-related construction time restrictions may also be imposed by the Hawaii State Department of Health as part of the Construction Noise Permit (see Section 3.5.3 above).

3.5.5 Public Utilities

Impacts

Road construction would entail potential relocation and/or temporary removal of electricity/telephone poles and transmission lines, and water mains and distribution lines.

Mitigation

Special Contract Requirements developed as part of the construction documents will specify that the contractor will coordinate with utility companies to schedule disruption so as to minimize the inconvenience to utilities and their customers.

3.6 Required Permits and Approvals

Several permits and approvals would be required to implement this project. They are listed here under their granting agencies.

Permits/Approvals Currently Under Consideration:

Hawaii Coastal Zone Management Program

a. Coastal Zone Management Program Consistency Review

Permits/Approvals Sought Prior to Construction:

State Department of Health:

a. National Pollutant Discharge Elimination System Permit*

County Department of Public Works:

a. Permits for Excavation of Public Highway, Grading, Grubbing, and Stockpiling
b. Permits for Outdoor Lighting
c. Permits for Electrical Work

County Planning Department

a. Permit for Subdivision

* Denotes need for permit/approval is not yet determined.

4 COMMENTS AND COORDINATION

4.1 Agencies Contacted

The following agencies received a letter inviting their participation in the preparation of the Environmental Assessment.

Federal Agencies

Pacific Islands Ecoregion
U.S. Fish and Wildlife Service
P.O. Box 50167, Honolulu, HI 96850

Chief, Planning and Operations Division
U.S. Army Engineer District, Honolulu
Ft. Shafter HI 96858-5440

State Agencies

State Historic Preservation Division
33 South King Street, 6th Floor
Honolulu, Hawaii 96813

Chancellor's Office
University of Hawaii at Hilo
200 West Kawili Street
Hilo, HI 96720

Office of Planning - Hawaii CZM Program
Hawaii State Department of Business,
Economic Development and Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

County Agencies

Hawaii County Planning Department
25 Aupuni Street
Hilo, Hawaii 96720

Hawaii County Council
25 Aupuni Street
Hilo Hawaii 96720

Hawaii County Civil Defense
920 Ululani Street
Hilo, Hawaii 96720

Hawaii County Police Department
349 Kapiolani Street
Hilo, Hawaii 96720

Hawaii County Fire Department
25 Aupuni Street
Hilo, Hawaii 96720

Copies of correspondence from agencies or organizations with substantive comments during the preparation of the EA are included in Appendix 4.

4.2 Public Involvement

The following organizations received a letter inviting their participation in the preparation of the Environmental Assessment:

- o Sierra Club
- o Hawaii Island Chamber of Commerce

The County of Hawaii invited public participation throughout project development. County officials attended "neighborhood meetings" sponsored by the Hawaii County Council representative for the district. In addition, County officials have spoken in person or by telephone with various community members and community association leaders. The process has generated evidence of the perceived effects of the project on neighborhood issues, such as identity, cohesion, and safety.

A public meeting was held on June 17, 1999, during the comment period for the EA. Information concerning the meeting is contained in Appendix 4.

4.3 Coordination Correspondence

Two letters were received as a result of coordination letters with federal agencies (or state agencies mandated with administering federal laws or programs) with jurisdiction over aspects of the project and/or expertise in areas of concern:

U.S. Fish and Wildlife Service
Hawaii State Historic Preservation Division

These letters are contained at the beginning of Appendix 4 and are referenced in appropriate sections of this document.

5 LIST OF DOCUMENT PREPARERS

This Environmental Impact Statement was prepared for the Federal Highway Administration and the County of Hawaii by Okahara and Associates jointly with Ron Terry, Ph.D. The following companies and individuals were involved:

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Sub-Consultants

Y. Ebisu Acoustic Engineer	M.S. University of Hawaii, Elect. Eng., 1969 P.E. Electrical Engineering, State of Hawaii
Barry Neal Air Quality Specialist	M.S. University of Hawaii, Meteorology, 1976
Randall Okaneku Traffic Engineer	M.S. University of Hawaii, Civil Eng., 1978 P.E. Civil Engineering-Transportation, State of Hawaii

6 STATE OF HAWAII ENVIRONMENTAL ASSESSMENT FINDINGS

Section 11-200-12 of the State Administrative Rules sets forth the criteria by which the significance of environmental impacts shall be evaluated. The following discussion paraphrases these criteria individually and evaluates the project's relation to each.

1. *The project will not involve an irrevocable commitment or loss or destruction of any natural or cultural resources.* The area is entirely developed for urban uses of residences and small commercial. No natural or cultural resources are present or would be affected. The State Historic Preservation Division has determined that no cultural resources are present.

2. *The project will not curtail the range of beneficial uses of the environment.* No future beneficial use of the environment will be affected in any way by the proposed project.

3. *The project will not conflict with the State's long-term environmental policies.* The State's long term environmental policies are set forth in Chapter 344, HRS. The broad goals of this policy are to conserve natural resources and enhance the quality of life. A number of specific guidelines support these goals. No aspect of the proposed project conflicts with these guidelines. The project supports a number of guidelines, including those encouraging transportation systems in harmony with the lifestyle of the people and the environment.

4. *The project will not substantially affect the economic or social welfare of the community or State.* The improvements will benefit the social and economic welfare of the Waiakea area of South Hilo by providing safer road intersections for residents and visitors.

5. *The project does not substantially affect public health in any detrimental way.* No effects to public health are anticipated.

6. *The project will not involve substantial secondary impacts, such as population changes or effects on public facilities.* No adverse secondary effects are expected. The project will not enable development.

7. *The project will not involve a substantial degradation of environmental quality.* Permits mandating best management practices for soil erosion and sediment control will ensure that the project will not degrade environmental quality in any substantial way.

8. *The project will not substantially affect any rare, threatened or endangered species of flora or fauna or habitat.* No endangered species of flora or fauna are known to exist on the project site or would be affected in any way by the project.

9. *The project is not one which is individually limited but cumulatively may have considerable effect upon the environment or involves a commitment for larger actions.* Most adverse impacts related to the project are negligible and can be mitigated through proper enforcement of permit conditions. Therefore, such impacts will not accumulate in relation to other projects.

10. *The project will not detrimentally affect air or water quality or ambient noise levels.* The project will have negligible effects in terms of water quality. There will be an overall benefit in regard to air quality. Noise impacts will occur but can be largely mitigated through noise reduction barriers.

11. *The project will not affect nor would it likely to be damaged as a result of being located in an environmentally sensitive area, such as flood plains, tsunami zones, erosion-prone areas, geologically hazardous lands, estuaries, fresh waters or coastal waters.* The project does not impact any floodways. Although the project is located in a zone exposed to some earthquake and volcanic hazard, there are no reasonable alternatives.

12. *The project will not substantially affect scenic vistas and viewplanes identified in county or state plans or studies.* No viewplanes mentioned in the Hawaii County General Plan or any other County or State plan is present or would be affected.

13. *The project will not require substantial energy consumption.* Negligible amounts of energy input will be required for vegetation removal and site preparation.

For the reasons above, the proposed project is not expected to have any significant effect in the context of Chapter 343, Hawaii Revised Statues and section 11-200-12 of the State Administrative Rules. The Hawaii County Department of Public Works has therefore issued a Finding of No Significant Impact (FONSI), meaning that an Environmental Impact Statement will not be prepared.

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APPENDIX 1

TRAFFIC ASSESSMENT

DRAFT TRAFFIC IMPACT ANALYSIS REPORT
FOR THE PROPOSED

KAWAILANI STREET IMPROVEMENTS
AINAOLA DRIVE/POHAKULANI STREET
TO IWALANI STREET

PREPARED FOR

OKAHARA & ASSOCIATES, INC.

PREPARED BY

TMC

THE TRAFFIC MANAGEMENT CONSULTANT

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Chapter 1. Introduction

I. Purpose and Scope of the Study

A. Purpose

The purpose of this study is to analyze the traffic impacts resulting from the proposed improvements of Kawailani Street at its intersections at Ainaola Drive/Pohakulani Street and at Iwalani Street. This report presents the findings and recommendations of the traffic study.

B. Scope

The scope of this study includes:

1. Description of the proposed project.
2. Description of the study area.
3. Evaluation of existing roads.
4. Analysis of existing peak hour traffic conditions.
5. Development of peak hour traffic forecasts for the Year 2018.
6. Analysis of the Year 2018 peak hour traffic under the "No-Build" Scenario.
7. The evaluation of alternative improvements at the study intersections.
8. Analysis of the Year 2018 peak hour traffic under two preferred alternative improvement plans.
9. Recommendation of improvements based upon the findings of this study.

II. Project Description

The proposed project, located in South Hilo, Hawaii, would consist of traffic improvements at the Kawailani Street intersections at Iwalani Street and at Ainaola Drive/Pohakulani Street.

Kawailani Street, Ainaola Drive, and Iwalani Street are part of a network of streets in the vicinity. While the traffic forecast does account for other long range traffic improvements, the traffic analysis, contained herein, focuses on the study intersections and does not analyze the impacts of alternative system-wide improvements, i.e., improving alternative routes that may divert traffic from the study intersections.

This study evaluates seven (7) alternative concepts for traffic improvements at these intersections and selects two alternatives for further analysis. The alternative improvement plans consider: traffic signalization; the widening/upgrading of existing roadways; the realignment of roadways; and non-traffic signal control applications. In addition, the traffic impact analysis includes the assessment of future traffic conditions without any improvements.

III. Background

A. General

The "Urban Intersection Study" (UIS), dated October 1994, was prepared for the County of Hawaii Department of Public Works. The intersection of Kawailani Street and Iwalani Street along with thirteen (13) other intersections was evaluated in terms of traffic volumes, congestion, delays, and traffic safety.

B. Traffic Safety

The UIS indicated that a total of fourteen (14) accidents were reported at the intersection of Kawailani Street and Iwalani Street between the Years 1991 and 1993. Five (5) of those accidents involved an injury. The Kawailani Street/Iwalani Street intersection ranked first in the number of injury accidents relative to the peak hour volume; third in the number of injury accidents relative to the 24-hour volume, second in the number of total accidents relative to the peak hour volume, and third in the number of total accidents relative to the 24-hour volume. According to the schematic accident diagram depicted in the UIS, six (6) of the accidents were of the type that may be mitigated by traffic signal control, i.e., involving right angle or left turn collisions.

C. Traffic Signal Warrant Analysis

The UIS also indicated that the intersection of Kawailani Street and Iwalani Street met four warrants for traffic signals according to the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD). These warrants include Warrant 1 "Minimum Vehicular Volume", Warrant 2 "Interruption of Continuous Traffic", Warrant 9 "Four Hour Volumes", and Warrant 11 "Peak Hour Volume".

Because of the proximity of the intersection of Kawailani Street and Ainaola Drive/Pohakulani Street to the Kawailani Street/Iwalani Street intersection, both intersections are analyzed in this study.

Chapter 2. Existing Conditions

I. General

The existing land use in the vicinity of the study intersections is primarily residential. The only exception is the Wiki Wiki Mart on the southwest corner of the intersection of Kawailani Street and Ainaola Drive/Pohakulani Street.

The street system in South Hilo is a grid network, comprised of well-spaced east-west collectors streets and closely-spaced north-south streets. The exception to the north-south and east-west orientation of the road network is Ainaola Drive, which cuts diagonally across the street grid. The northeast-southwest alignment of Ainaola Drive provides a direct route for area residents traveling to and from the Waiakea School complexes, the University of Hawaii, and Hilo Town. Figure 1 depicts the vicinity of the study area.

II. Roadways

A. Kawailani Street

Kawailani Street is a two lane, two way, east-west major collector street between Kanoelehua Avenue and Kupulau Road. Kawailani Street intersects Ainaola Drive/Pohakulani Street and Iwalani Street at unsignalized intersections. No provisions for exclusive turning lanes exist on Kawailani Street at Ainaola Drive/Pohakulani Street or at Iwalani Street.

Figure 1. Vicinity Map

The existing right-of-way width on Kawailani Street varies between 50 feet and 60 feet between Ehenene Place/Kuhilani Street and Ainaola Drive/Pohakulani Street. The Kawailani Street right-of-way width reduces to 40 feet, east of Ainaola Drive/Pohakulani Street.

B. Ainaola Drive

Ainaola Drive is a two lane, two way major collector street, which generally runs southwest-northeast, between the Waiakea Homesteads area and Kawailani Street. The existing right-of-way width on Ainaola Drive is 60 feet. Ainaola Drive is yield-controlled at its skewed intersection with Kawailani Street. Ainaola Drive, together with Iwalani Street, forms a major north-south thoroughfare in area, via a short connection on Kawailani Street.

C. Iwalani Street

Iwalani Street is two lane, two way, north-south major collector street between Haihai Street to the south and Puainako Street to the north. Iwalani Street continues as Kawili Street to the University of Hawaii at Hilo, and into Hilo Town. Iwalani Street is stop-controlled at its four-legged intersection with Kawailani Street. The existing right-of-way on Iwalani Street is 80 feet wide north of Kawailani Street, and 40 feet wide south of Kawailani Street.

D. Pohakulani Street

Pohakulani Street is a two lane, two way local street, oriented in the north-south directions. The north and south legs of the intersection of Pohakulani Street at Kawailani Street are cul-de-sac roadways. Pohakulani Street continues northward to Puainako Street; however, a section of the street, midway between Puainako Street and Kawailani Street, is unimproved and does not permit through traffic.

Pohakulani Street, Kawailani Street, and Ainaola Drive form a five-legged unsignalized intersection, which is comprised of three separate junctions between each pair of intersecting roadways. The northbound Pohakulani Street is stop-controlled at Ainaola Drive and also at Kawailani Street. Northbound Pohakulani Street at Ainaola Drive provides a two lane approach, an exclusive right turn lane toward Kawailani Street, and a shared through/left turn lane. Southbound Pohakulani Street, between Kawailani Street and Ainaola Drive, also provides a two lane approach. One lane is dedicated to traffic turning right to southwest bound

Ainaola Drive. The other lane continues in the southbound direction to Pohakulani Street, yielding the right-of-way to northeast bound Ainaola Drive. The existing right-of-way on Pohakulani Street is 40 feet wide.

E. Kuhilani Street and Ehenene Place

Kuhilani Street is a two lane, two way, minor north-south collector road, located west of Pohakulani Street, and between Kawailani Street and Puainako Street. Kuhilani Street is the north leg of its four-legged unsignalized intersection with Kawailani Street, opposite Ehenene Place, a cul-de-sac road. The right-of-way on Kuhilani Street is 50 feet wide. The right-of-way width on Ehenene Place varies between 50 feet and 60 feet.

III. Traffic Operations

A. General

1. Traffic Count Data Collection

The field investigation, conducted in October 1997, consisted of a visual inspection of the roadways and peak period traffic conditions and manual traffic count surveys. The surveys were conducted from 6:00 AM to 8:45 AM and from 3:00 PM and 6:00 PM at the following intersections:

a. Kawailani Street and Kuhilani Street/Ehenene Place

b. Kawailani Street and Ainaola Drive/Pohakulani Street

c. Kawailani Street and Iwalani Street

2. Capacity Analysis Methodology

The highway capacity analysis performed for this study is based upon procedures presented in the "Highway Capacity Manual" (HCM), Special Report 209, Transportation Research Board, and the "Highway Capacity Software", Federal Highways Administration.

Level of Service (LOS) is "defined as a qualitative measure describing operational conditions within a traffic stream". Several factors are included in determining LOS such as: speed, delay, vehicle density, freedom to maneuver, traffic interruptions, driver comfort, and safety. LOS "A", "B", and "C" are considered satisfactory levels of service. LOS "D" is generally considered a "desirable minimum" operating level of service. LOS "E" is an undesirable condition and LOS "F" is an unacceptable condition.

From an operational perspective, LOS "F" results in traffic queues backing up from downstream intersections, affecting the traffic flow at the study intersection. LOS "F" also can occur when the traffic demand meets or exceeds the intersection's capacity, which results in queuing from the study intersection. From a planning perspective, LOS "F" indicates that the traffic demand exceeds the roadway's carrying capacity.

B. Existing AM Peak Hour Traffic Analysis

The existing AM peak hour of traffic occurred between 7:00 AM and 8:00 AM during the field investigation. The dominant directions of traffic during the AM peak hour were eastbound on Kawailani Street, and northeast bound on Ainaola Drive, turning right onto eastbound Kawailani Street. The heavy left turn demand on eastbound Kawailani Street at Iwalani Street resulted in occasional queuing on eastbound Kawailani Street beyond and onto Ainaola Drive. Figure 2 depicts the existing AM peak hour of traffic and the results of the capacity analysis.

1. Iwalani Street and Kawailani Street Intersection

Both approaches of Iwalani Street at its intersection with Kawailani Street operated at LOS "F" during the existing AM peak hour of traffic. The LOS "F" conditions resulted in extreme delays experienced by motorists turning onto or proceeding through the intersection. The single lane approaches also resulted in delays of the right turn movements. The Iwalani Street delays were mitigated when motorists on Kawailani Street permitted motorists on Iwalani Street to turn onto or cross Kawailani Street.

The left turn movement on eastbound Kawailani Street operated at LOS "B". However, the left turn movement from the one lane approach caused delays to through traffic, which was evident by the queuing on eastbound Kawailani Street that was observed during the AM peak hour of traffic. Existing AM peak hour volumes on Kawailani Street meet the volume warrant for an exclusive left turn lane on eastbound Kawailani Street at Iwalani Street.

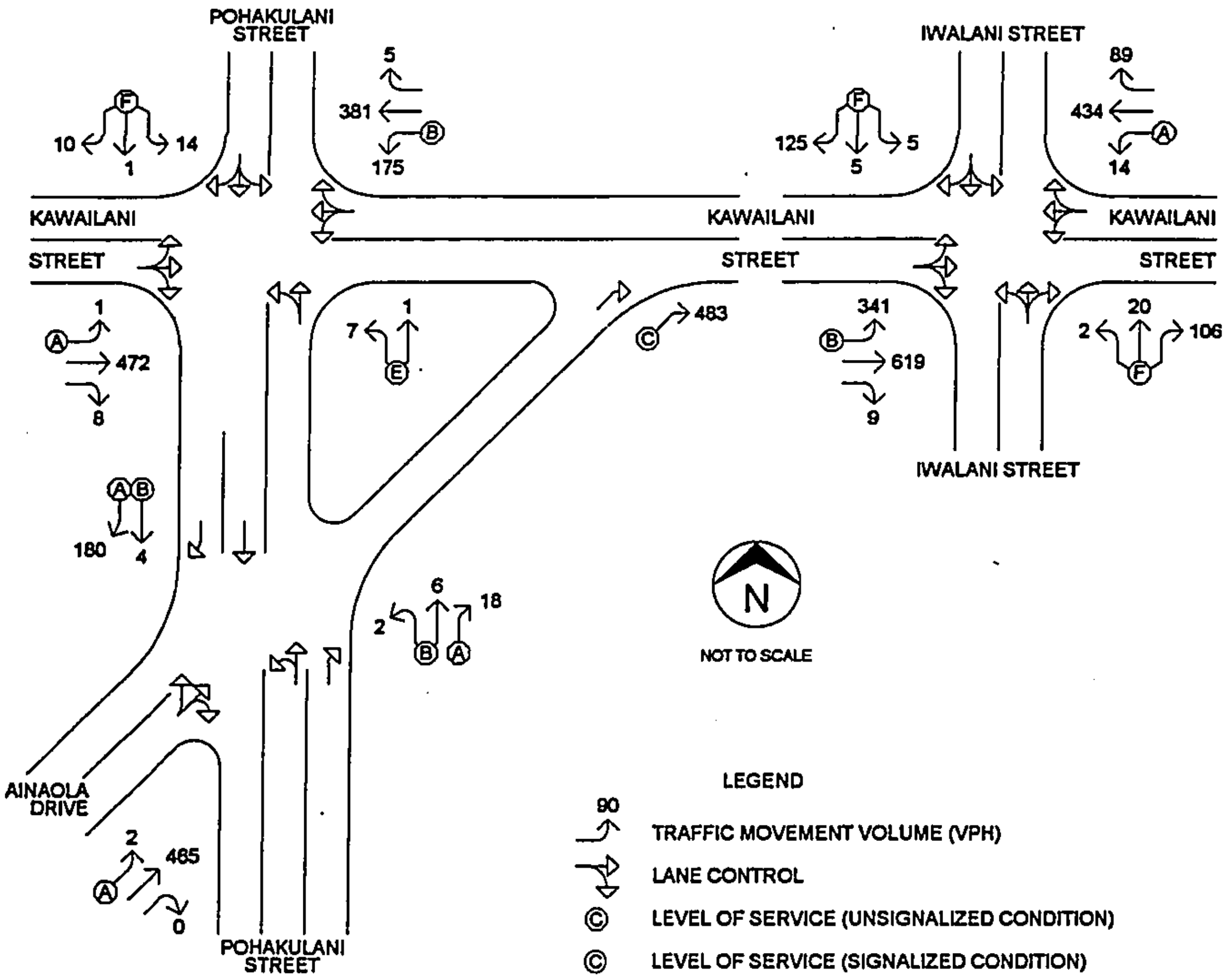


Figure 2. Existing AM Peak Hour Traffic

2. Ainaola Drive/Pohakulani Street and Kawailani Street Intersection

The northbound approach of Pohakulani Street at Kawailani Street operated at LOS "E" during the existing AM peak hour of traffic. The southbound approach of Pohakulani Street operated at LOS "F". The right turn movement from Ainaola Drive onto Kawailani Street operated at LOS "C". The side street delays were a result of eastbound queues on Kawailani Street that backed up from Iwalani Street. These delays again were mitigated when motorists on Kawailani Street permitted motorists on Ainaola Drive/Pohakulani Street to turn onto or proceed through the intersection. Existing AM peak hour volumes on Kawailani Street meet the volume warrant for an exclusive left turn lane on westbound Kawailani Street at Ainaola Drive/Pohakulani Street.

The intersection of Ainaola Drive and Pohakulani Street operated at satisfactory LOS during the existing AM peak hour of traffic.

C. Existing PM Peak Hour Traffic Analysis

The existing PM peak hour of traffic occurred between 4:30 PM and 5:30 PM during the field investigation. The PM peak hour directions of traffic were reversed from the AM peak hour, i.e., heavy traffic volumes occurred on southbound Iwalani Street, westbound Kawailani Street, and southwest bound Ainaola Drive. The heavy left turn movement on westbound Kawailani Street at Ainaola Drive/ Pohakulani Street resulted in occasional queuing on Kawailani Street, which extended beyond Iwalani Street. The existing PM peak hour traffic and the results of the capacity analysis are depicted on Figure 3.

1. Iwalani Street and Kawailani Street Intersection

The southbound approach of Iwalani Street at Kawailani Street operated at LOS "F" during the existing PM peak hour of traffic. The northbound approach of Iwalani Street operated at LOS "E". Longer delays were observed on both approaches when the westbound queue on Kawailani Street extended beyond Iwalani Street. Motorists on Kawailani Street permitted motorists on Iwalani Street to turn onto or cross Kawailani Street. Existing PM peak hour volumes on Kawailani Street again meet the volume warrant for an exclusive left turn lane on eastbound Kawailani Street at Iwalani Street.

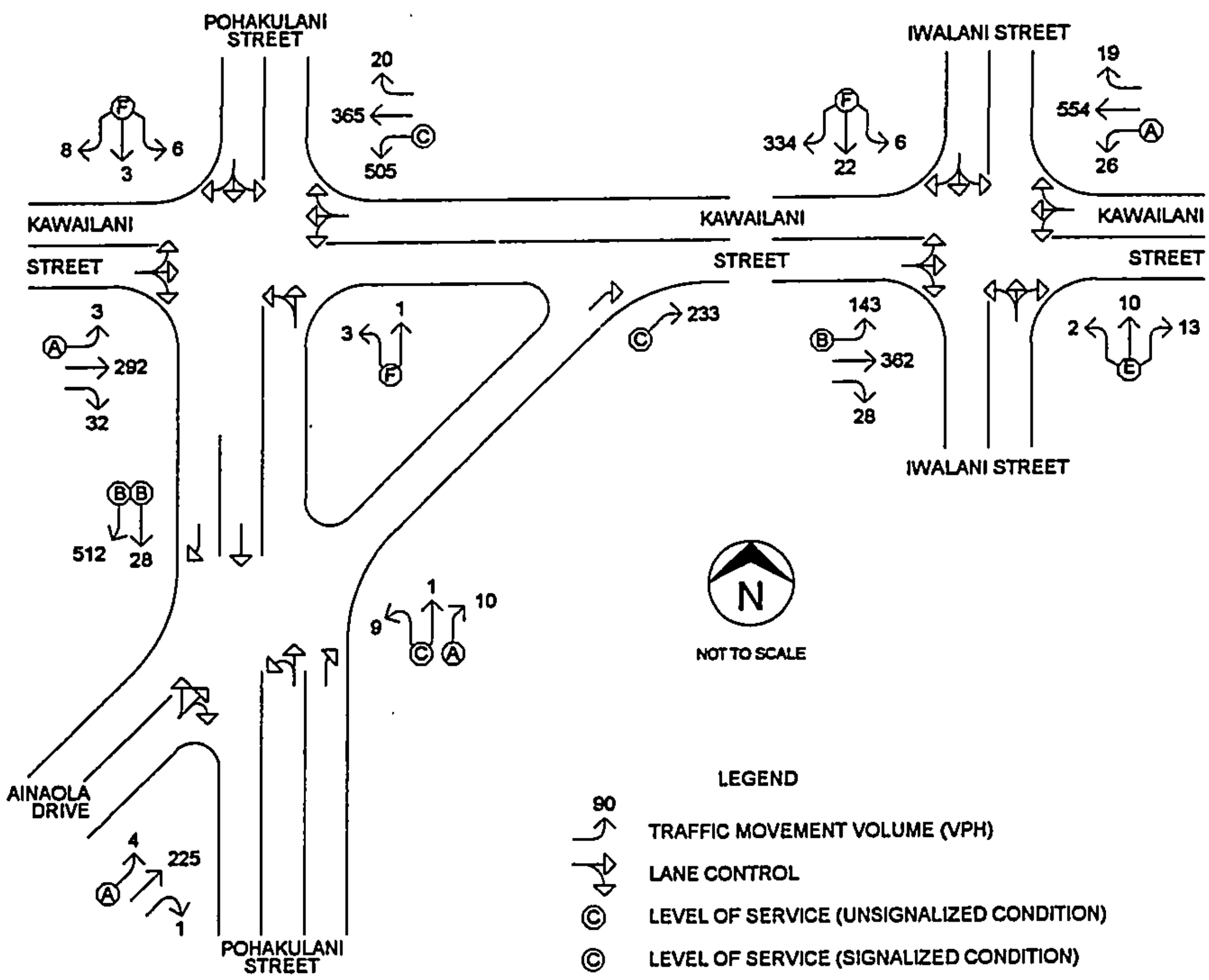


Figure 3. Existing PM Peak Hour Traffic

2. Ainaola Drive/Pohakulani Street and Kawailani Street Intersection

Both approaches of Pohakulani Street at Kawailani Street operated at LOS "F" during the existing PM peak hour of traffic. Although the traffic volumes were low on Pohakulani Street, the delays were long, except when motorists on Kawailani Street yielded to traffic turning onto or crossing the intersection. The right turn movement from Ainaola Drive onto Kawailani Street operated at LOS "C". The left turn movement on westbound Kawailani Street operated at LOS "C". However, the left turn movement from the single lane approach caused delays for through traffic, which was evident by the westbound queuing that was observed during the PM peak hour of traffic. Existing PM peak hour volumes on Kawailani Street also meet the volume warrant for an exclusive left turn lane on westbound Kawailani Street at Ainaola Drive/Pohakulani Street. The intersection of Ainaola Drive and Pohakulani Street operated at satisfactory LOS during the existing PM peak hour of traffic.

Chapter 3. Projected Traffic

I. Long Range Travel Forecast

The travel forecast, presented in this study, was developed from the Hawaii Long Range Land Transportation Plan Draft Final Report, January 1998 (HLRLTP), prepared for the State of Hawaii Department of Transportation, in cooperation with the County of Hawaii Department of Public Works and Planning Department. The HLRLTP used the Year 1992 as its base year, and the Year 2020 as its planning horizon for the land use inventory and travel forecasts. A travel forecast model was developed by dividing the island into "traffic analysis zones" (TAZ), i.e., a definable area in which all trips originating within the TAZ have destinations in other TAZs. These trips are assigned to a network model, which represents the roadway system.

Future traffic assignments were not presented in the HLRLTP; therefore, the rate of growth of traffic in the vicinity of the project was developed, based upon the increase in the total trips generated by TAZs within the immediate vicinity of the proposed project. These TAZs included the areas identified in the HLRLTP as:

- TAZ 55 - Lower Puainako
- TAZ 56 - Kinoole-Puainako
- TAZ 64 - Komohana
- TAZ 65 - Ainaola
- TAZ 66 - Upper Puainako
- TAZ 67 - Waiakea Uka

The average annual growth in trip generation for these TAZs was 1.1 percent per year. This growth rate is applied uniformly over the existing (1998) peak hour traffic volumes and projected over a twenty-year time frame to estimate the Year 2018 peak hour traffic demands.

II. No-Build Scenario

A. General

The Year 2018 traffic operations are analyzed without the proposed improvements or the "No-Build" scenario, i.e., under existing roadway conditions. While it is highly unlikely that highway improvements would not be implemented by the Year 2018, it is even more unlikely that the peak hour traffic demands, presented in this section, would actually occur under the extremely congested conditions. In areas where the projected demands exceed the intersection capacity, traffic would most likely divert to alternative routes, where traffic improvements has been implemented. Otherwise, motorists could adjust their travel patterns to avoid the peak hours of traffic, resulting in longer peak periods instead of higher peak hour traffic demands. The purpose of analyzing the "No-Build" scenario is to assess the benefits derived by the proposed improvements by comparing the Year 2018 traffic operations under existing roadway conditions and under the improved roadway conditions.

B. AM Peak Hour Traffic Analysis Without Project

Both Iwalani Street approaches at Kawailani Street are expected to continue to operate at LOS "F". The left turn movement on eastbound Kawailani Street is expected to still operate at LOS "C"; however, queue lengths can be expected to extend beyond Ainaola Drive more frequently.

The right turn movement from Ainaola Drive to eastbound Kawailani Street is expected to operate at LOS "F". Both approaches of Pohakulani Street at Kawailani Street are expected to operate at LOS "F". Queuing on Ainaola Drive from Kawailani Street can be expected to increase the delays experienced on northbound Pohakulani Street at Ainaola Drive. Figure 4 depicts the Year 2018 AM peak hour traffic and the results of the capacity analysis without any traffic improvements.

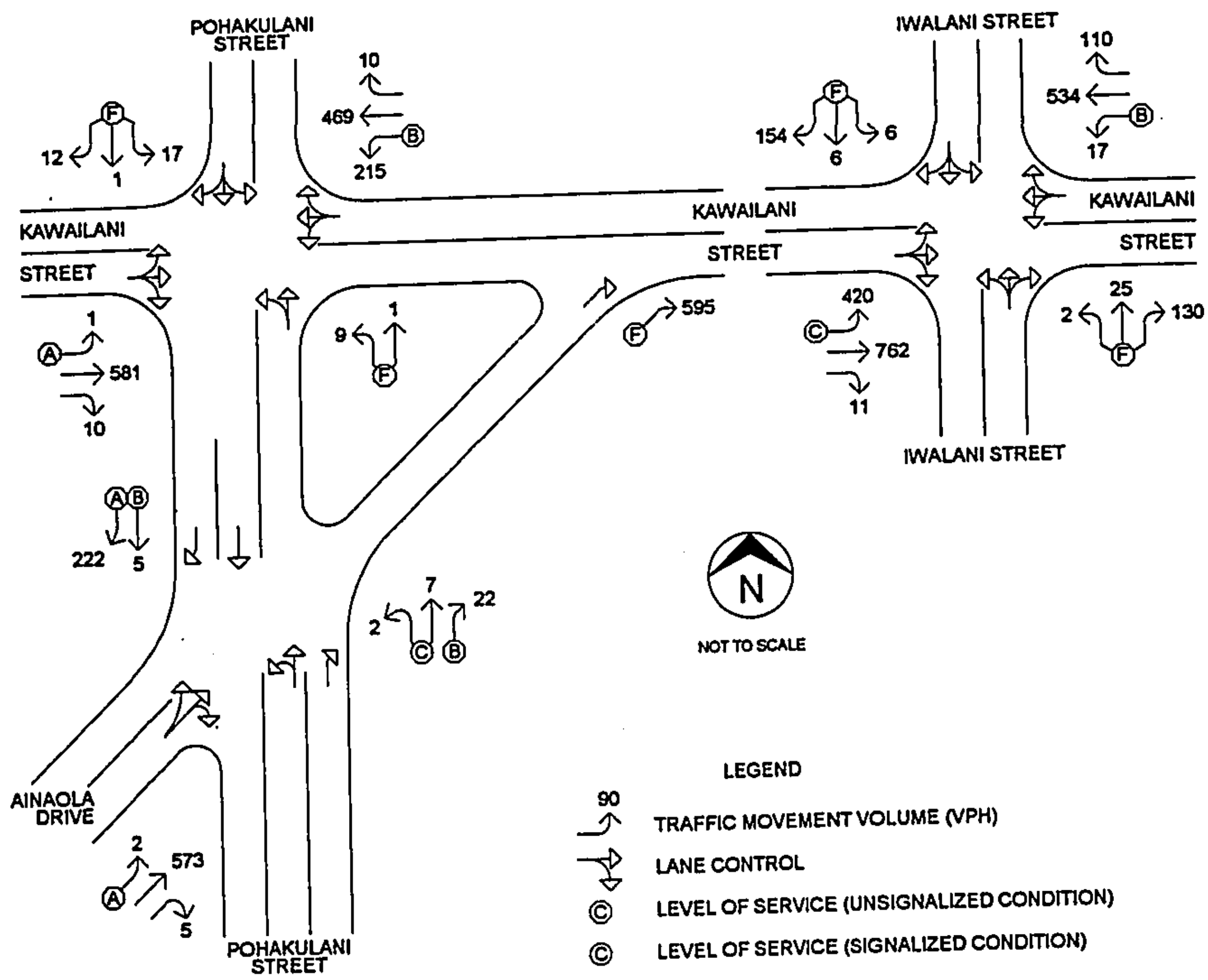


Figure 4. Year 2018 AM Peak Hour Without Improvements

C. PM Peak Hour Traffic Analysis Without Project

The northbound approach of Iwalani Street at Kawailani Street is expected to deteriorate to LOS "F" during the Year 2018 PM peak hour of traffic. Traffic operations on all legs of the intersection would be affected by the queuing on westbound Kawailani Street at Ainaola Drive/Pohakulani Street.

The left turn movement on westbound Kawailani Street is expected to operate at LOS "F" during the Year 2018 PM peak hour of traffic without the proposed improvements. The northbound and southbound approaches of Pohakulani Street and Kawailani Street are expected to continue to operate at LOS "F".

The left turn/through movement on the northbound approach of Pohakulani Street at Ainaola Drive is expected to operate at LOS "E" during the Year 2018 PM peak hour of traffic without the proposed improvements. The Year 2018 PM peak hour traffic without improvements and the results of the capacity analysis are depicted on Figure 5.

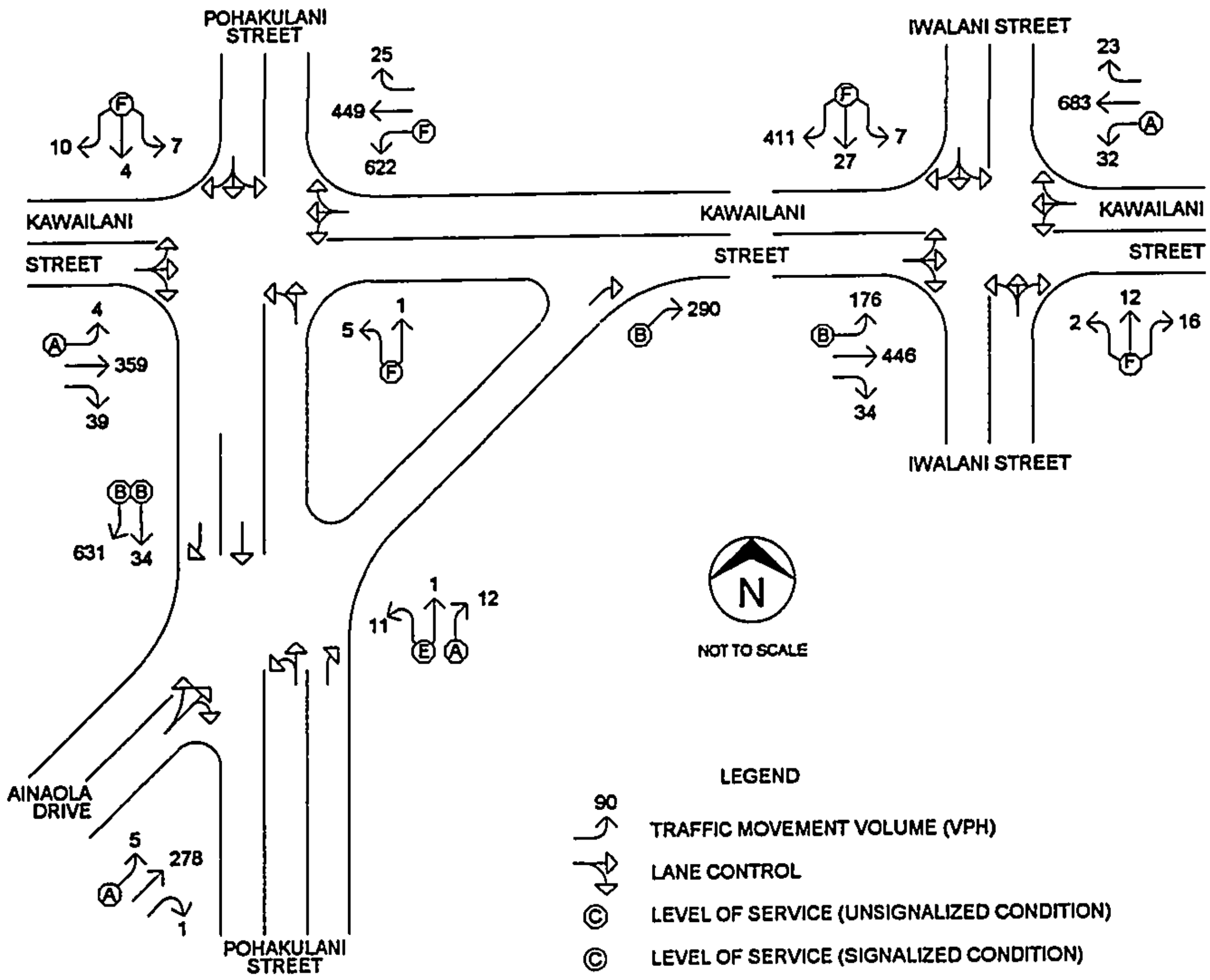


Figure 5. 2018 PM Peak Hour Traffic Without Project

Chapter 4. Evaluation of Alternatives

I. General

A total of seven (7) alternative alignments were developed for the Kawailani Street improvements. The various alternatives included realigning and/or widening existing streets that would require land acquisition and, in some cases, the demolition of homes. The alternatives were evaluated in terms of the following criteria: feasibility, impacts to residents, right-of-way acquisition, overall costs, traffic operations, and environmental impacts.

The alternative alignments have the following common features:

- Widening Kawailani Street between Kuhilani Street/Ehehene Place and Iwalani Street to provide for exclusive left turn lanes(s) and additional through lane(s).
- Widening the southbound approach of Iwalani Street at Kawailani Street to provide for an exclusive right turn lane.
- Realigning Ainaola Drive at Kawailani Street to eliminate/reduce the skewed intersection.

II. Alternative 1

A. Description

Under Alternative 1, Ainaola Drive is proposed to be realigned to intersect Kawailani Street opposite the north leg of Pohakulani Street. Realigning Ainaola Drive to form a more conventional four-legged intersection increases the intersection spacing on Kawailani Street between Ainaola Drive/Pohakulani Street and Iwalani Street. The south leg of Pohakulani Street would be realigned to intersect Ainaola Drive at a stop-controlled four-legged intersection opposite the Wiki Wiki Mart driveway. The Kawailani Street intersection at Ainaola Drive and at Iwalani Street would be traffic signalized. Alternative 1 is depicted on Figure 6.

B. Advantages

1. Alternative 1 would be the least disruptive to the environs in that it involves minimum modification of existing street alignments.
2. Right-of-way acquisition is not expected to involve the demolition of homes.
3. Traffic flows would remain along existing corridors and, therefore, do not significantly impact previously unaffected residents.

C. Disadvantages

1. The spacing between the Kawailani Street intersections at Iwalani Street and at Ainaola Drive/Pohakulani Street would limit the available storage length for proposed left turn lanes on Kawailani Street.
2. The spacing between the intersections may affect the efficiency of the traffic signal coordination along Kawailani Street.
3. The realignment of the south leg of Pohakulani Street to Ainaola Drive would create a new unsignalized intersection adjacent to the proposed traffic signalized intersection of Kawailani Street and Ainaola Drive/Pohakulani Street.

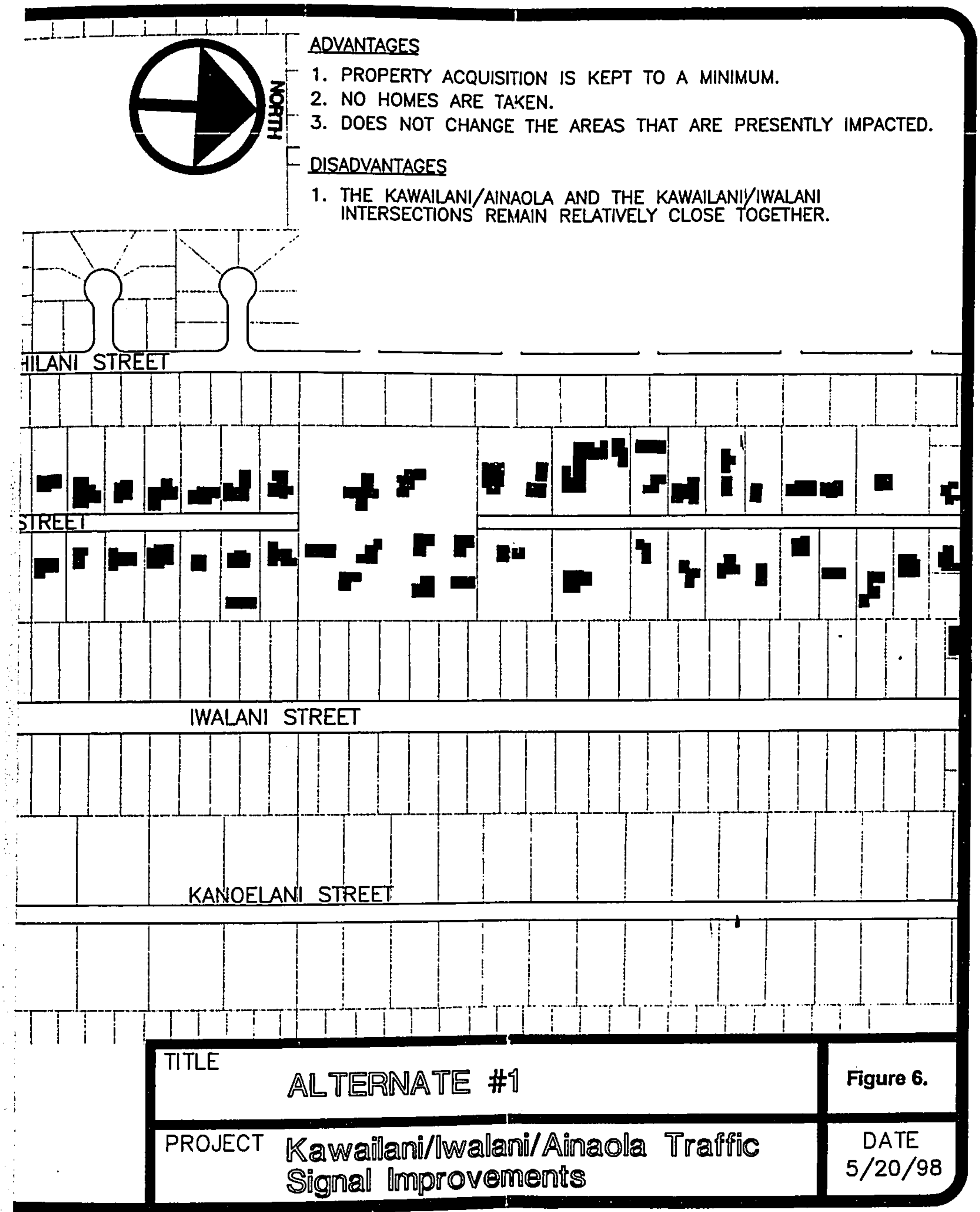
III. Alternative 2

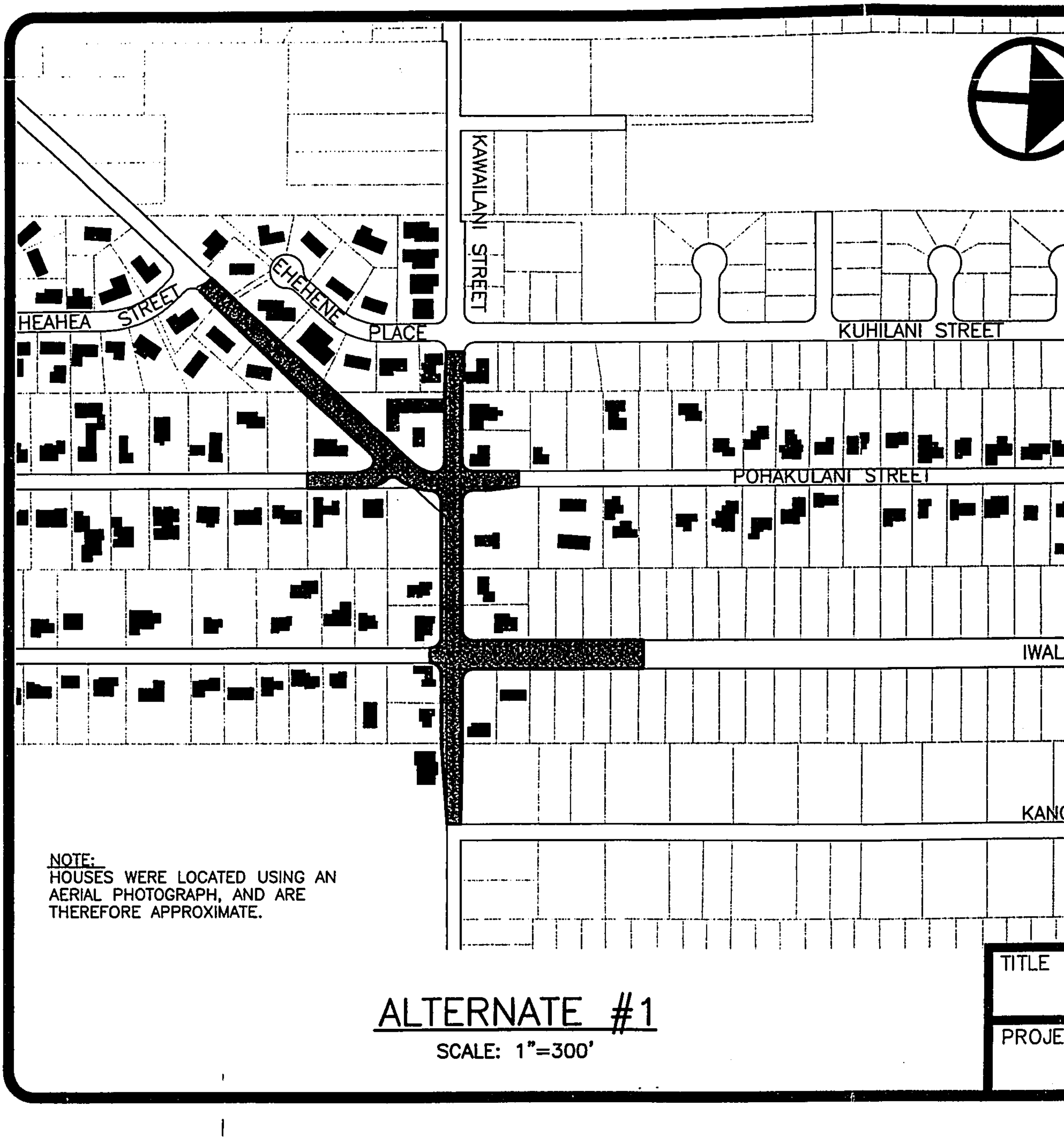
A. Description

Alternative 2 is similar to Alternative 1 except that access to the south leg of Pohakulani Street would be provided by a new roadway through an undeveloped lot located further south along Ainaola Drive. Figure 7 depicts Alternative 2.

B. Advantages

In addition to the advantages listed above under Alternative 1, Alternative 1 would further separate the new intersection between Ainaola Drive and Pohakulani Street from the proposed traffic signals at the intersection of Kawailani Street and Ainaola Drive/Pohakulani Street.

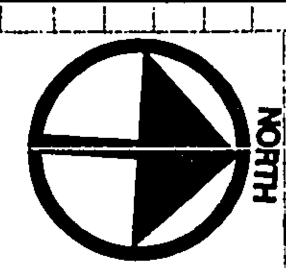

ADVANTAGES
1. PROPERTY ACQUISITION IS KEPT TO A MINIMUM.
2. NO HOMES ARE TAKEN.
3. DOES NOT CHANGE THE AREAS THAT ARE PRESENTLY IMPACTED.
DISADVANTAGES
1. THE KAWAILANI/AINAOLA AND THE KAWAILANI/IWALANI INTERSECTIONS REMAIN RELATIVELY CLOSE TOGETHER.
NORTH
ILANI STREET
STREET
IWALANI STREET
KANOELANI STREET
TITLE
ALTERNATE #1
Figure 6.
PROJECT
Kawailani/Iwalani/Ainaola Traffic Signal Improvements
DATE
5/20/98



NOTE:
HOUSES WERE LOCATED USING AN AERIAL PHOTOGRAPH, AND ARE THEREFORE APPROXIMATE.

ALTERNATE #1

SCALE: 1"=300'

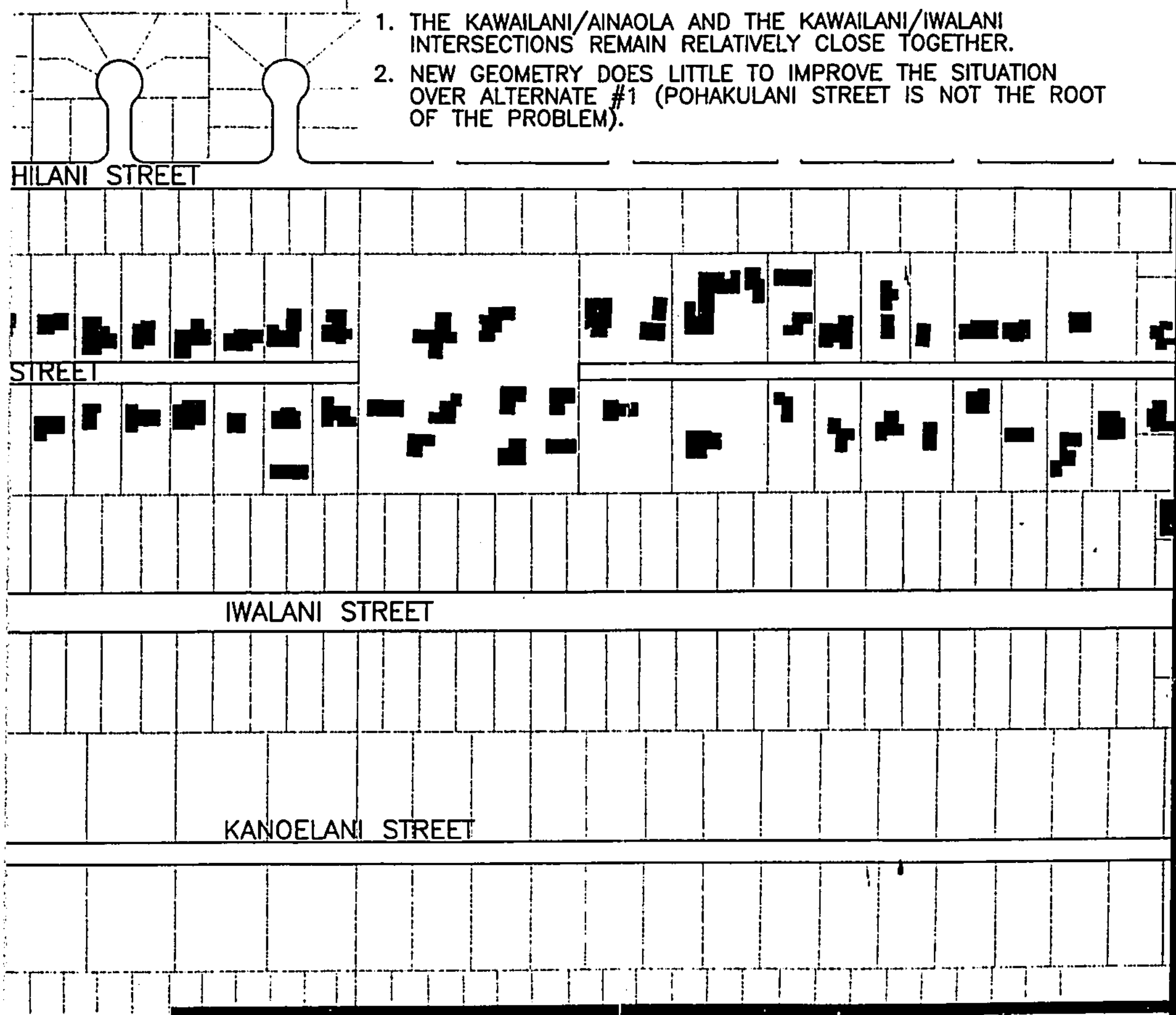


ADVANTAGES

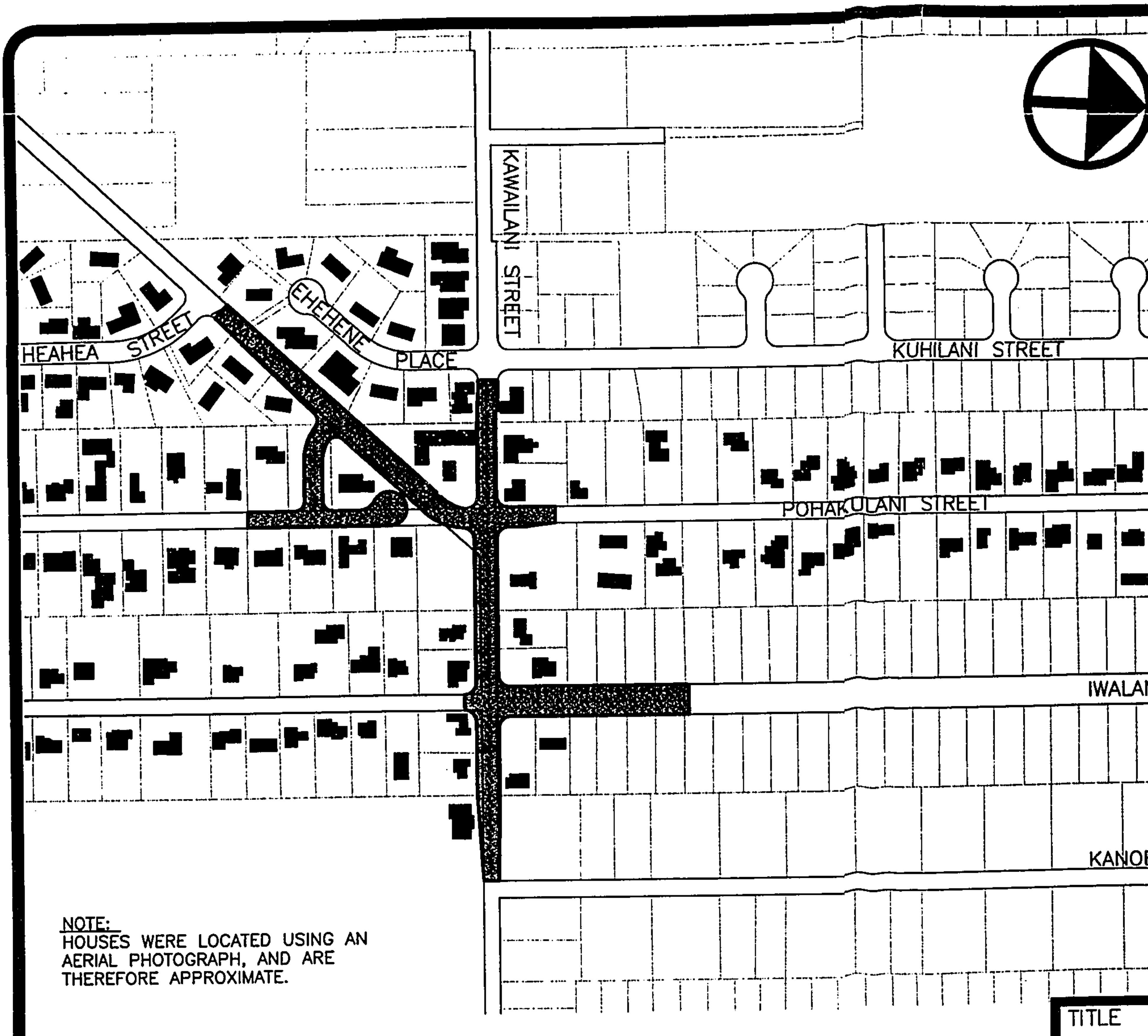
1. PROPERTY ACQUISITION IS RELATIVELY SMALL.
2. NO HOMES ARE TAKEN.
3. DOES NOT CHANGE THE AREAS THAT ARE PRESENTLY IMPACTED.
4. GIVES MORE ROOM BETWEEN THE AINAOLA/POHAKULANI T-INTERSECTION AND THE KAWAILANI/AINAOLA INTERSECTION.

DISADVANTAGES

1. THE KAWAILANI/AINAOLA AND THE KAWAILANI/IWALANI INTERSECTIONS REMAIN RELATIVELY CLOSE TOGETHER.
2. NEW GEOMETRY DOES LITTLE TO IMPROVE THE SITUATION OVER ALTERNATE #1 (POHAKULANI STREET IS NOT THE ROOT OF THE PROBLEM).



TITLE	ALTERNATE #2	Figure 7.
PROJECT	Kawailani/Iwalani/Ainaola Traffic Signal Improvements	DATE 5/20/98



NOTE:
HOUSES WERE LOCATED USING AN AERIAL PHOTOGRAPH, AND ARE THEREFORE APPROXIMATE.

ALTERNATE #2

SCALE: 1"=300'

C. Disadvantages

1. As discussed under Alternative 1, the intersection spacing on Kawailani Street would limit the available left turn storage lengths and may affect the efficiency of the traffic signal coordination.

2. One undeveloped lot would need to be acquired for the new road alignment.

IV. Alternative 3

A. Description

Alternative 3 is another variation of Alternative 1, in which access to the south leg of Pohakulani Street would be relocated to Heahea Street, which is located further south along Ainaola Drive. Figure 8 depicts Alternative 3.

B. Advantages

In addition to the advantages discussed under Alternative 1, relocating the Pohakulani Street access to the existing Heahea Street would eliminate an access point along Ainaola Drive.

C. Disadvantages

1. As discussed under Alternative 1, the intersection spacing on Kawailani Street would limit the available left turn storage lengths, and may affect the efficiency of the traffic signal coordination.

2. More extensive right-of-way acquisition would involve at least one home.

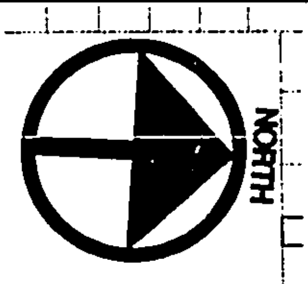
3. The traffic from Pohakulani Street would be diverted to Heahea Street, affecting residents in the immediate vicinity of the new intersection.

4. The increase in traffic from Pohakulani Street may impact the intersection of Heahea Street and Ainaola Drive.

V. Alternative 4

A. Description

Alternative 4 is yet another variation of Alternative 1 in the treatment of the south leg of Pohakulani Street. Under Alternative 4, Pohakulani Street would be relocated to Iwalani Street by constructing a new roadway through an improved residential lot. Figure 9 depicts Alternative 4.

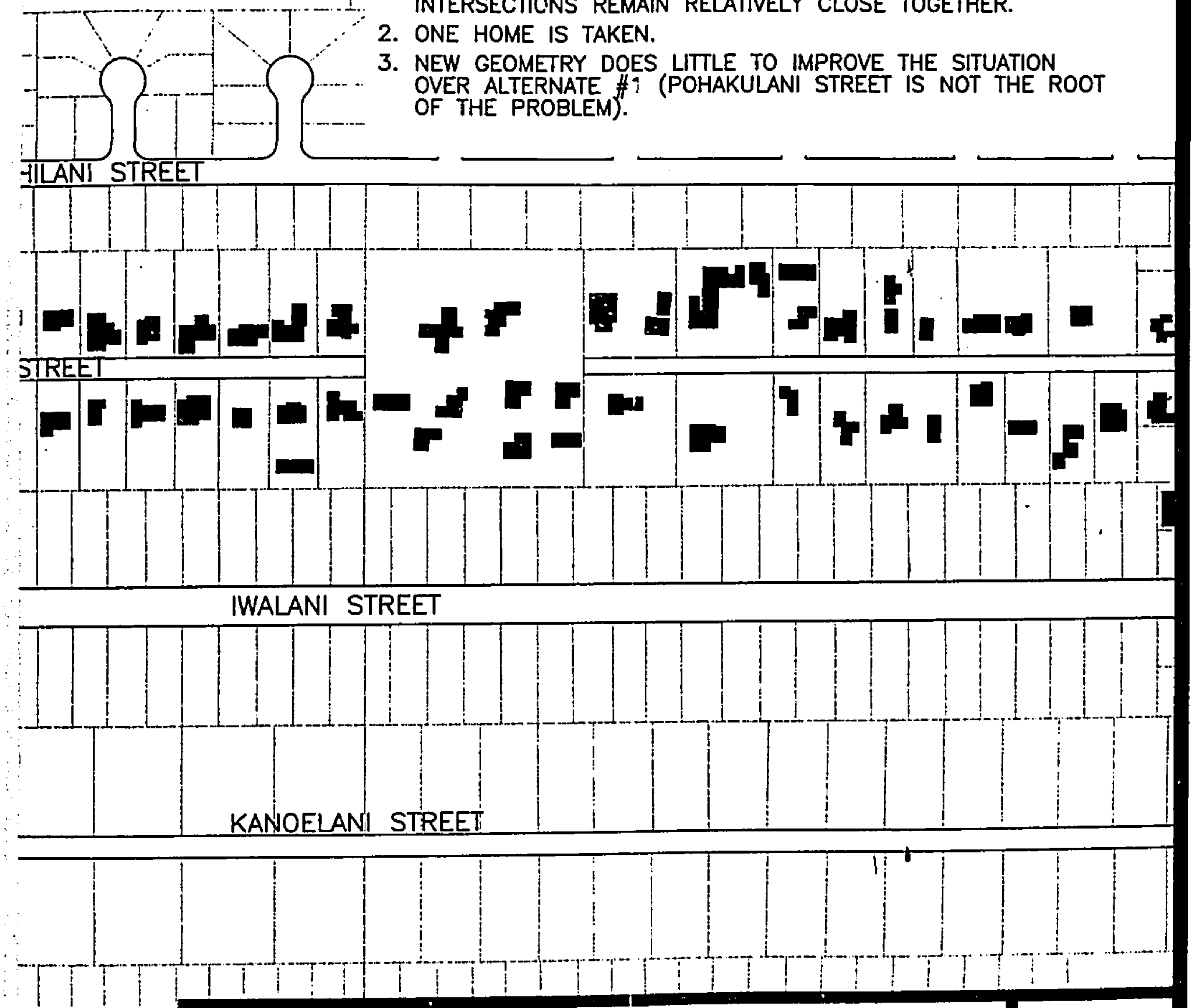


ADVANTAGES

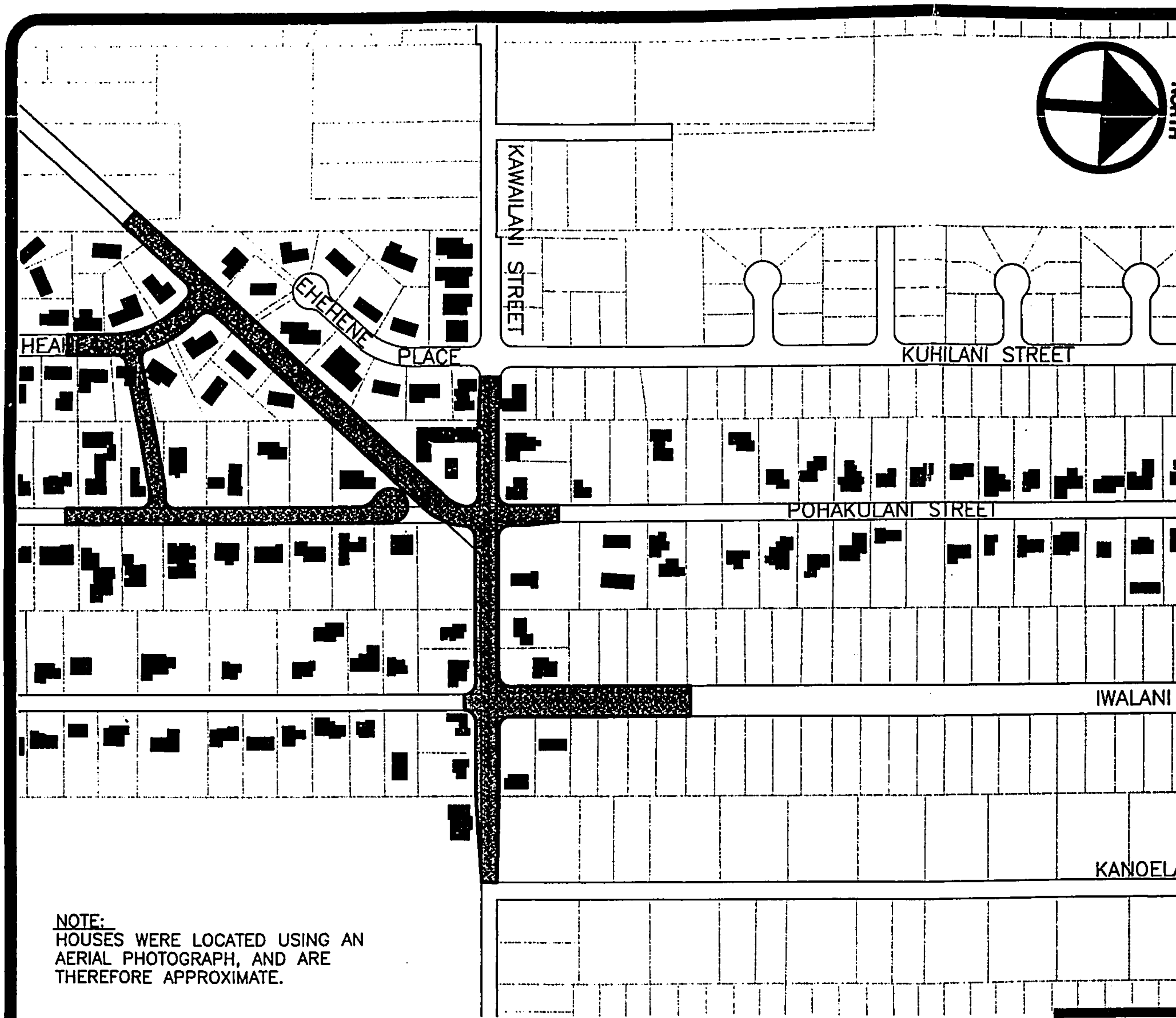
1. DOES NOT CHANGE THE AREAS THAT ARE PRESENTLY IMPACTED (EXCEPT FOT HEAHEA STREET).
2. ELIMINATES THE AINAOLA/POHAKULANI T-INTERSECTION (MAKES AINAOLA DRIVE A LITTLE SAFER).

DISADVANTAGES

1. THE KAWAILANI/AINAOLA AND THE KAWAILANI/IWALANI INTERSECTIONS REMAIN RELATIVELY CLOSE TOGETHER.
2. ONE HOME IS TAKEN.
3. NEW GEOMETRY DOES LITTLE TO IMPROVE THE SITUATION OVER ALTERNATE #1 (POHAKULANI STREET IS NOT THE ROOT OF THE PROBLEM).



TITLE **ALTERNATE #3**	**Figure 8.**
PROJECT **Kawailani/Iwalani/Ainaola Traffic Signal Improvements**	DATE 5/20/98



NOTE:
HOUSES WERE LOCATED USING AN AERIAL PHOTOGRAPH, AND ARE THEREFORE APPROXIMATE.

ALTERNATE #3

SCALE: 1"=300'

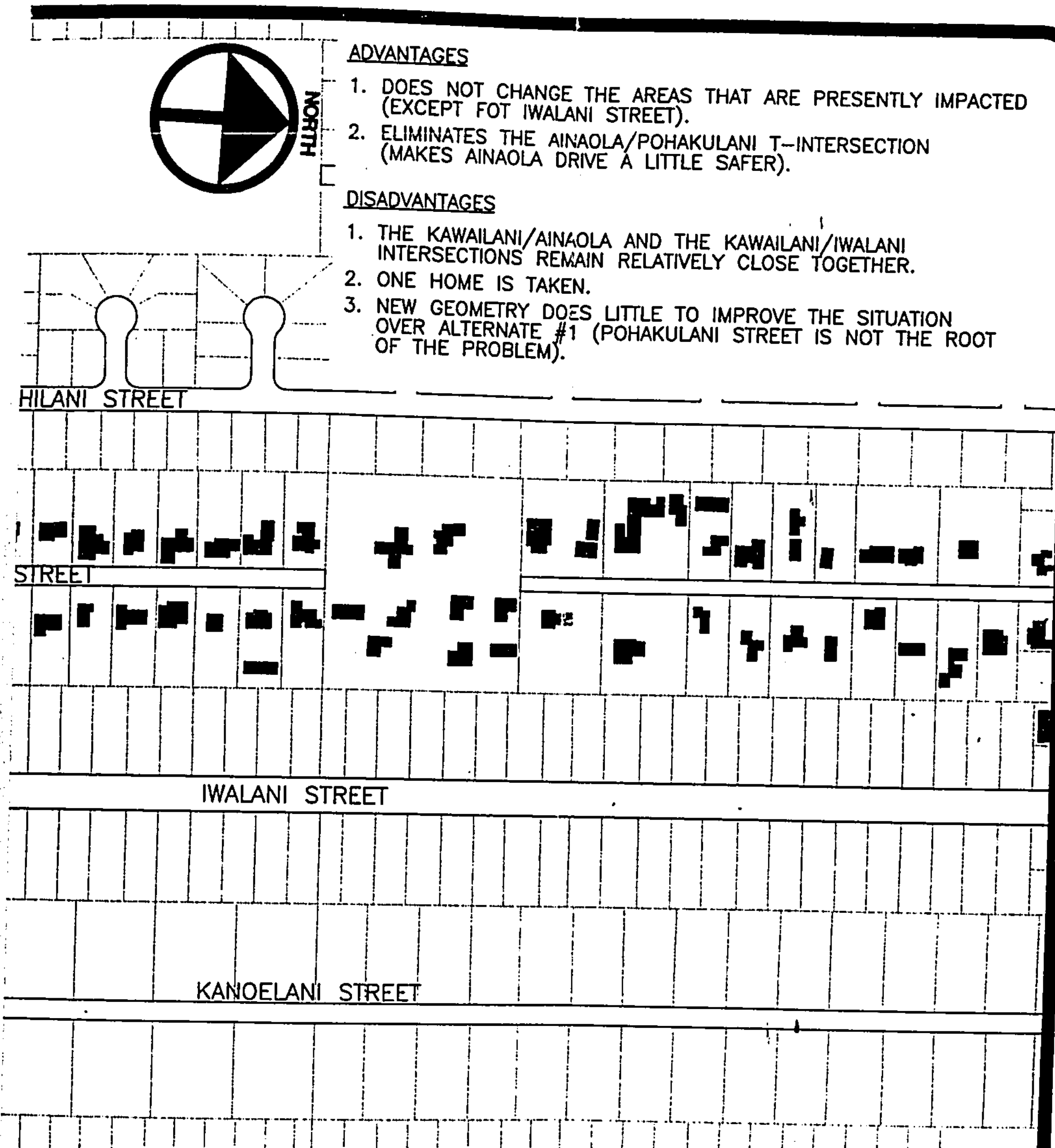
TITLE
PROJECT

ADVANTAGES

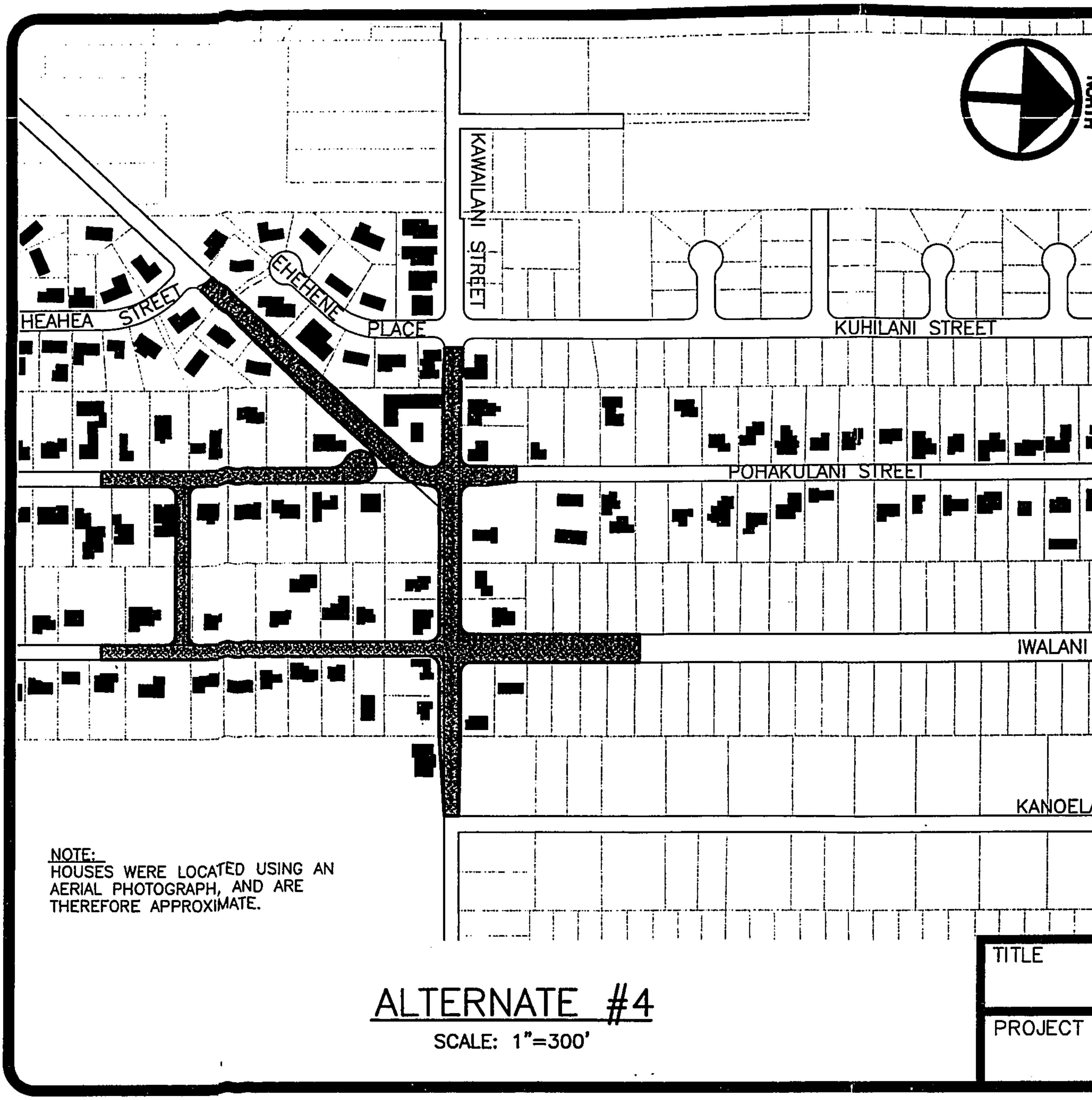
1. DOES NOT CHANGE THE AREAS THAT ARE PRESENTLY IMPACTED (EXCEPT FOT IWALANI STREET).
2. ELIMINATES THE AINAOLA/POHAKULANI T-INTERSECTION (MAKES AINAOLA DRIVE A LITTLE SAFER).

DISADVANTAGES

1. THE KAWAILANI/AINAOLA AND THE KAWAILANI/IWALANI INTERSECTIONS REMAIN RELATIVELY CLOSE TOGETHER.
2. ONE HOME IS TAKEN.
3. NEW GEOMETRY DOES LITTLE TO IMPROVE THE SITUATION OVER ALTERNATE #1 (POHAKULANI STREET IS NOT THE ROOT OF THE PROBLEM).



TITLE ALTERNATE #4	Figure 9.
PROJECT Kawailani/Iwalani/Ainaola Traffic Signal Improvements	DATE 5/20/98



ALTERNATE #4

SCALE: 1"=300'

B. Advantages

1. Alternative 4 would eliminate an access point along Ainaola Drive as in Alternative 3.

2. It would reduce the traffic along the heavily traveled Ainaola Drive and Kawailani Street by diverting Pohakulani Street traffic to the less utilized Iwalani Street.

3. It improves access to Pohakulani Street via relatively low volume Iwalani Street.

C. Disadvantages

1. The disadvantages discussed under Alternative 1 regarding the intersection spacing and traffic signal coordination would remain.

2. Extensive right-of-way acquisition would involve at least one home.

3. The diverted traffic from Pohakulani Street would affect residents along Iwalani Street between Kawailani Street and Haihai Street.

VI. Alternative 5

A. Description

Under Alternative 5, Ainaola Drive is proposed to be realigned to the existing Ehenene Place alignment, intersecting Kawailani Street opposite Kuhilani Street. The intersection of Kawailani Street and Ehenene Place/Kuhilani Street would be signalized, in addition to the Iwalani Street intersection. The Pohakulani Street intersection also may require traffic signalization. Figure 10 depicts Alternative 5.

B. Advantages

1. The intersection spacing on Kawailani Street, between the heavily utilized Ainaola Drive and Iwalani Street, would be increased almost two-fold, providing more left turn storage length between intersections.

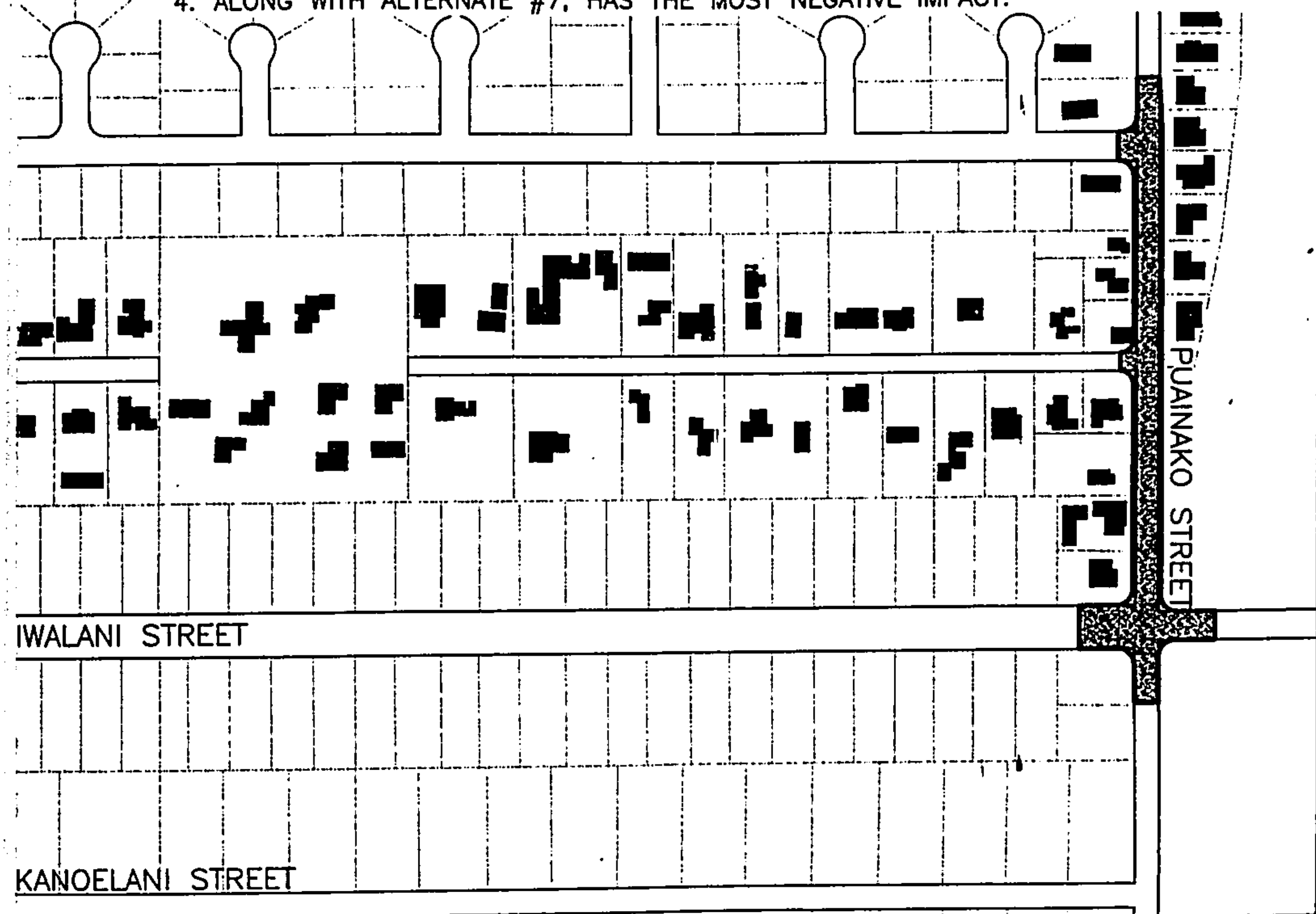
2. A portion of the Ainaola Drive traffic demand would be diverted to Kuhilani Street.

ADVANTAGES

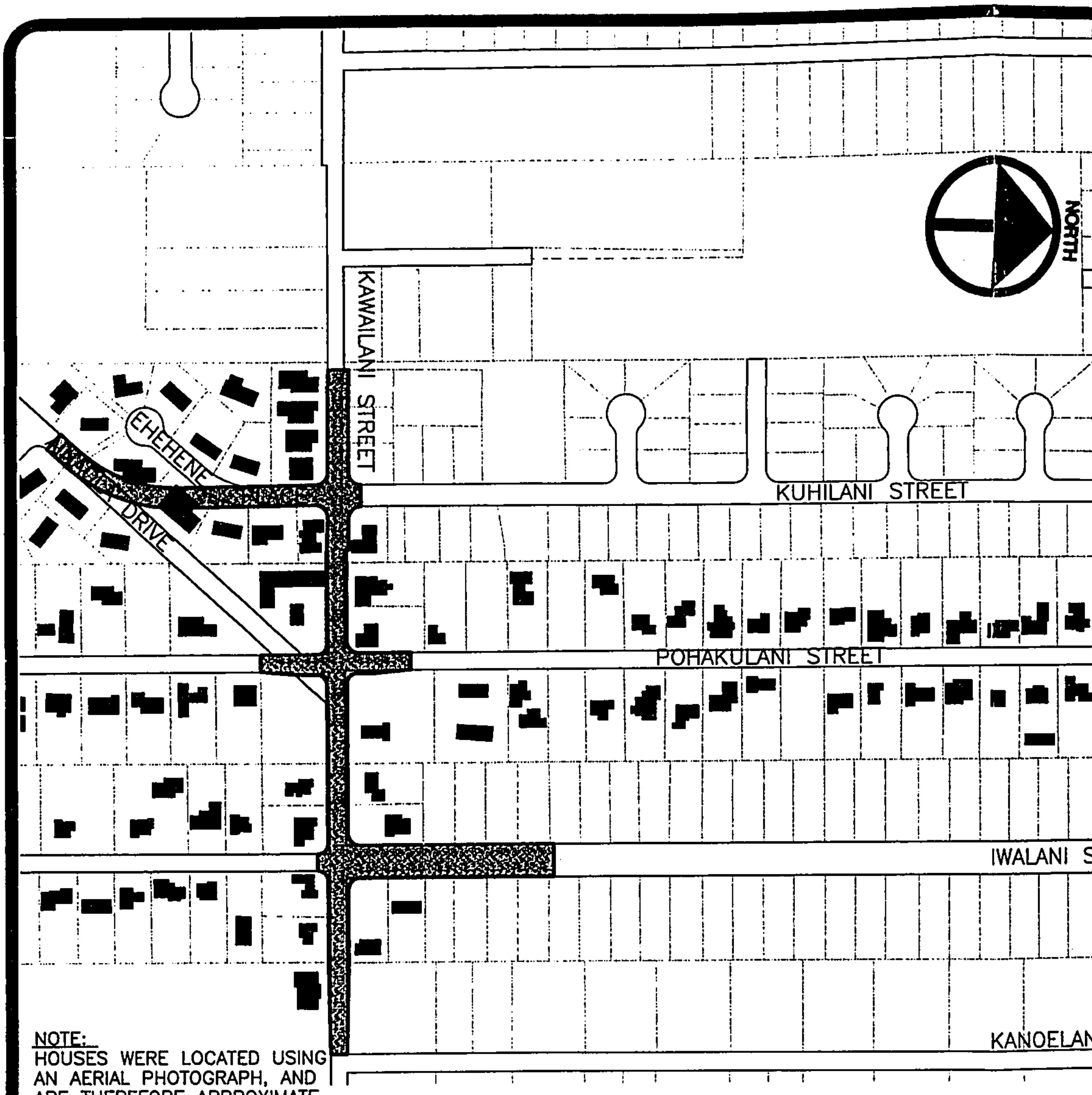
1. THE BEST GEOMETRIC SOLUTION.
2. PHYSICALLY KUHILANI STREET IS WIDE ENOUGH AND PROBABLY DOES NOT NEED IMPROVEMENTS.
3. MOVES THE KAWAILANI/AINAOLA AND KAWAILANI/IWALANI INTERSECTIONS FURTHER APART.
4. CONGESTION IN THE KAWAILANI/IWALANI/AINAOLA AREA WILL BE GREATLY IMPROVED.

DISADVANTAGES

1. THE TRAFFIC PROBLEM WILL BE MOVED TO THE PUAINAKO/KUHILANI/IWALANI AREA.
2. TWO HOMES ARE TAKEN.
3. KUHILANI STREET WILL TURN INTO A MAJOR THOROUGHFARE, THEREFORE THE RESIDENTS ALONG KUHILANI STREET AND ALL SIDE STREETS WILL BE IMPACTED TREMENDOUSLY.
4. ALONG WITH ALTERNATE #7, HAS THE MOST NEGATIVE IMPACT.



TITLE ALTERNATE #5	Figure 10.
PROJECT Kawailani/Iwalani/Ainaola Traffic Signal Improvements	DATE 5/20/98



ADVANTAGES

1. THE BEST
2. PHYSICALLY
NEED IMPR
3. MOVES THE
APART.
4. CONGESTIO

DISADVANTAGE

1. THE TRAFF
2. TWO HOME
3. KUHILANI S
RESIDENTS
TREMENDOU
4. ALONG WIT

NOTE:
HOUSES WERE LOCATED USING AN AERIAL PHOTOGRAPH, AND ARE THEREFORE APPROXIMATE.

ALTERNATE #5

SCALE: 1"=300'

TITLE

PROJECT

C. Disadvantages

1. The intersection of Pohakulani Street and Kawailani Street also may require traffic signalization.
2. Right-of-way acquisition would involve two homes on Ehenene Place.
3. Residents along Ehenene Place would be impacted by Ainaola Drive traffic.
4. Residents along Kuhilani Street would be impacted by Ainaola Drive traffic, diverted from Iwalani Street.

VII. Alternative 6

A. Description

Alternative 6 is most unconventional departure from the other alternatives. This alternative would involve an updated version of an "Old World" intersection: the "modern roundabout", also known as a "traffic circle". A roundabout is an at-grade intersection, where two or more roadways intersect at a wide, one-way, circular roadway containing an island in the center of the intersection. The roadway approaches are widened to provide for multi-lane entries to the roundabout. Traffic on all approaches must yield to traffic on the roundabout, turn right to enter the circular roadway, and turn right again to exit at the appropriate leg of the intersection.

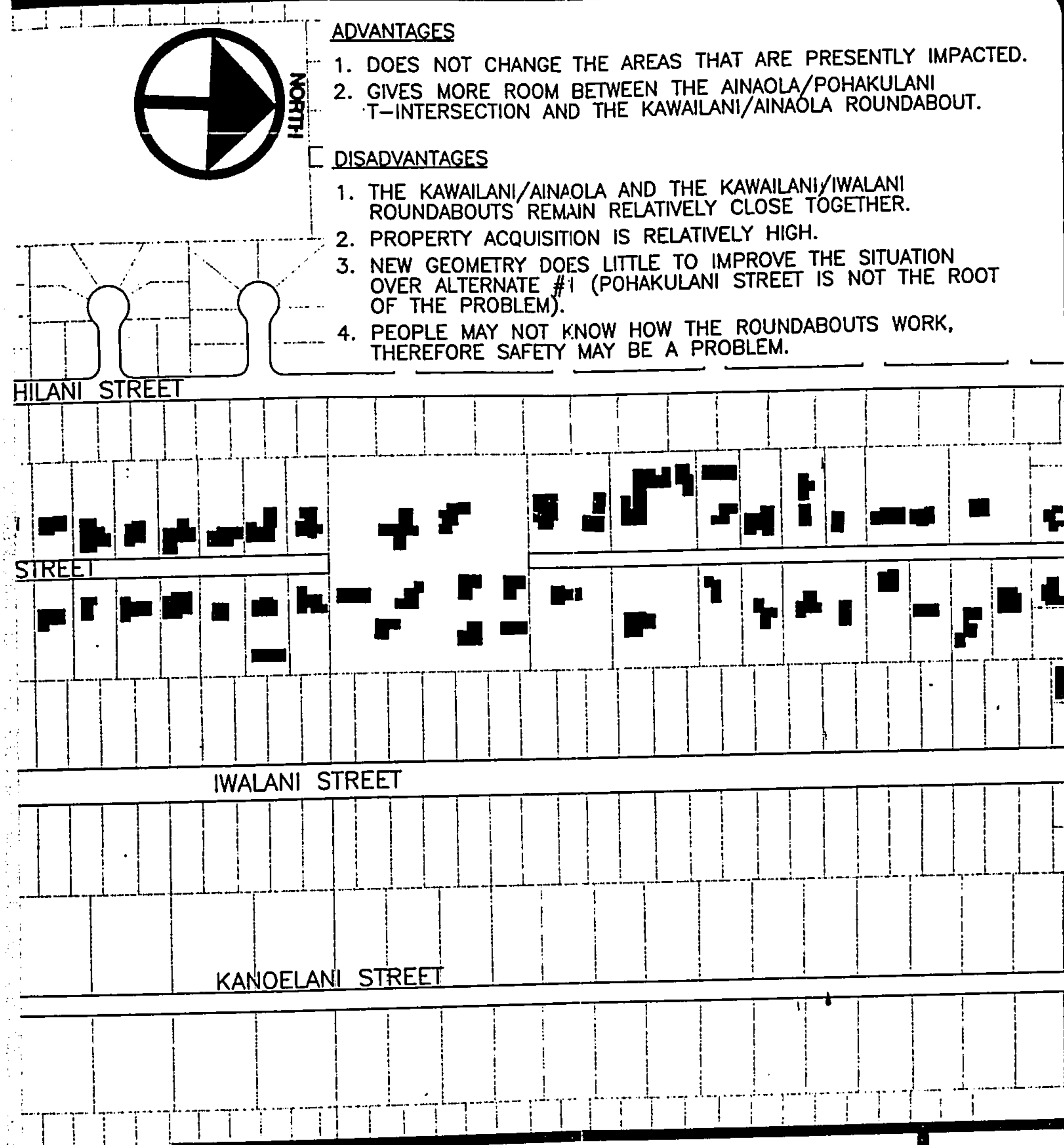
The modern roundabout has experienced a revival of sorts on the mainland United States. A modern roundabout has yet to be implemented in the State of Hawaii. However, it is seriously being considered as an alternative to traffic signals on Oahu and Molokai by the responsible State and County transportation agencies. Figure 11 depicts Alternative 6. Examples of modern roundabouts, depicted on Figure 12, are taken from "Roundabout Design Guidelines", Ourston & Doctors, 1995.

ADVANTAGES

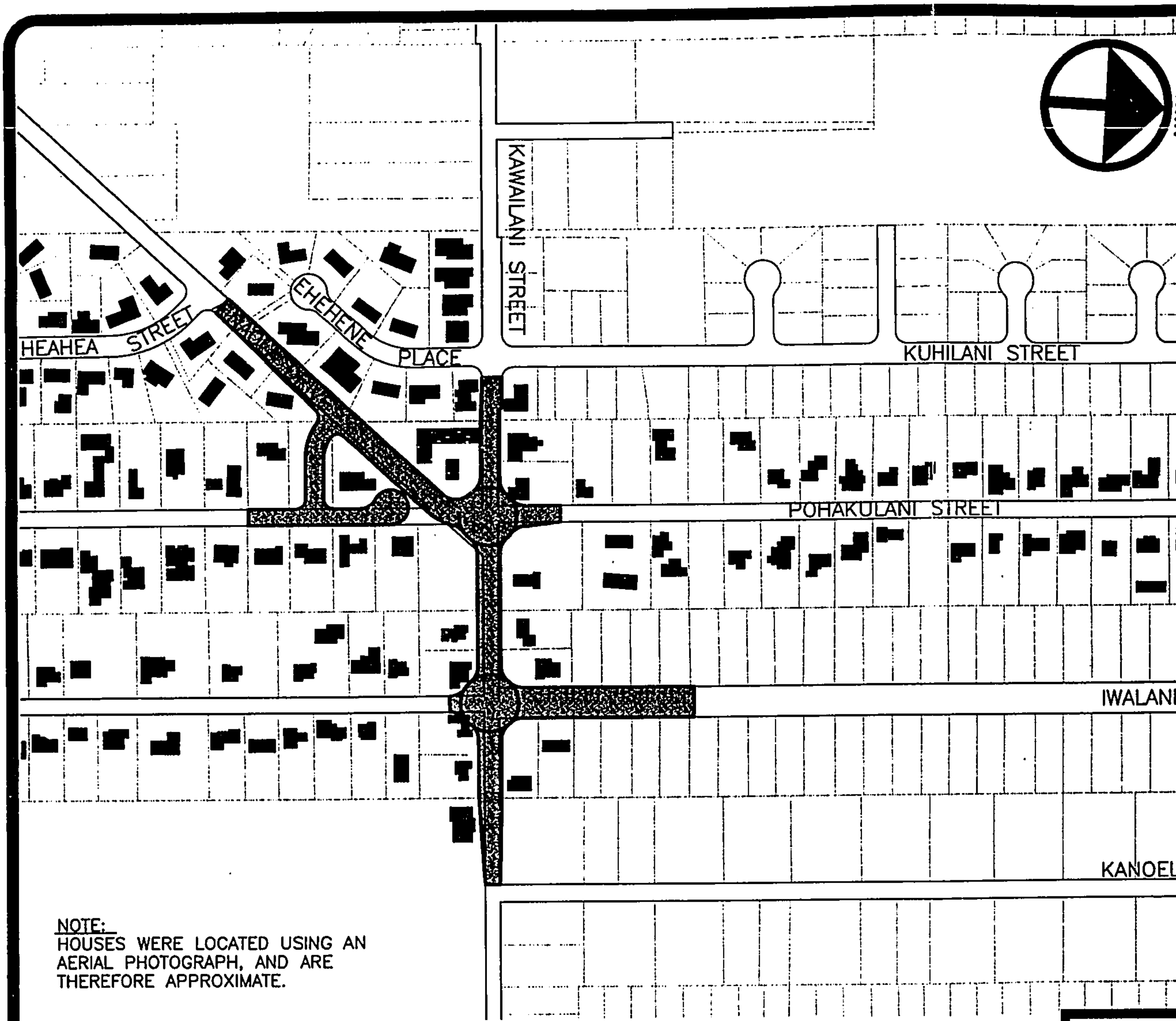
1. DOES NOT CHANGE THE AREAS THAT ARE PRESENTLY IMPACTED.
2. GIVES MORE ROOM BETWEEN THE AINAOLA/POHAKULANI T-INTERSECTION AND THE KAWAILANI/AINAOLA ROUNDABOUT.

DISADVANTAGES

1. THE KAWAILANI/AINAOLA AND THE KAWAILANI/IWALANI ROUNDABOUTS REMAIN RELATIVELY CLOSE TOGETHER.
2. PROPERTY ACQUISITION IS RELATIVELY HIGH.
3. NEW GEOMETRY DOES LITTLE TO IMPROVE THE SITUATION OVER ALTERNATE #1 (POHAKULANI STREET IS NOT THE ROOT OF THE PROBLEM).
4. PEOPLE MAY NOT KNOW HOW THE ROUNDABOUTS WORK, THEREFORE SAFETY MAY BE A PROBLEM.



TITLE ALTERNATE #6	Figure 11.
PROJECT Kawailani/Iwalani/Ainaola Traffic Signal Improvements	DATE 5/20/98



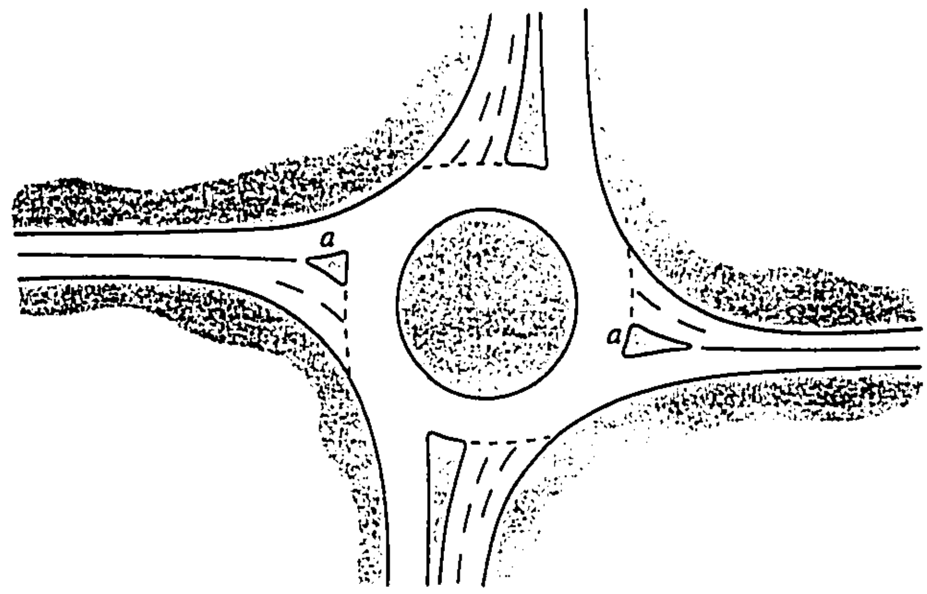
ALTERNATE #6

SCALE: 1"=300'

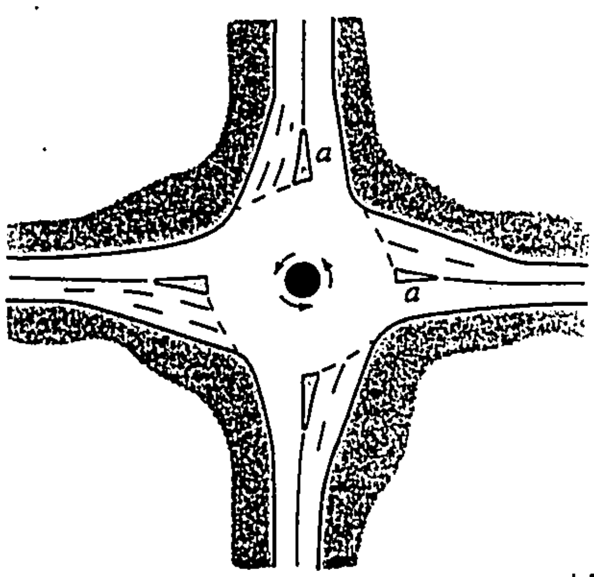
TITLE

PROJECT

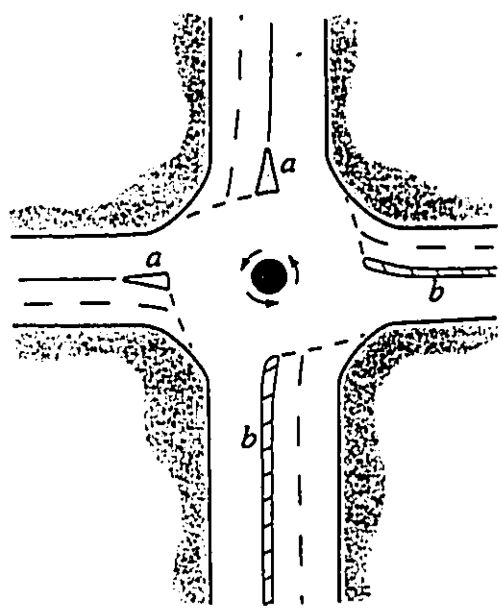
Normal Roundabout



Mini-roundabout: 4-Leg Intersection With Flared Approaches



Mini-roundabout: 4-Leg Intersection Without Flared Approaches



Ref.: Roundabout Design Guidelines (Ourston & Doctors)

LEGEND

a Curbed splitter island.
b Painted splitter island.

Figure 12. Examples of Modern Roundabouts

B. Advantages

1. Studies have shown that the modern roundabout can be superior to a signalized intersection in terms of carrying capacity, particularly where two or more roadways are heavily traveled ("Roundabout Revolution Comes to America", Leif Ourston, 1992).

2. Studies have shown that the modern roundabout can be superior to a signalized intersection in terms of traffic safety, if properly utilized (Ourston).

3. The number of lanes required along Kawailani Street may be reduced, which would decrease the acquisition of additional right-of-way.

4. Right-of-way acquisition for auxiliary lanes on Iwalani Street and Ainaola Drive may be reduced.

5. Vehicular emissions may be reduced as compared to traffic signal controls.

6. Overall traffic delays may be reduced as compared to traffic signal controls.

7. The roundabout would be virtually maintenance-free as compared to a traffic signal system.

8. The roundabout may be more energy efficient relative to vehicle fuel.

C. Disadvantages

1. Negotiating the roundabout would require higher levels of driver attention and skill.

2. Right-of-way acquisitions would be higher at the corners of the intersections to accommodate the circular roadway.

3. The modern roundabout is untested in the State of Hawaii.

VIII. Alternative 7

A. Description

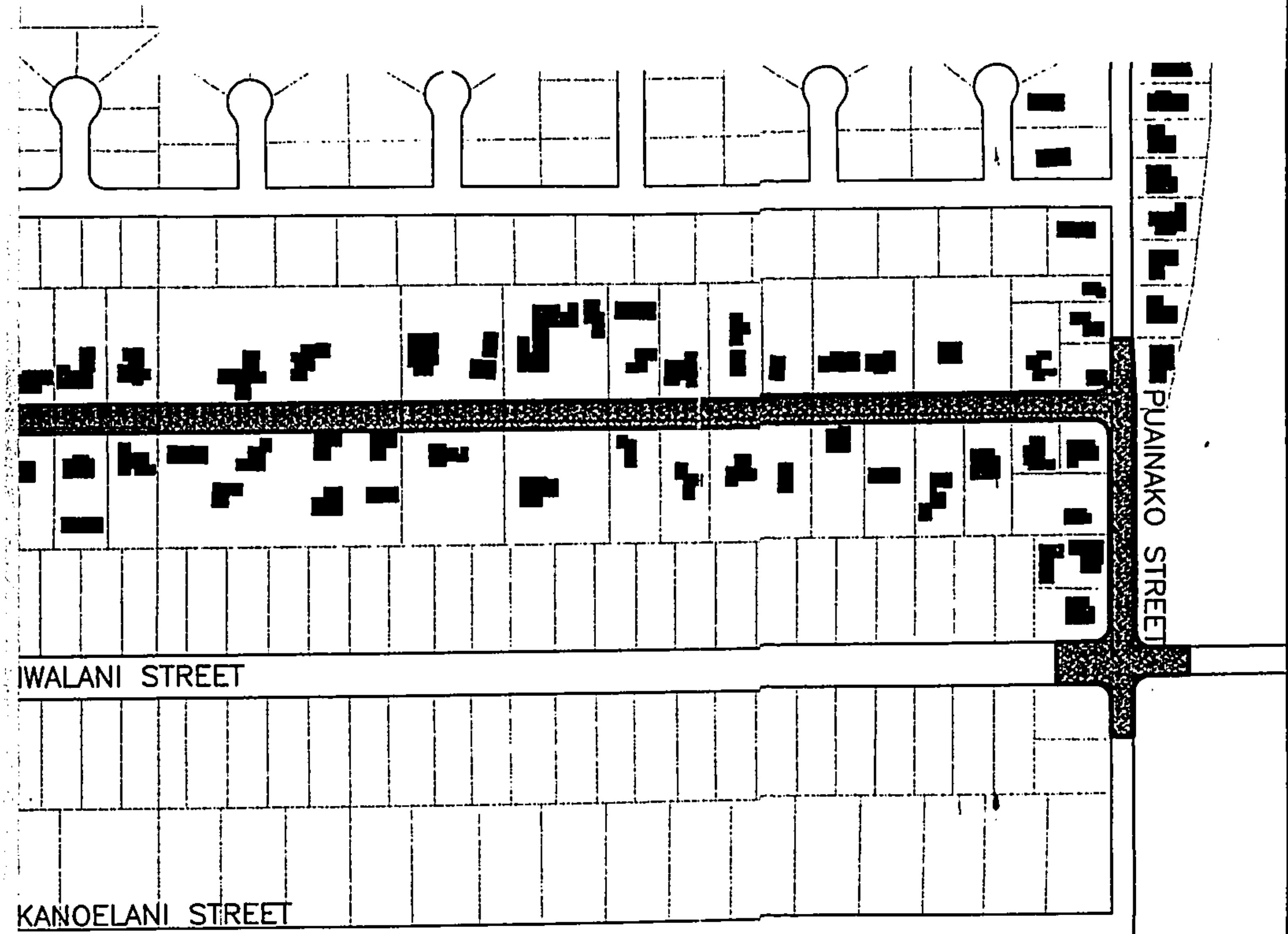
Alternative 7 is identical to Alternative 1 except it proposes to upgrade Pohakulani Street between Kawailani Street and Puainako Street to divert traffic from Iwalani Street. Figure 13 depicts Alternative 7.

ADVANTAGES

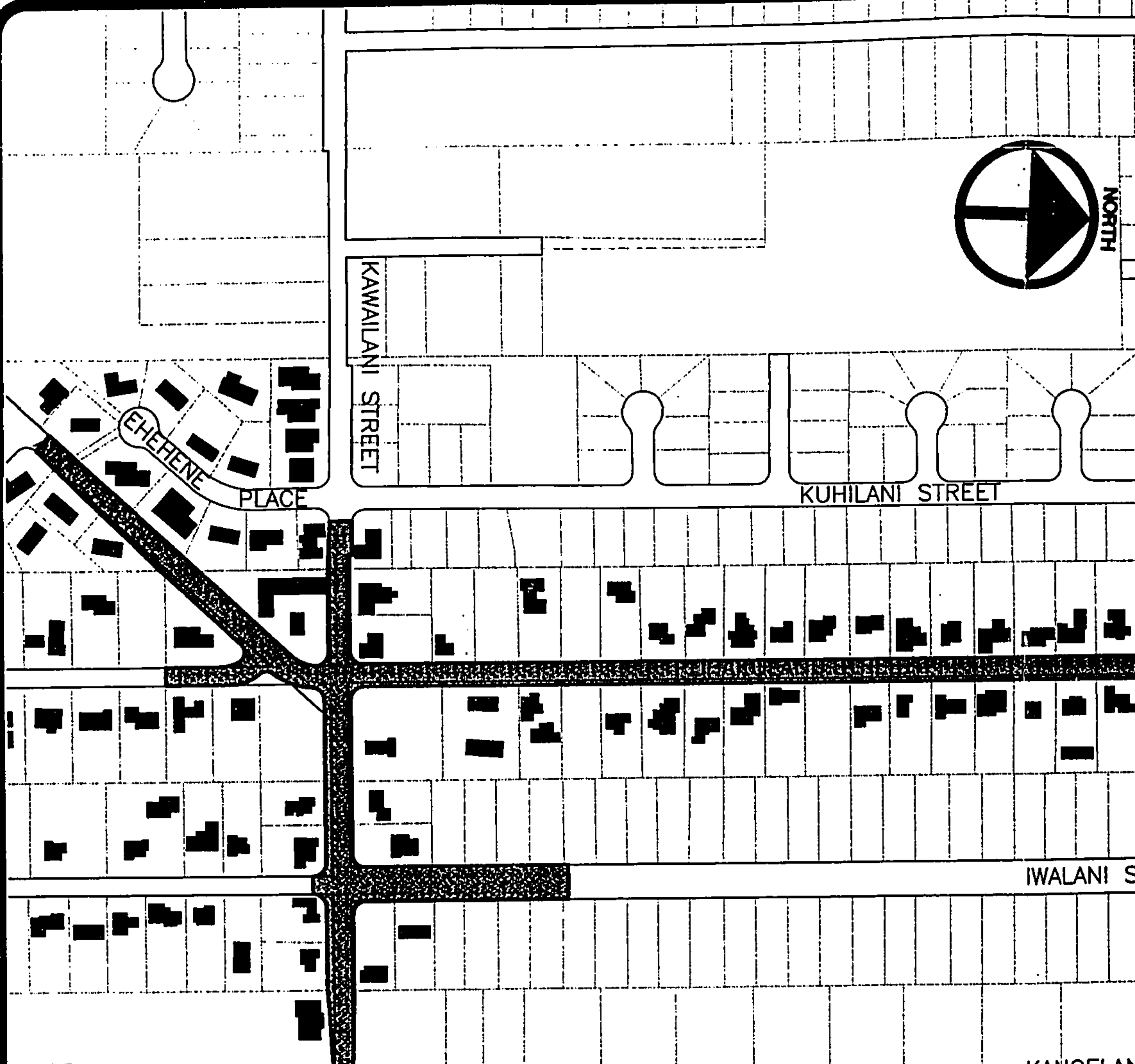
1. NO HOMES ARE TAKEN.
2. WILL REDUCE THE CONGESTION AT THE KAWAILANI/IWALANI INTERSECTION.

DISADVANTAGES

1. THE TRAFFIC PROBLEM WILL BE MOVED TO THE PUAINAKO/POHAKULANI/IWALANI AREA.
2. POHAKULANI STREET WILL TURN INTO A MAJOR THOROUGHFARE, THEREFORE THE RESIDENTS ALONG POHAKULANI STREET WILL BE IMPACTED TREMENDOUSLY.
3. ALONG WITH ALTERNATE #5, HAS THE MOST NEGATIVE IMPACT.
4. WILL BE THE MOST EXPENSIVE.



TITLE	ALTERNATE #7	Figure 13.
PROJECT	Kawailani/Iwalani/Ainaola Traffic Signal Improvements	DATE 5/20/98



ADVANTAGES

1. NO HOMES
2. WILL REDUC

DISADVANTAGES

1. THE TRAFFIC
2. POHAKULANI RESIDENTS
3. ALONG WITH
4. WILL BE THE

NOTE:
HOUSES WERE LOCATED USING AN AERIAL PHOTOGRAPH, AND ARE THEREFORE APPROXIMATE.

ALTERNATE #7

SCALE: 1"=300'

TITLE

PROJECT

B. Advantages

In addition to the advantages listed above under Alternative 1, Alternative 7 potentially could reduce traffic on Kawailani Street and on Iwalani Street.

C. Disadvantages

1. The realignment of the south leg of Pohakulani Street to Ainaola Drive would create a new unsignalized intersection adjacent to the proposed traffic signalized intersection of Kawailani Street and Ainaola Drive/Pohakulani Street.
2. The cumulative acquisition of right-of-way on Pohakulani Street would be significant.
3. It would divert traffic to Puainako Street.
4. The traffic diverted from Iwalani Street would impact the residents along Pohakulani Street.

IX. Summary

Table 1 summarizes the ratings of seven alternatives from 1 through 10 (1 being the highest relative to the other alternatives).

Table 1. Evaluation of Alternatives

Criteria	Alternatives						
	1	2	3	4	5	6	7
Property Acquisition Costs	1	2	7	8	10	9	4
Design/Construction Costs	1	2	6	7	10	7	9
Design	6	5	4	3	1	10	2
Traffic Operations	6	5	4	3	1	10	2
Condemnation of Homes	1	2	5	7	10	3	9
Noise/Air Quality Impacts	1	2	4	6	8	3	9
Overall Rankings	1	2	7	8	8	9	9
Note: Ratings developed by Okahara & Associates							

X. Preferred Alternatives

A. General

Alternatives 1 and 2 have been selected for further analysis based upon the previous discussion. Alternatives 1 and 2 have been further expanded to include two schemes (A and B) for each alternative, for a total of four (4) combinations of alternatives and schemes. Schemes A and B differ in the number of lanes, proposed on Kawailani Street between Ainaola Drive/Pohakulani Street and Iwalani Street. In both Schemes A and B, an exclusive left turn lane would be provided on Kawailani Street at the Wiki Wiki Mart driveway.

As discussed previously, the difference between Alternatives 1 and 2 is how access to the south leg of Pohakulani Street would be improved. The treatment of Pohakulani Street does not significantly affect the traffic operations of Schemes A or B, since the traffic volumes on Pohakulani Street are relatively low. Therefore, the traffic impact analysis, contained herein, was performed on Schemes A and B.

B. Scheme A

Scheme A would provide a four (4) lane section on Kawailani Street, between Iwalani Street and Ainaola Drive/Pohakulani Street. The four lane widening would provide one through lane and an exclusive left turn lane in both directions on Kawailani Street at Ainaola Drive/Pohakulani Street. Ainaola Drive would be realigned to intersect Kawailani Street at a conventional right angle intersection.

The four lane widening of Kawailani Street at Iwalani Street would provide an exclusive left turn lane and a shared through/right turn lane in the westbound direction, and an exclusive left turn lane, a through only lane, and a shared through/right turn lane in the eastbound direction. The north leg of Iwalani Street would be widened to provide an exclusive right turn lane in the southbound direction. Alternative 1A is depicted on Figure 14.

C. Scheme B

Scheme B would include a five (5) lane section on Kawailani Street, between Iwalani Street and Ainaola Drive/Pohakulani Street. The additional lane on Kawailani Street would provide for double left turn lanes on westbound Kawailani Street at Ainaola Drive. Ainaola Drive also would require widening to provide for two southwest bound lanes to accommodate the double left turn movement. The

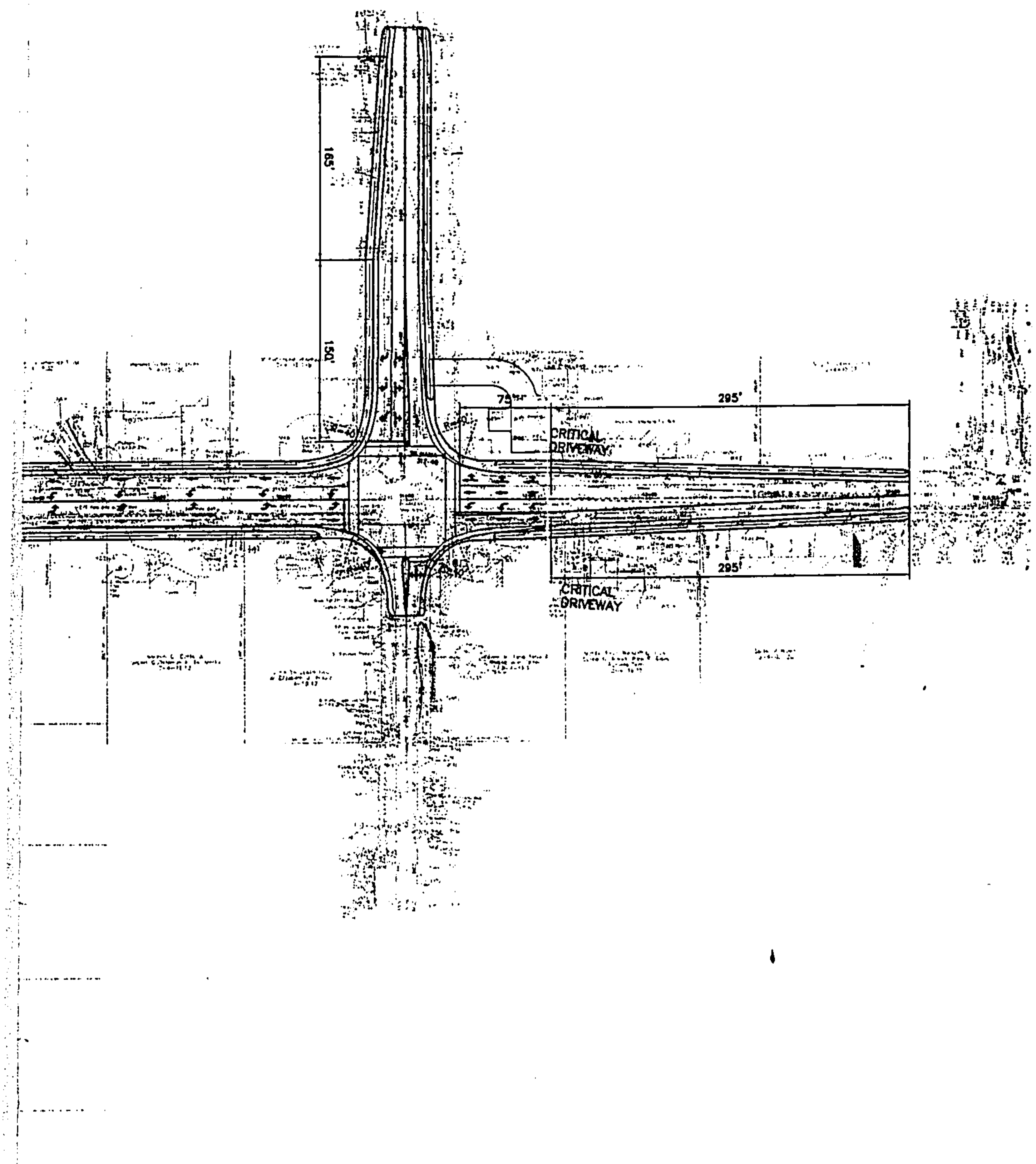
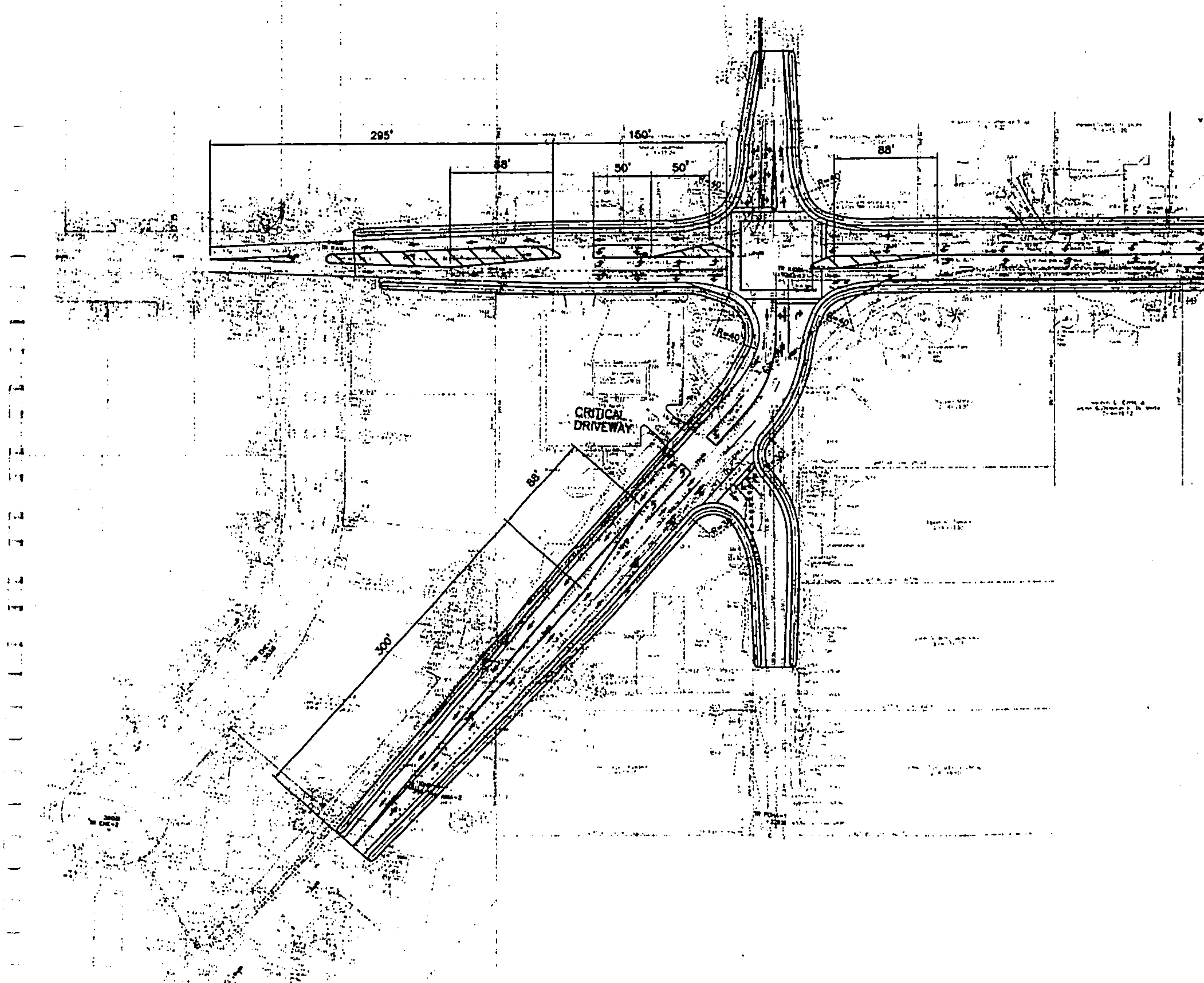


Figure 14. Alternative 1A


295'
150'
88'
50'
50'
88'
CRITICAL
DRIVEWAY
88'
300'

two lanes on Ainaola Drive would be extended to allow traffic to merge into one lane. In addition to the double left turn lanes, the eastbound approach of Kawailani Street at Ainaola Drive/Pohakulani Street would include a shared through/right turn lane. The westbound approach of Kawailani Street would include an exclusive left turn lane and a shared through/right turn lane. As in Scheme A, Ainaola Drive would provide an exclusive right turn lane and shared through/left turn lanes on its approaches. The right turn movement from Ainaola Drive would turn into a separate lane, without conflicting with eastbound traffic on Kawailani Street.

The five-lane widening of Kawailani Street would provide an exclusive left turn lane, a through only lane, and a shared through/right turn lane in the eastbound direction at Iwalani Street. The two through lanes on Kawailani Street would merge into one lane east of Kanoelani Street. In the westbound direction, Kawailani Street would provide an exclusive left turn lane and a shared through/right turn lane. The north leg of Iwalani Street would be widened to provide an exclusive right turn lane in the southbound direction. Similar to Ainaola Drive, the right turn movement from southbound Iwalani Street would turn into a separate lane, without conflicting with westbound traffic on Kawailani Street.

The center lane on Kawailani Street, between Ainaola Drive/Pohakulani Street and Iwalani Street, is proposed as a two-way left turn lane. The two-way left turn lane becomes an exclusive left turn lane on the westbound approach of Ainaola Drive/Pohakulani Street and the eastbound approach at Iwalani Street. The two-way left turn lane would provide the flexibility for left turn storage in both directions during the peak periods of traffic. During the AM peak period of traffic, the heavy left turn traffic demand from eastbound Kawailani Street to northbound Iwalani Street would utilize the storage capacity of the two-way left turn lane. During the PM peak period, the heavy left turn traffic demand from westbound Kawailani Street to southwest bound Ainaola Drive can utilize the storage capacity of the two-way left turn lane. The two-way left turn lane also would facilitate left turn movements to and from driveways along Kawailani Street. Figure 15 depicts Alternative 1B.

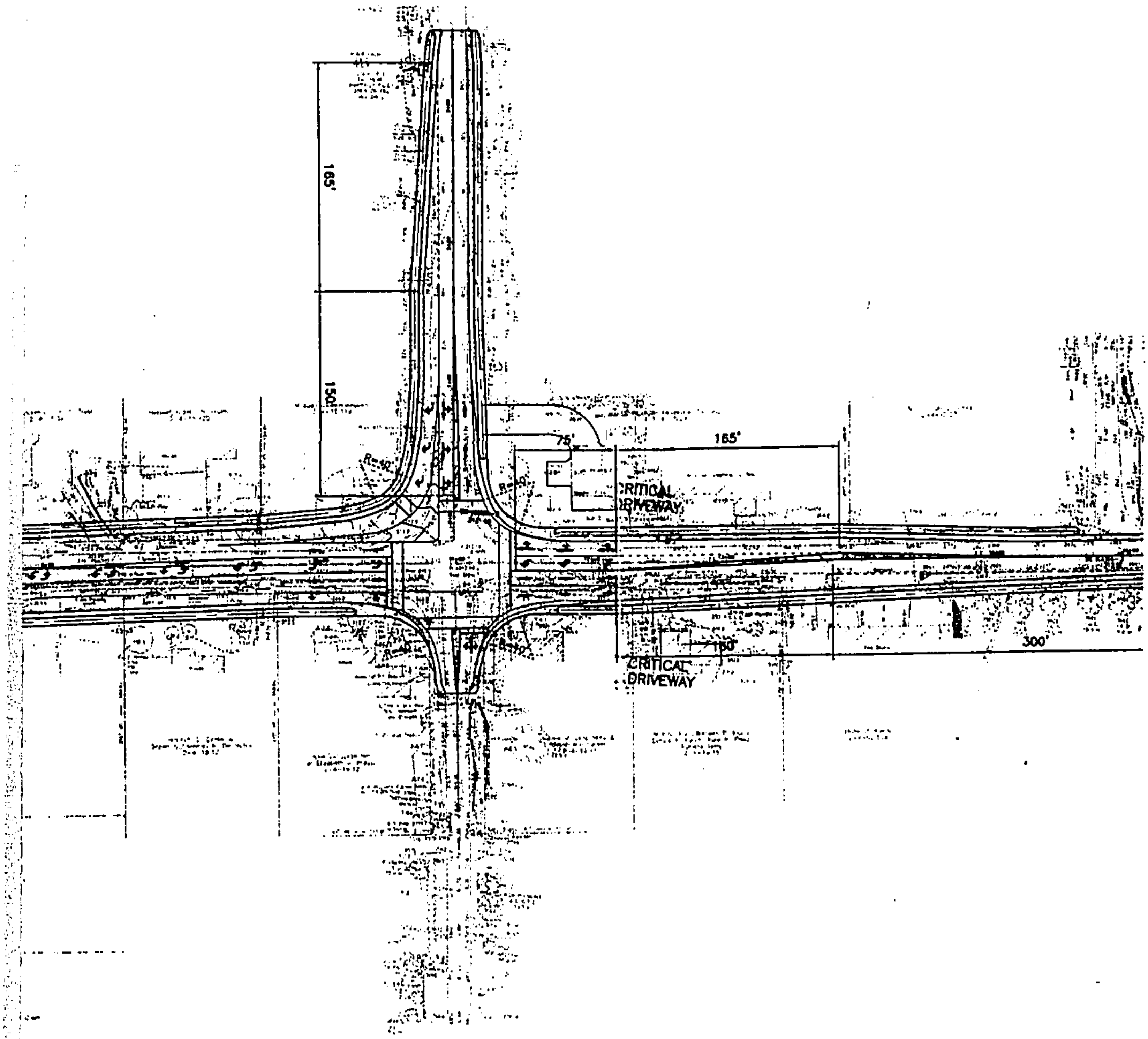
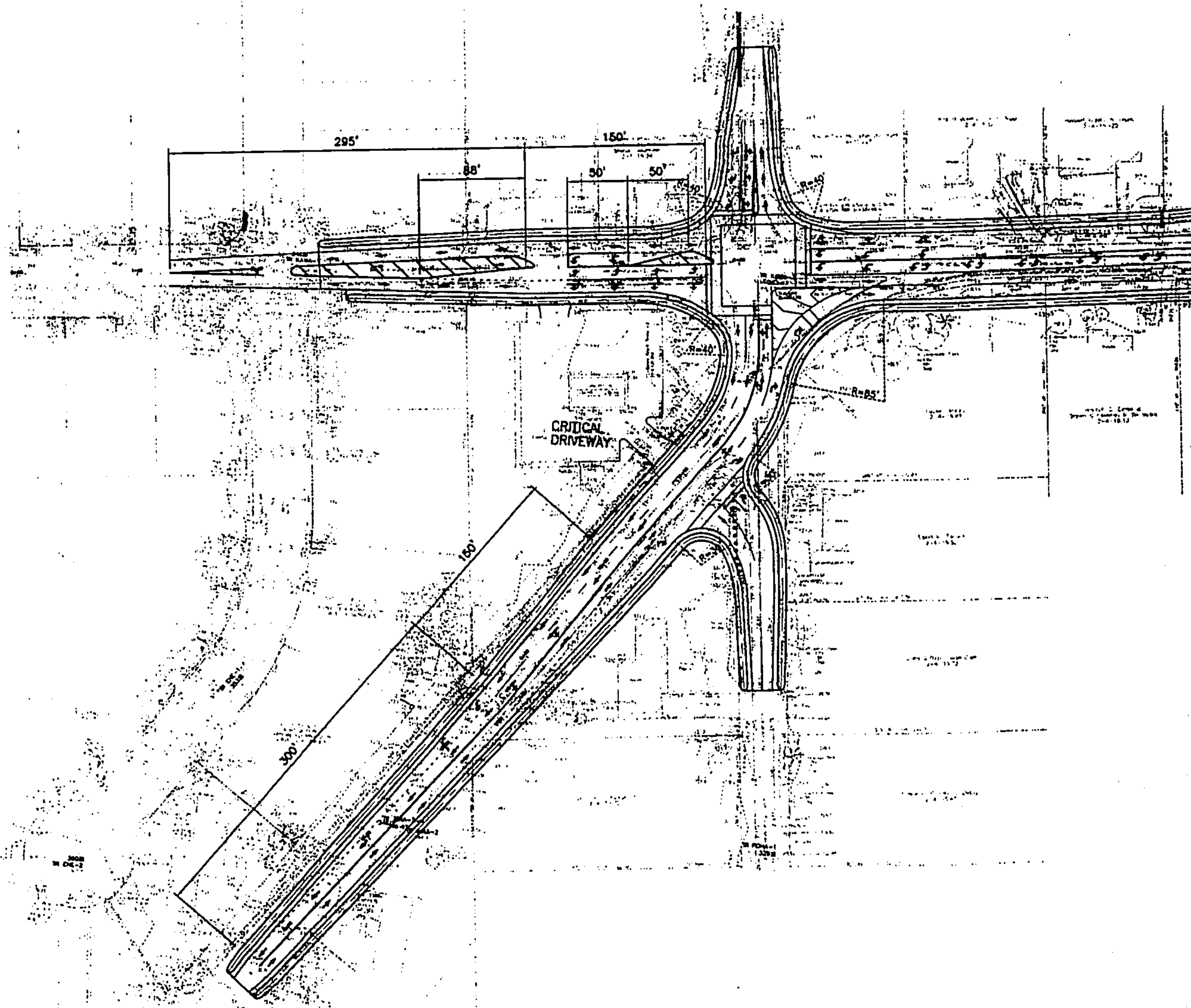


Figure 15. Alternative 1B


295'
150'
88'
50'
50'
R=40'
R=85'
CRITICAL DRIVEWAY
150'
300'

Chapter 5. Traffic Impact Analysis

I. General

The Highway Capacity Manual methodology, used in the study, analyzes isolated signalized intersections. Because of the proximity of the study intersections, traffic operations at one intersection may affect the other. Queuing between the study intersections may continue to be problematic. The traffic signal coordination between can facilitate the east-west movements on Kawailani Street or the north-south movements between Ainaola Drive and Iwalani Street, as well as reduce the queuing between intersections. The coordination between the Ainaola Drive/Pohakulani Street and the Iwalani Street intersections should initially be set so that the Kawailani Street green phases would be occur simultaneously at both intersections. Field adjustments can then be made by setting offsets between the adjacent traffic signals to facilitate a traffic movement in a particular direction at a given time of day. In any case a uniform traffic signal cycle length must be selected between the two intersections at any given time of day.

The traffic signal cycle length affects the queuing and storage requirements of a turning lane. Shorter cycle lengths service turning movements more often, resulting in shorter queue lengths. Longer cycle lengths increase intersection capacity by reducing the "lost" time between phases, i.e., the start-up time it takes for a stopped queue to begin moving through the intersection and time needed for vehicles to clear the intersection between conflicting phases. An "optimum" traffic signal cycle length can be selected, based upon the intersection spacing, to facilitate a two-way directional flow of traffic. The minimum traffic signal cycle lengths were selected in this traffic impact analysis to minimize the queuing between intersections, while maintaining acceptable Levels of Service.

Queuing analysis defines queue length in stochastic terms. A 95 percentile queue length of 300 feet indicates that traffic queue lengths of up to 300 feet can be expected to occur about 95 percent of the time, i.e., queue lengths are expected to exceed 300 feet about 5 percent of the time. The 95 percentile design queue length is considered desirable, while the 90 percentile queue length is considered the minimum design criteria. Because of the close spacing of the study intersections, the minimum 90 percentile queue was used as the basis of design.

II. Scheme A

A. Year 2018 AM Peak Hour Traffic With Scheme A

Under the proposed Scheme A traffic improvements, the study intersections would operate at satisfactory Levels of Service, i.e., LOS "C" or better during the AM peak hour of traffic. A sixty (60) second traffic signal cycle was used in the AM peak hour analysis of Scheme A. The Year 2018 AM peak hour traffic with Scheme A is depicted on Figure 16.

During the AM peak hour of traffic, the projected left turn demand on eastbound Kawailani Street at Iwalani Street would queue up to 275 feet. The 90 percentile left turn queue is expected to be accommodated by the proposed 290± foot storage lane on eastbound Kawailani Street at Iwalani Street. The projected left turn demand on westbound Kawailani Street at Ainaola Drive/Pohakulani Street is expected to queue up to 150 feet. The proposed 400± foot storage lane is expected to be more than adequate to accommodate the 90 percentile left turn queue on westbound Kawailani Street.

B. Year 2018 PM Peak Hour Traffic With Scheme A

During the PM peak hour of traffic with Scheme A improvements, the study intersections are expected to continue to operate at LOS "C" or better. A traffic signal cycle length of 60 seconds was again used in the analysis to minimize the queuing between intersections. Figure 17 depicts the Year 2018 PM peak hour traffic with Scheme A.

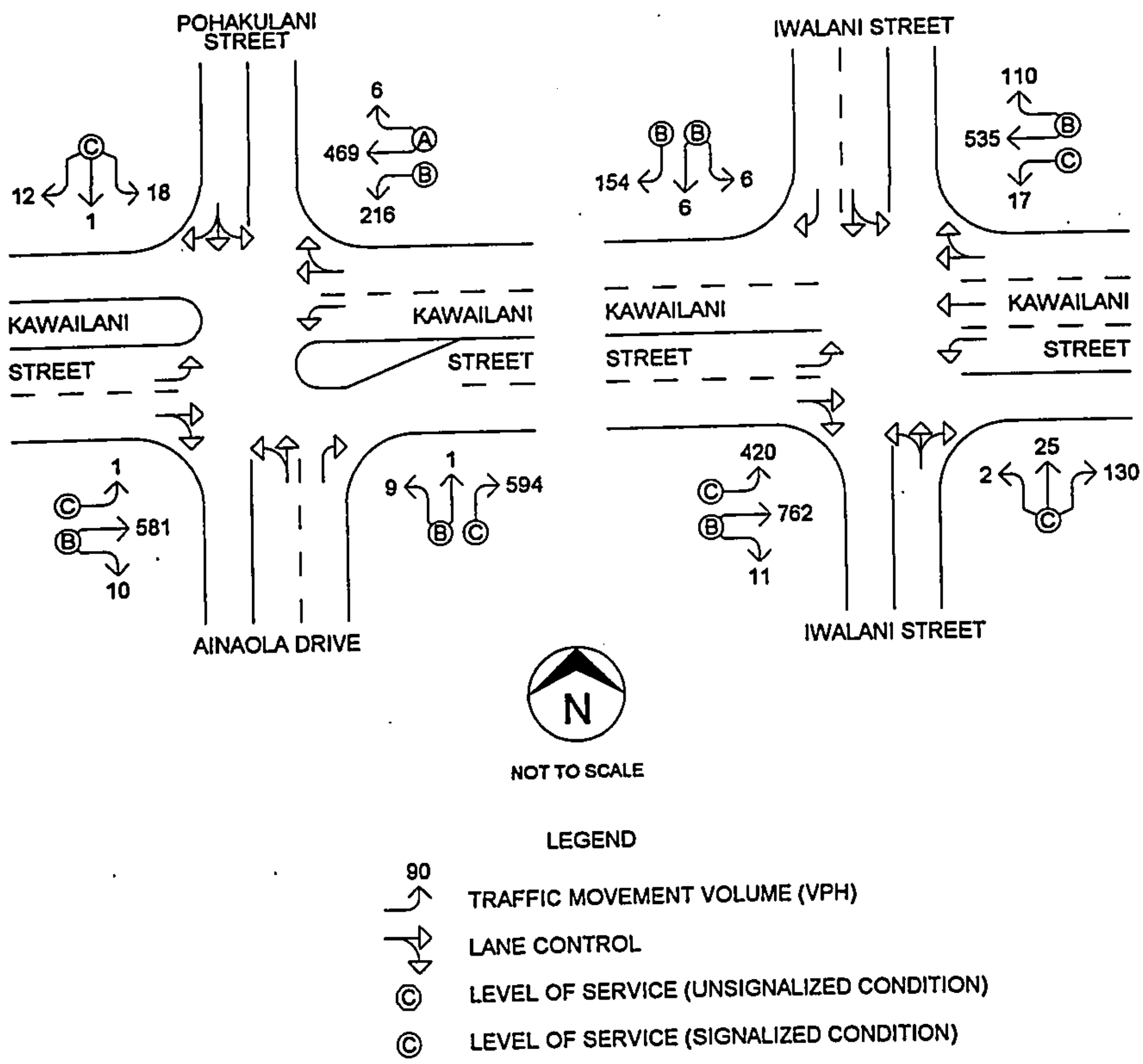


Figure 16. Year 2018 AM Peak Hour Traffic with Scheme A

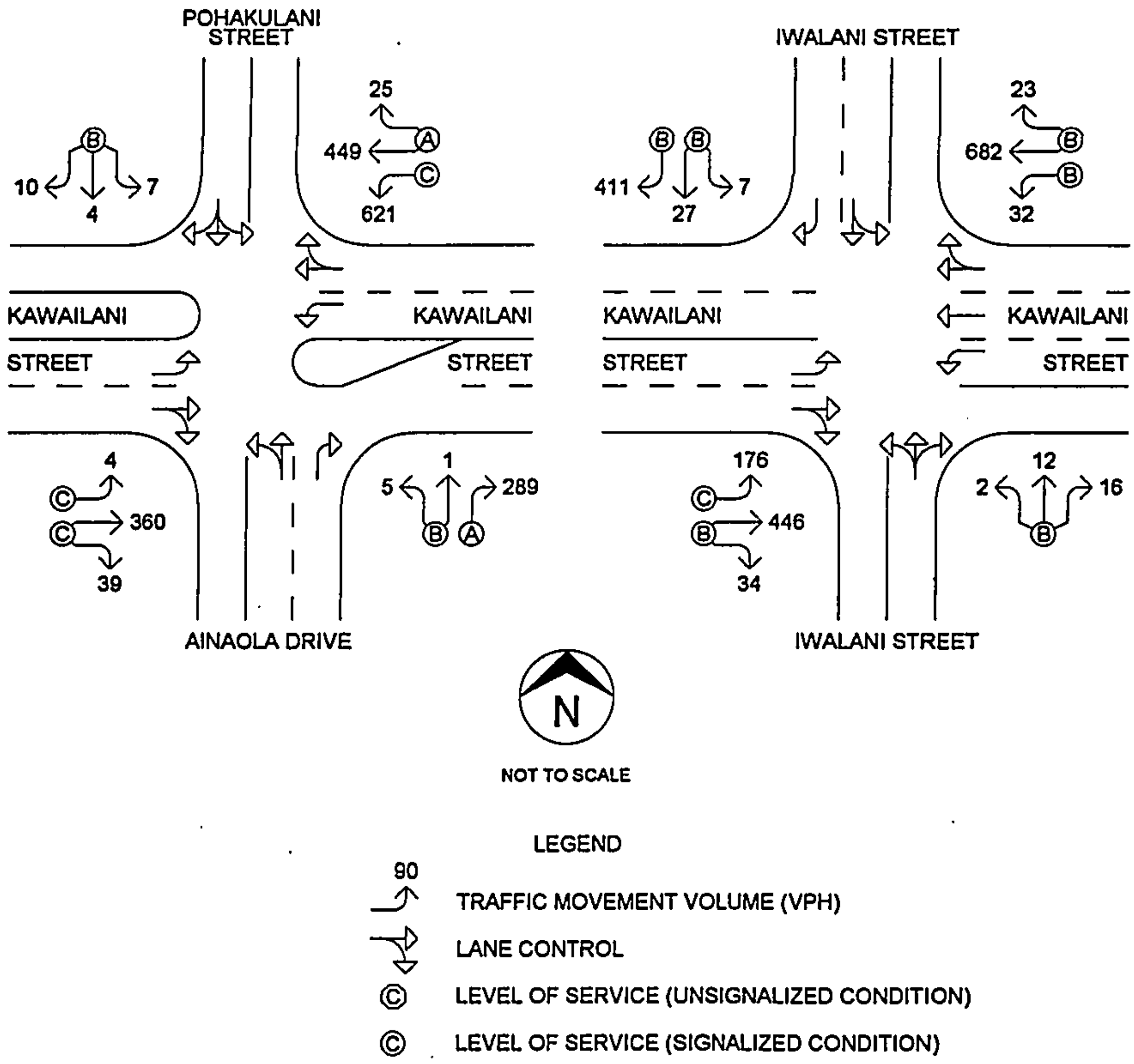


Figure 17. Year 2018 PM Peak Hour Traffic With Scheme A

The PM peak hour left turn demand from westbound Kawailani Street to southwestbound Ainaola Drive is expected to queue up to 400 feet. The 90 percentile left turn queue is expected to be accommodated within the 400± foot distance between the Ainaola Drive/Pohakulani Street and Iwalani Street intersections. The eastbound left turn demand on Kawailani Street at Iwalani Street is expected to queue up to 150 feet. The proposed 290± foot storage lane on eastbound Kawailani Street is expected to be more than adequate to accommodate the 90 percentile left turn queue.

III. Scheme B

A. Year 2018 AM Peak Hour Traffic With Scheme B

The proposed Scheme B traffic improvements would result in satisfactory LOS at the intersection of Kawailani Street and Ainaola Drive/Pohakulani Street. Scheme B AM peak hour traffic operations were analyzed using an 80 second traffic signal cycle length. The intersection of Kawailani Street and Iwalani Street is expected to operate at an overall LOS "C". The northbound approach of Iwalani Street is expected to operate at LOS "D". The LOS on the eastbound through movement on Kawailani Street at Iwalani Street would improve from LOS "B" under Scheme A to LOS "A" under Scheme B, resulting from the addition of two through lanes crossing the intersection. On the other hand, the LOS on the westbound through movement on Kawailani Street at Iwalani Street dropped from LOS "B" under Scheme A to LOS "C" under Scheme B, with the reduction from two through lanes to one through lane.

The left turn demand on eastbound Kawailani Street at Iwalani Street is expected to occupy most of the storage length in the two-way left turn lane during the AM peak hour. The 90 percentile left turn queue on eastbound Kawailani Street is expected to extend up to 350 feet. During the Year 2018 AM peak hour of traffic, the 90 percentile left turn queue on westbound Kawailani Street at Ainaola Drive/Pohakulani Street is expected to extend up to 200 feet, utilizing only the exclusive left turn lane. The Year 2018 AM peak hour traffic with Scheme B is depicted on Figure 18.

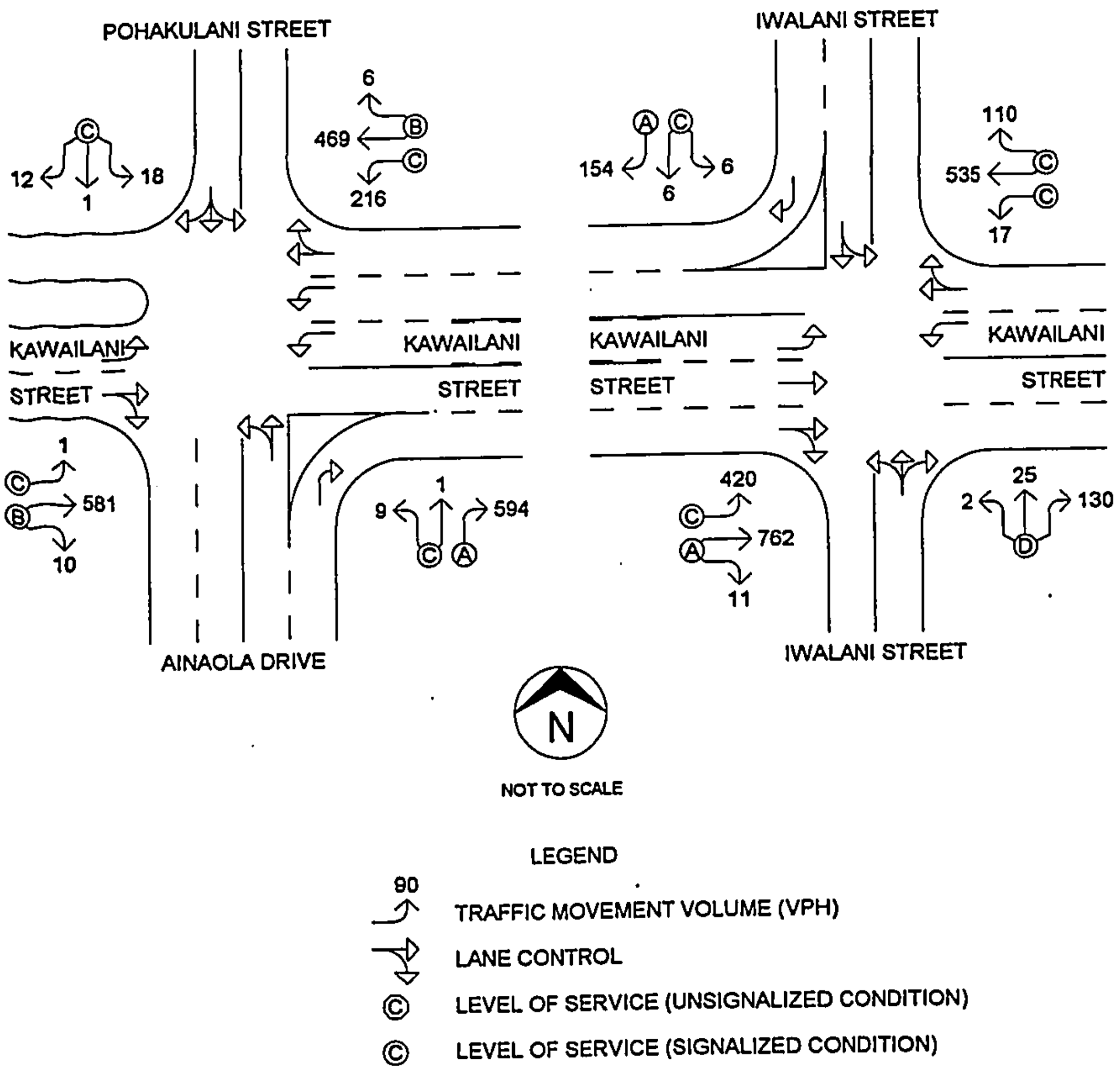


Figure 18. Year 2018 AM Peak Hour Traffic With Scheme B

B. Year 2018 PM Peak Hour Traffic With Scheme B

During the PM peak hour of traffic with Scheme B improvements, the study intersections are expected to operate at LOS "C" or better. The Scheme B PM peak hour traffic operations also were analyzed using an 80 second traffic signal cycle length. Figure 19 depicts the Year 2018 PM peak hour traffic with Scheme B.

The 90 percentile left turn queue on eastbound Kawailani Street at Iwalani Street is expected to extend up to 175 feet. The left turn queue on westbound Kawailani Street at Ainaola Drive/Pohakulani Street can be accommodated in the proposed double left turn lanes The westbound left turn demand is distributed among the double left turn lanes, assuming that 80 percent of the unutilized portion of the two-way left turn lane is occupied with the remaining left turn demand queuing in the exclusive left turn lane. The 90 percentile left turn queue on westbound Kawailani Street is expected to extend up to 375 feet, and should be accommodated by the proposed 400± left turn lane.

The proposed geometrics at the intersection of Kawailani Street and Iwalani Street may be problematic, particularly during the PM peak hour of traffic. The eastbound through lane on Kawailani Street at Iwalani Street is channelized into the exclusive left turn lane at Ainaola Drive/Pohakulani Street. This improvement would result in a "lane trap" for through traffic, i.e., through traffic would be required to merge into the right lane at Ainaola Drive/Pohakulani Street. At the same time, southbound traffic on Iwalani Street, turning right at Kawailani Street then left at Ainaola Drive, would have to merge into the left turn lane. This condition would result in weaving conflicts between the two movements in a relative short distance between the study intersections.

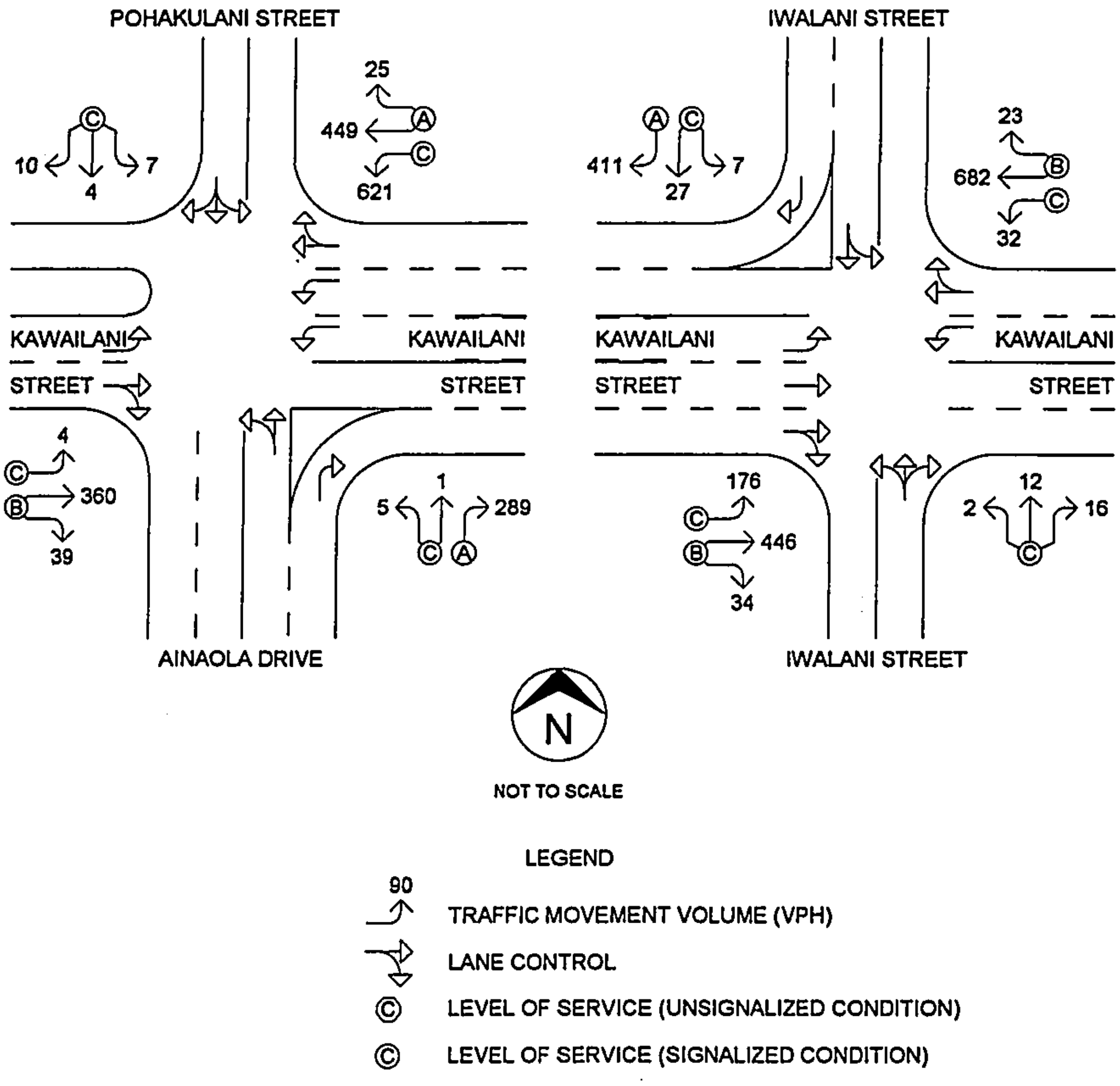


Figure 19. Year 2018 PM Peak Hour Traffic With Scheme B

IV. Capacity Analysis Summary

Table 2 summarizes the capacity analysis of Schemes A and B.

Table 2. Analysis of Schemes A and B

Kawailani Street Intersection			Scheme A	Scheme B
Ainaola Drive/ Pohakulani Street	AM Peak Hour	LOS	B	B
		V/C	0.82	0.48
	PM Peak Hour	LOS	B	B
		V/C	0.79	0.63
Iwalani Street	AM Peak Hour	LOS	B	C
		V/C	0.69	0.87
	PM Peak Hour	LOS	B	B
		V/C	0.64	0.82

Table 3 summarizes the left queue lengths between Ainaola DrivePohakulani Street and Iwalani Street.

Table 3. Left Turn Queue Length Summary

Scheme	Left Turn Lane Length	Cycle Length	EB	WB
A	Available Lane Length	N/A	290	400
	AM Peak Hour 90%ile Queue	60	275	150
	PM Peak Hour 90%ile Queue	60	150	400
B	Available Lane Length *	N/A	350	400
	AM Peak Hour 90%ile Queue	80	350	200
	PM Peak Hour 90%ile Queue	80	175	375

*Note: EB LT lane length includes portion of two-way left turn lane.
WB LT lane length includes only full length left turn lane.

V. Pohakulani Street Traffic Assessment

A. General

The preferred realignment options for the south leg of Pohakulani Street at Ainaola Drive are discussed in the descriptions of Alternatives 1 and 2. The objective of the realignment was to further separate the intersection of Pohakulani Street and Ainaola Drive and the intersection of Kawailani Street and Ainaola Drive. Alternative 1 would provide intersection spacing on Ainaola Drive between Kawailani Street and Pohakulani Street of 140± feet. Alternative 2 would provide an intersection spacing of over 400 feet.

The projected PM peak hour left turn demand meets the volume warrant for an exclusive left turn lane, which was developed by M. D. Harmelink and adopted by the American Association of State Highway and Transportation Officials (AASHTO). An exclusive left turn lane on Ainaola Drive at Pohakulani Street is proposed under Scheme A only. Ainaola Drive is proposed to be widened to provide two through lanes in each direction under Scheme B. Scheme B does not provide for an exclusive left turn lane at Pohakulani Street due to right-of-way constraints.

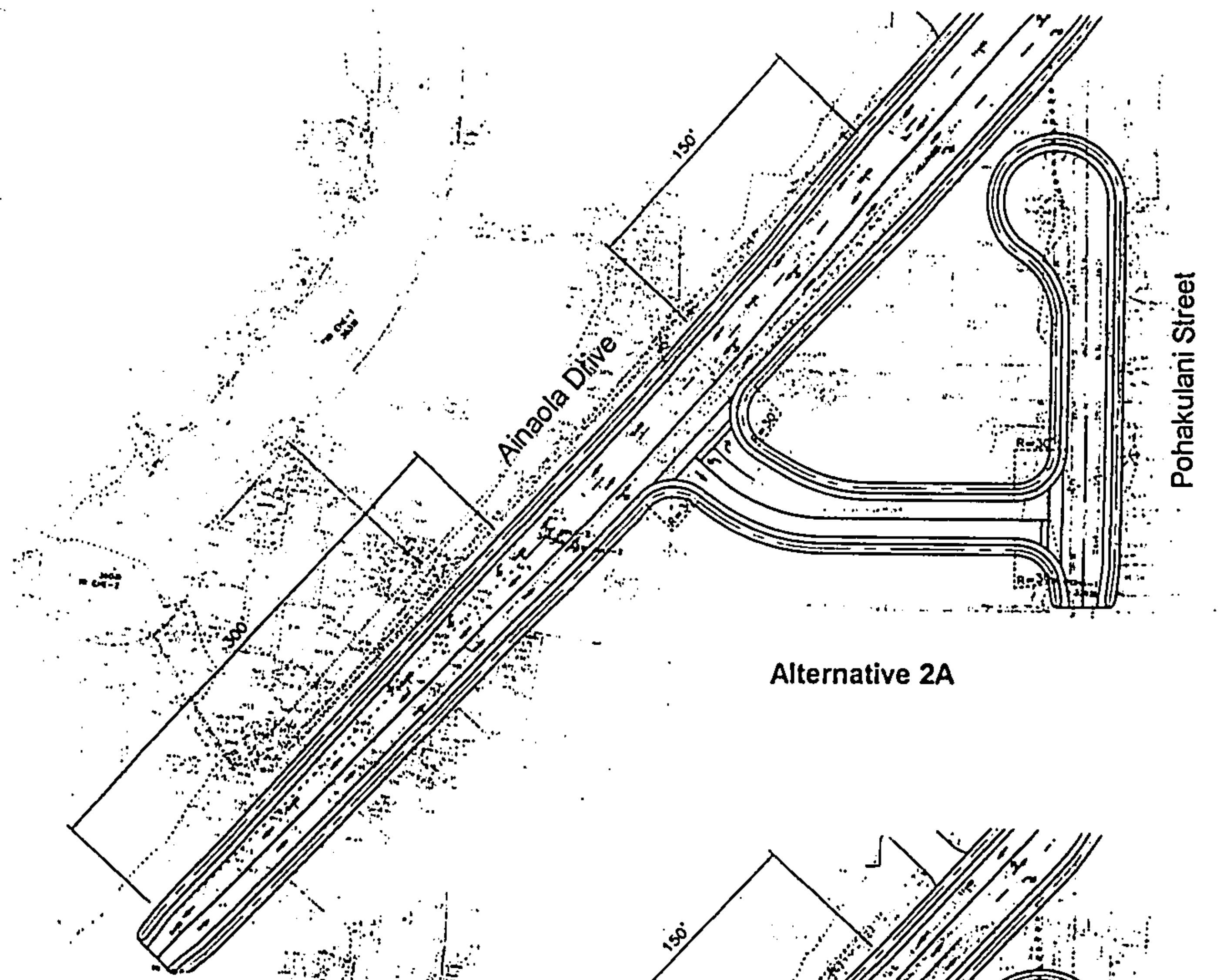
B. Scheme A

Under Alternative 1A, the intersection of Ainaola Drive and Pohakulani Street would be situated closer to Kawailani Street. However, an exclusive left turn would be provided to separate the left turn vehicles from through traffic. Alternative 1A was previously depicted on Figure 14.

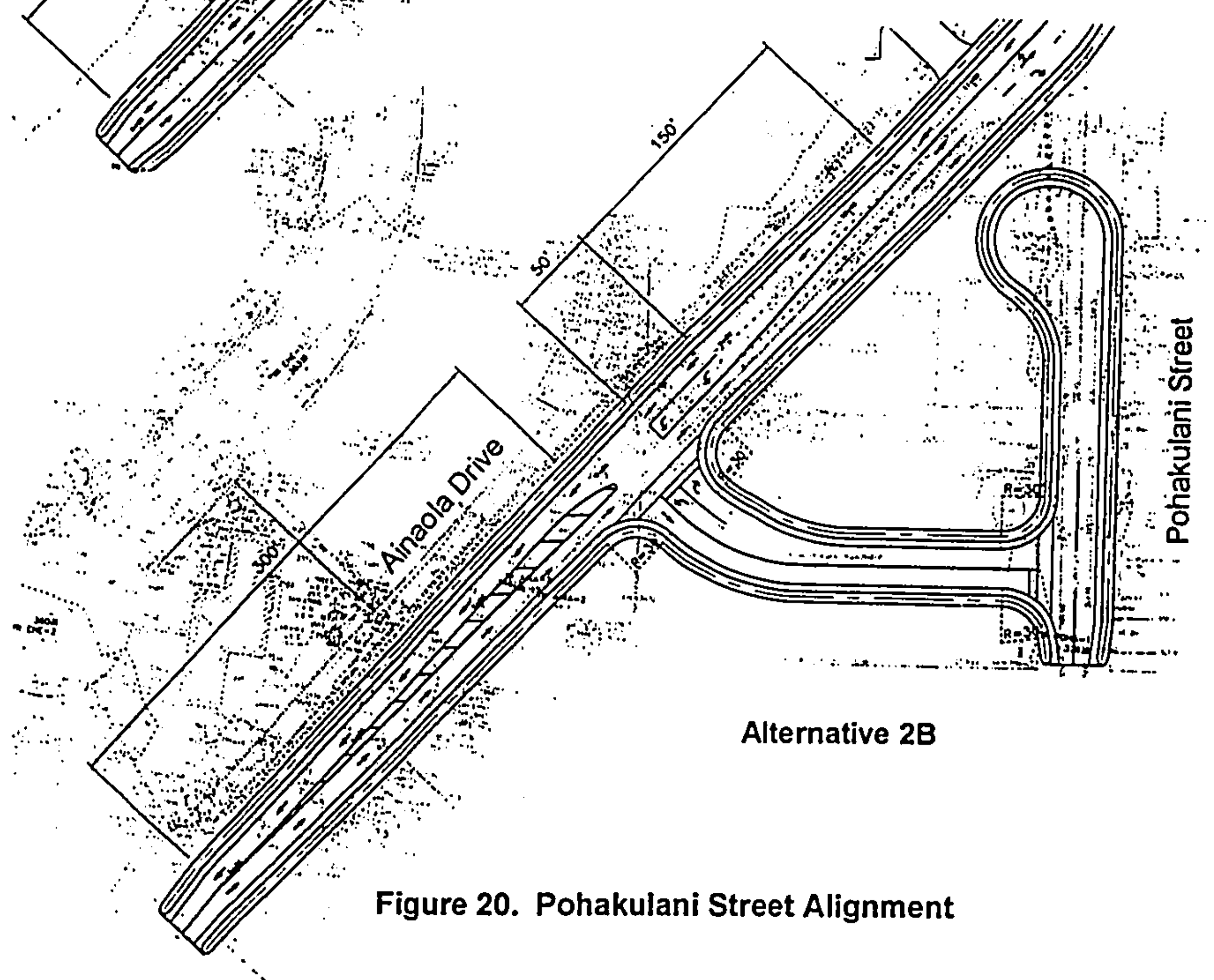
Alternative 2A is the most desirable option for the proposed Pohakulani Street realignment. It would include an exclusive left turn lane on Ainaola Drive, while providing for an intersection spacing of over 400 feet from Kawailani Street. Figure 20 depicts Alternative 2A.

C. Scheme B

Alternative 1B is the least desirable option for the proposed Pohakulani Street realignment. The intersection spacing on Ainaola Drive, between Kawailani Street and Pohakulani Street, may adversely impact traffic operations at the intersection of Kawailani Street and Ainaola Drive/Pohakulani Street. During the PM peak hour, the heavy left turn movement from westbound Kawailani Street to Ainaola Drive



Alternative 2A



Alternative 2B

Figure 20. Pohakulani Street Alignment

may experience delay behind a vehicle waiting to turn left from the through lane on Ainaola Drive to Pohakulani Street. The sight distance between a motorist turning left from Kawailani Street and a vehicle waiting to turn left from the through lane on southwest bound Ainaola Drive is limited. Alternative 1B was previously depicted on Figure 15.

Alternative 2B presents the same situation as Alternative 1B with regard to potential delays to southwest bound traffic on Ainaola Drive. However, the intersection of Pohakulani Street and Ainaola Drive would be located over 400 feet southwest of Kawailani Street. The intersection spacing would provide adequate distance for a motorist in the left lane to slow down and stop or to change lanes and bypass the vehicle waiting to turn left at Pohakulani Street. The Pohakulani Street realignment under Alternative 2B also is depicted on Figure 20.

Chapter 6. Recommendations and Conclusions

I. Recommendations

Alternative 2A is recommended for the improvements of the Kawailani Street intersections at Ainaola Drive/Pohakulani Street and at Iwalani Street. These improvements minimize the right-of-way acquisition requirements, while still provide satisfactory LOS for the design year traffic demands.

A. General

1. Kawailani Street should be widened from two lane to four lanes between Iwalani Street and Ainaola Drive/Pohakulani Street.
2. An exclusive left turn lane should be provided on Kawailani Street at the Wiki Wiki Mart driveway.

B. Intersection of Ainaola Drive/Pohakulani Street and Kawailani Street

1. Traffic signals should be installed at the intersection of Ainaola Drive/ Pohakulani Street and Kawailani Street.
2. The four lane widening should provide one through lane and an exclusive left turn lane in both directions on Kawailani Street at Ainaola Drive/Pohakulani Street.
3. Ainaola Drive should be realigned to intersect Kawailani Street at a conventional right angle intersection.

C. Intersection of Iwalani Street and Kawailani Street

1. Traffic signals should be installed at the intersection of Iwalani Street and Kawailani Street.

2. The four lane widening of Kawailani Street at Iwalani Street should provide an exclusive left turn lane and a shared through/right turn lane in the westbound direction.

3. The westbound approach of Kawailani Street at Iwalani Street should provide an exclusive left turn lane, a through only lane, and a shared through/right turn lane.

4. The north leg of Iwalani Street would be widened to provide an exclusive right turn lane in the southbound direction.

D. Intersection of Pohakulani Street and Ainaola Drive

1. The existing south leg of Pohakulani Street at Ainaola Drive should be reconstructed into a cul-de-sac. Access to Pohakulani Street should be provided via a new roadway through an undeveloped lot further south on Ainaola Drive.

2. An exclusive left turn lane should be provided on southwest bound Ainaola Drive at the new access road to Pohakulani Street.

3. The new Pohakulani Street access should provide separate left turn and right turn lanes.

II. Conclusions

Kawailani Street, between Ainaola Drive/Pohakulani Street and Iwalani Street is an existing "bottleneck" during the peak hours of traffic. Traffic, turning left from eastbound Kawailani Street to northbound Iwalani Street, creates traffic queues during the AM peak hour. During the PM peak hour of traffic, the reverse situation occurs when traffic turning left from westbound Kawailani Street to southwest bound Ainaola Drive creates traffic queues. The queuing on Kawailani Street causes extreme delays to through traffic and side street traffic.

In evaluating alternative improvements for Kawailani Street, a heavy emphasis was placed upon property acquisition costs, condemnation of homes, impacts to residents, and overall construction costs. The highest ranked alternatives, in terms of engineering design and traffic operations, were rated among the lowest overall. In the final analysis, Alternative 2A satisfies the minimum requirements for traffic operations and safety, while minimizing the environmental impacts of the proposed improvements and reducing the overall cost of the project.

APPENDIX 2

AIR QUALITY STUDY

AIR QUALITY STUDY

FOR THE PROPOSED

KAWAILANI-IWALANI-AINAOLA

TRAFFIC SIGNAL IMPROVEMENTS PROJECT

HILO, HAWAII

Prepared for:

RON TERRY

July 1998

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1.0 SUMMARY

The County of Hawaii is proposing to improve the safety and operation of the existing roadway intersections along Kawailani Street at Ainaola Drive/Pohakulani Street and at Iwalani Street in the Waiakea area of South Hilo, Hawaii. The project will include installation of traffic signals and realigning and widening of streets near these intersections. This study examines the potential short-term and long-term air quality impacts that could occur as a result of construction and use of the proposed roadway facilities through the year 2018. Mitigative measures are suggested where possible and appropriate to lessen any potential air quality impacts from the project.

Both federal and state standards have been established to maintain ambient air quality. At the present time, seven parameters are regulated including: particulate matter, sulfur dioxide, hydrogen sulfide, nitrogen dioxide, carbon monoxide, ozone and lead. Hawaii state air quality standards are more stringent than the comparable national limits except for sulfur dioxide and the recently revised national particulate matter standard.

Regional and local climate together with the amount and type of human activity generally dictate the air quality of a given location. The climate of the Hilo area is very much affected by its windward and coastal situation. Daytime winds are predominantly trade winds from easterly to northerly directions, while nighttime winds are mostly mountain drainage winds from the southwest. Wind speeds typically are relatively light varying between about 5 and 10 miles per hour. Temperatures in the Hilo area are very moderate with average daily minimum and maximum temperatures ranging from 66°F to 82°F. Rainfall is substantial with an average of 129 inches per year.

Except for occasional impacts from nearby volcanic emissions and possibly occasional localized impacts from traffic congestion, the present air quality of the project area is believed to be relatively good. The little air quality data that are available for the area from the Department of Health indicate that concentrations are currently well within state and federal air quality standards.

If the proposed project is given the necessary approvals to proceed, it is probably inevitable that some short-term impacts on air quality will occur either directly or indirectly during project construction. Short-term impacts from fugitive dust may occur, and increased emissions from traffic disruption may also reduce air quality during the period of construction. State air pollution control regulations prohibit visible emissions of fugitive dust. Hence, an effective dust control plan should be implemented to ensure compliance with state regulations.

The high rainfall in the project area should serve to naturally control construction dust to a large extent, but it is recommended that during prolonged dry periods that active work areas be watered at least twice daily. A minimum dust control plan should also include provisions for keeping adjacent paved roadways free of tracked dirt. Increased emissions from traffic disruption can be mitigated by moving construction equipment and workers to and from the project site during off-peak traffic hours and by minimizing road closures during peak-traffic periods.

After construction, the long-term impacts of emissions from motor vehicles using the improved roadways were assessed based on an air quality modeling study. The air quality modeling study was designed to estimate current worst-case ambient concentrations of carbon monoxide in the project area and to predict future levels both without and with the proposed project in the year 2018. Areas near the two primary intersections proposed for improvement were studied. These included Ainaola Drive/Pohakulani Street at Kawailani Street and Iwalani Street at Kawailani Street. The model results indicated that despite some traffic congestion during peak traffic periods present worst-case carbon monoxide concentrations are within both the national and the state standards. In the year 2018 without the project, worst-case concentrations were predicted to continue to comply with the national standards, but the worsening traffic congestion in the area could cause the state standards to be exceeded near the intersection of Pohakulani Street/Ainaola Drive and Kawailani Street. With any of the project alternatives being contemplated

(1A, 2A, 1B or 2B), the model results predict that the potential exceedance of the state standards in the project area would be eliminated, i.e., the overall air quality would be better with the project than without it. Thus, measures to mitigate long-term air quality impacts of the proposed project appear to be either unnecessary or unwarranted.

2.0 INTRODUCTION AND PROJECT DESCRIPTION

The County of Hawaii is proposing to improve the safety and operation of two existing intersections along Kawailani Street in the Waiakea, South Hilo, Hawaii area. These intersections are Ainaola Drive/Pohakulani Street with Kawailani Street and Iwalani Street with Kawailani Street (see Figure 1). Currently, these intersections operate at a poor level of service during peak traffic hours, and traffic projections indicate the problems will only grow worse with time unless improvements are undertaken to improve traffic flow. The proposed project includes the installation of a new traffic signal system and the realignment and widening of several streets in this area. With the proposed improvements, traffic at these intersections is expected to flow more efficiently and safely at least through the year 2018.

The purpose of this study was to evaluate the potential air quality impacts of the proposed project and recommend mitigative measures, if possible and appropriate, to reduce or eliminate any degradation of air quality in the area. Before examining the potential impacts of the proposed project, a discussion of ambient air quality standards is presented and background information concerning the regional and local climatology and the present air quality of the project area is provided.

3.0 AMBIENT AIR QUALITY STANDARDS

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

Each of the regulated air pollutants has the potential to create or exacerbate some form of adverse health effect or to produce environmental degradation when present in sufficiently high concentration for prolonged periods of time. The AAQS specify a maximum allowable concentration for a given air pollutant for one or more averaging times to prevent harmful effects. Averaging times vary from one hour to one year depending on the pollutant and type of exposure necessary to cause adverse effects. In the case of the short-term (i.e., 1- to 24-hour) AAQS, both national and state standards allow a specified number of exceedances each year.

State of Hawaii AAQS are in some cases considerably more stringent than comparable national AAQS. In particular, the State of Hawaii 1-hour AAQS for carbon monoxide is four times more stringent than the comparable national limit, and the state 1-hour limit for ozone is more than two times as stringent as the national 1-hour standard. The national 1-hour ozone standard will be phased out during the next three years in favor of the new (and more stringent) 8-hour standard.

Hawaii AAQS for sulfur dioxide were relaxed in 1986 to make the state standards essentially the same as the national limits. In 1993, the state also revised its particulate standards to follow those set by the federal government. During 1997, the federal government again revised its standards for particulate. To date, the Hawaii Department of Health has not updated the state particulate standards.

4.0 REGIONAL AND LOCAL CLIMATOLOGY

Regional and local climatology significantly affects the air quality of a given location. Wind, temperature, atmospheric turbulence, mixing height and rainfall all influence air quality. Although the climate of Hawaii is relatively moderate throughout most of the state, significant differences in these parameters may occur from one location to another. Most differences in regional and local climates within the state are caused by the mountainous topography.

The entire state of Hawaii lies well within the belt of northeasterly trade winds generated by the semi-permanent Pacific high pressure cell to the north and east of the islands. Areas along the eastern coasts of the islands are particularly affected by the trade winds and are usually well-ventilated nearly year round. Although Hilo is situated along the eastern coast of Hawaii Island, the high mountains of Mauna Loa and Mauna Kea significantly modify the trade wind influence, causing winds to be lighter than might be expected. The nearest long-term wind data available for the project area are collected at the Hilo Airport located about 3 miles to the east. These data are probably at least semi-representative of the project corridor. Mean annual wind speed at the airport is about 8 mph, which is lower than many windward locations in the state, and wind directions are bimodal showing either a northeast or southwest preference [1]. Northeast trade winds typically occur during the daytime, while winds from the southwest typically occur during the nighttime due to cold air drainage from the mountains. Winds from the south or southwest also occur occasionally in association with winter storms.

Air pollution emissions from motor vehicles, the formation of photochemical smog and smoke plume rise all depend in part on air temperature. Colder temperatures tend to result in higher emissions of contaminants from automobiles but lower concentrations of photochemical smog and ground-level concentrations of air pollution from stack sources. In Hawaii, the annual and daily variation of temperature depends to a large degree on elevation above sea level, distance inland and exposure to the trade winds. Average temperatures at locations near sea level generally are warmer than those at higher elevations. Areas exposed to the trade winds tend to have the least temperature variation, while inland and leeward areas often have the most. At nearby Hilo Airport, average annual daily minimum and maximum temperatures are 66°F and 82°F, respectively. The extreme minimum temperature on record is 53°F, and the extreme maximum is

94°F [2]. Temperatures in the project vicinity are probably very similar.

Small scale, random motions in the atmosphere (turbulence) cause air pollutants to be dispersed as a function of distance or time from the point of emission. Turbulence is caused by both mechanical and thermal forces in the atmosphere. It is oftentimes measured and described in terms of Pasquill-Gifford stability class. Stability class 1 is the most turbulent and class 6 the least. Thus, air pollution dissipates the best during stability class 1 conditions and the worst when stability class 6 prevails. In the project area, stability class 5 or 6 is probably the highest stability class that occurs, developing during clear, calm nighttime or early morning hours when temperature inversions form due to radiational cooling. Stability classes 1 through 4 occur during the daytime, depending mainly on the amount of cloud cover and incoming solar radiation and the onset and extent of the sea breeze.

Mixing height is defined as the height above the surface through which relatively vigorous vertical mixing occurs. Low mixing heights can result in high ground-level air pollution concentrations because contaminants emitted from or near the surface can become trapped within the mixing layer. In Hawaii, minimum mixing heights tend to be high because of mechanical mixing caused by the trade winds and because of the temperature moderating effect of the surrounding ocean. Low mixing heights may sometimes occur, however, at inland locations and even at times along coastal areas early in the morning following a clear, cool, windless night. Coastal areas also may experience low mixing levels during sea breeze conditions when cooler ocean air rushes in over warmer land. Mixing heights at most locations in Hawaii typically are above 3000 feet (1000 meters).

Rainfall can have a beneficial affect on the air quality of an area in that it helps to suppress fugitive dust emissions, and it also may "washout" gaseous contaminants that are water soluble. Rainfall in Hawaii is highly variable depending on elevation and on location with respect to the trade wind. The Hilo area has a wet climate. Normal annual rainfall for Hilo Airport is about 129 inches [2]. This is distributed fairly evenly throughout the year, although the summer months are slightly drier.

5.0 PRESENT AIR QUALITY

Air quality in the vicinity of the proposed project is currently mostly affected by emissions from motor vehicles, industry and natural sources. Table 3 presents an air pollutant emission summary for the island of Hawaii for calendar year 1993. The emission rates shown in the table pertain to manmade emissions only, i.e., emissions from natural sources are not included. As suggested in the table, much of the manmade particulate, sulfur oxides and hydrocarbon emissions on Hawaii Island originate from point sources, such as power plants and other fuel-burning industries. Area sources of particulate emissions include the mineral products industry and agriculture. Nitrogen oxides and carbon monoxide emissions emanate predominantly from area sources, i.e., motor vehicle traffic. Although not included in the emissions inventory, perhaps the dominant air pollutant emission source on the island for the past several years has been the Kilauea Volcano, but the trade winds carry volcanic emissions away from the Hilo area much of the time. Most of the volcanic emissions occur as sulfur dioxide and then convert into particulate sulfate which causes a volcanic haze (vog) to blanket the area during kona wind conditions. The major industrial sources in the Hilo area specifically are oil-burning power plants which primarily emit sulfur dioxide, nitrogen oxides and particulate matter. Local motor vehicle traffic emits carbon monoxide, nitrogen oxides, particulate, hydrocarbons (an ozone precursor) and smaller amounts of other pollutants.

The State Department of Health (DOH) operates a network of air quality monitoring stations at various locations around the state. Each station, however, typically does not monitor the full complement of air quality parameters. Very little data have been reported for the Hilo area. During 1985, DOH collected samples of 24-hour average particulate matter and sulfur dioxide concentrations at the University of Hawaii-Hilo campus [3]. These data indicated that concentrations were well within standards, and monitoring was discontinued. Other data have been collected and reported since 1985 in connection with electrical power development in Hilo and Puna, but these data have not been published to date by DOH.

Although there are no air quality data to substantiate this, it is probable that the more stringent state standards pertaining to carbon monoxide are exceeded on occasion near high-volume intersections in the Hilo area during periods of coincident traffic congestion and poor dispersion conditions.

6.0 SHORT-TERM IMPACTS OF PROJECT

Short-term direct and indirect impacts on air quality could potentially occur during project construction. For a project of this nature, there are two potential types of air pollution emissions that could directly result in short-term air quality impacts during project construction: (1) fugitive dust from vehicle movement and soil excavation; and (2) exhaust emissions from on-site construction equipment. Indirectly, there also could be short-term impacts from slow-moving construction equipment traveling to and from the project site and from the disruption of normal traffic flow caused by roadway closures.

Fugitive dust emissions may arise from the grading and dirt-moving activities associated with site clearing and preparation work. The emission rate for fugitive dust emissions from construction activities is difficult to estimate accurately because of its elusive nature of emission and because the potential for its generation varies greatly depending upon the type of soil at the construction site, the amount and type of dirt-disturbing activity taking place, the moisture content of exposed soil in work areas, and the wind speed. The EPA [4] has provided a rough estimate for uncontrolled fugitive dust emissions from construction activity of 1.2 tons per acre per month under conditions of "medium" activity, moderate soil silt content (30%), and precipitation/evaporation (P/E) index of 50. Uncontrolled fugitive dust emissions in the project area would likely be lower due to the wet climate. In any case, State of Hawaii Air Pollution Control Regulations [5] prohibit visible emissions of fugitive dust from construction activities at the property line. Thus, an effective dust control plan for the project construction phase is essential.

Adequate fugitive dust control can usually be accomplished by the establishment of a frequent watering program to keep bare-dirt surfaces in construction areas from becoming significant sources of dust. In dust-prone or dust-sensitive areas, other control measures such as limiting the area that can be disturbed at any given time, applying chemical soil stabilizers, mulching and/or using wind screens may be necessary. Control regulations further stipulate that open-bodied trucks be covered at all times when in motion if they are transporting materials that could be blown away. Haul trucks tracking dirt onto paved streets from unpaved areas is oftentimes a significant source of dust in construction areas. Some means to alleviate this problem, such as road cleaning or tire washing, may be appropriate.

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

Project construction activities will also likely obstruct the normal flow of traffic at times to such an extent that overall vehicular emissions in the project area will temporarily increase. The only means to alleviate this problem will be to attempt to keep roadways open during peak traffic hours and to move heavy construction equipment to and from construction areas during periods of low traffic volume.

7.0 LONG-TERM IMPACTS OF PROJECT

After construction is completed, use of the proposed new facilities could potentially cause long-term impacts on ambient air quality in the project vicinity if it causes an increase in motor vehicle emissions or if it concentrates more traffic near the affected intersections. It is not anticipated that the project will result in higher traffic volumes, but the widening of roadways and the installation of traffic signals may increase motor vehicle emissions near the modified intersections. Motor vehicles with gasoline-powered engines are significant sources of carbon monoxide, and they also emit nitrogen oxides and other contaminants.

Federal air pollution control regulations require that new motor vehicles be equipped with emission control devices that reduce emissions significantly compared to a few years ago. In 1990, the President signed into law the Clean Air Act Amendments. This new legislation required further emission reductions be phased in beginning in 1994. The combination of current and new restrictions on emissions from new motor vehicles will lower average emissions each year as more and more older vehicles leave the state's roadways. Carbon monoxide emissions, for example, are expected to decrease by about 20 to 30 percent on the average during the next 20 years due to the replacement of older vehicles with newer models.

To evaluate the potential long-term ambient air quality impact of a project such as this, computerized emission and atmospheric dispersion models can be used to estimate ambient carbon monoxide concentrations along the affected roadways. Carbon monoxide is selected for modeling because it is both the most stable and the most abundant of the pollutants generated by motor vehicles. Furthermore, carbon monoxide air pollution is generally considered to be a microscale problem that can be addressed locally to some extent, whereas nitrogen oxides air pollution most often is a regional issue that cannot be addressed by a single roadway improvement.

For this project, four scenarios were selected for the carbon monoxide modeling study: year 1997 with present conditions, year 2018 without the project, year 2018 with project Alternative 1A or 2A and year 2018 with project Alternative 1B or 2B. Presently, the intersections of Kawailani Street with Iwalani Street and with Pohakulani Street/Ainaola Drive are two-way stop-controlled with Kawailani Street being the major (unstopped) roadway, and it is assumed these intersections would remain unchanged in the 2018 without project scenario. The with project alternatives are described in the project traffic study [6] and elsewhere in more detail, but briefly, all project alternatives include the widening and signalization of the two intersections. All four project alternatives also include the realignment of Pohakulani Street with Ainaola Drive. The primary difference between Alternatives 1A/2A and 1B/2B with respect to the Kawailani intersections is the laneage along Kawailani Street. In Alternatives 1A/2A, Kawailani Street at Pohakulani Street/Ainaola Drive would have only one left-turn lane for westbound traffic whereas in Alternatives 1B/2B, two left-turn lanes would be provided. In Alternatives 1A/2A, Kawailani Street at Iwalani Street would have two lanes for westbound through traffic and one lane for eastbound through traffic; in Alternatives 1B/2B, the laneage for eastbound/westbound through traffic would be reversed, i.e., one lane for westbound through traffic and two lanes for eastbound through traffic.

The main objective of the carbon monoxide modeling study was to estimate maximum 1-hour average concentrations for each of the four scenarios studied. To evaluate the significance of the estimated concentrations, a comparison of the predicted values for each scenario can be made. Comparison of the estimated values to the national and state AAQS will provide another measure of significance.

The traffic impact report for the project indicates that traffic volumes will be slightly higher during the morning peak hour than during the afternoon peak period. Coincidentally, worst-case emission and meteorological dispersion conditions typically occur during the morning hours at most locations. Thus, the highest concentrations could be expected to occur during the morning peak traffic period. However, to ensure that there were no unusual traffic queuing conditions during the afternoon and that worst-case concentrations were identified, both morning and afternoon peak-traffic hours were examined for each scenario.

The EPA computer model MOBILE5A [7] was used to calculate vehicular carbon monoxide emissions for each year studied. This model is the most recently released version of the EPA mobile emission models. Emission estimates provided by the MOBILE5A model have been updated based on EPA's recent testing of on-road vehicles. This latest series of tests has indicated that emission control equipment deteriorates more rapidly than had been previously thought. Hence, MOBILE5A emission estimates are higher (in some cases as much as twice as high) compared to emission estimates derived from earlier versions of the model, particularly in states like Hawaii that have no inspection and maintenance program for emission control equipment.

The EPA computer model MOBILE5A was used to calculate vehicular carbon monoxide emissions for each year studied. One of the key inputs to MOBILE5A is vehicle mix. Unless very detailed information is available, national average values are typically assumed, which is what was used for the present study. Based on national average vehicle mix figures, the projected vehicle mix in the project area for 1997 was estimated to be 62.5% light-duty gasoline-powered automobiles, 27.0% light-duty gasoline-powered trucks and vans, 3.1% heavy-duty gasoline-powered vehicles, 0.3% light-duty diesel-powered vehicles, 6.4% heavy-duty diesel-powered trucks and buses, and 0.7% motorcycles. For the future scenarios studied, the estimated national average vehicle mix percentages were substantially the same except that light-duty gasoline-powered automobiles decreased by about 5% while light-duty gasoline-powered trucks and vans increased by about the same amount.

Other key inputs to the MOBILE5A emission model are the cold/hot start fractions. Motor vehicles operating in a cold- or hot-start mode emit excess air pollution. Typically, motor vehicles reach stabilized operating temperatures after about 4 miles of driving. For traffic operating within the project area, it was assumed that about 21 percent of all vehicles would be operating in the cold-start mode and that about 27 percent would be operating in the hot-start mode. These are typical default (national average) values.

Ambient temperatures of 59 and 68 degrees Fahrenheit were used for morning and afternoon peak-hour emission computations, respectively. These are conservative assumptions since morning/afternoon ambient temperatures will generally be warmer than this and emission estimates given by MOBILE5A are inversely proportional to the ambient temperature.

After computing vehicular carbon monoxide emissions through the use of MOBILE5A, these data were then input to an atmospheric dispersion model. EPA air quality modeling guidelines [8] currently recommend that the computer model CAL3QHC [9] be used to assess carbon monoxide concentrations at roadway intersections, or in areas where its use has previously been established, CALINE4 [10] may be used. Until recently, CALINE4 was used extensively in Hawaii to assess air quality impacts at roadway intersections. However, in December 1997, the California Department of Transportation recommended that the intersection mode of CALINE4 no longer be used because it was thought the model has become outdated. Studies have shown that CALINE4 may tend to over-predict maximum concentrations in some situations. Because of the recent recommendation by the California Department of Transportation that the intersection mode of CALINE4 no longer be used, CAL3QHC was used for the subject analysis.

CAL3QHC was developed for the U.S. EPA to simulate vehicular movement, vehicle queuing and atmospheric dispersion of vehicular emissions near roadway intersections. It is designed to predict 1-hour average pollutant concentrations near roadway intersections based on input traffic and emission data, roadway/receptor geometry and meteorological conditions.

Input peak-hour traffic data were obtained from the traffic study cited previously. This included vehicle approach volumes, saturation capacity estimates, intersection laneage and signal timings. For the future signalized intersection scenarios, all emission factors that were input to CAL3QHC for free-flow traffic were obtained from MOBILE5A based on an assumed free-flow vehicle speed of 30 mph. There is no specific methodology for applying CAL3QHC to unsignalized intersections, but it was assumed that free-flow speeds for each approach would be related to the reserve volume/capacity ratio. A base free-flow speed of 15 mph was assumed for the stop-controlled approaches, and this was adjusted downward based on the reserve volume/capacity ratio of the approach to a minimum of 2.5 mph. A free-flow speed of 30 mph was assumed for the non-stop approaches, and this was adjusted downward based on the left-turn reserve volume/capacity ratio, also to a minimum of 2.5 mph.

Model roadways were set up to reflect roadway geometry, physical dimensions and operating characteristics. Concentrations predicted by air quality models generally are not considered valid within the roadway mixing zone. The roadway mixing zone is usually taken to include 3 meters on either side of the traveled portion of the roadway and the turbulent area within 10 meters of a cross street. For this study, model receptor sites were located at the edges of the mixing zones where the maximum concentrations would likely occur, whether or not sidewalks currently exist. All receptor heights were placed at 1.8 meters above ground to simulate levels within the normal human breathing zone.

Input meteorological conditions for this study were defined to provide "worst-case" results. One of the key meteorological inputs is atmospheric stability category. For these analyses, atmospheric stability category 5 was assumed for morning scenarios and stability category 4 was assumed for afternoon cases. These are the most conservative stability categories that are generally used for estimating worst-case pollutant dispersion at suburban locations. A surface roughness length of 100 cm and a mixing height of 300 meters was used in all cases. Worst-case wind conditions were defined as a wind speed of 1 meter per second with a wind direction resulting in the highest predicted concentration. Concentration estimates were calculated at wind directions of every 5 degrees.

Existing background concentrations of carbon monoxide in the project vicinity are believed to be at relatively low levels. Hence, background contributions of carbon monoxide from sources or distant roadways not directly considered in the analysis were accounted for by adding a small background concentration of 0.5 ppm to all predicted concentrations for 1997. At least moderate development and increased traffic are expected to occur in the project area within the next several years which may result in an increase in background concentrations, although some of this will be offset by the retirement of older, more-polluting motor vehicles as discussed earlier. For the future (2018) scenarios studied, a background carbon monoxide concentration of 1 ppm was assumed.

Predicted Worst-Case 1-Hour Concentrations

Table 3 summarizes the final results of the modeling study in the form of the estimated worst-case 1-hour morning and afternoon ambient carbon monoxide concentrations for the two intersections studied. Estimated worst-case carbon monoxide concentrations are presented in the table for the year 1997 with existing traffic, year 2018 without the project, year 2018 with project Alternatives 1A/2A and year 2018 with project Alternatives 1B/2B. The locations of these estimated worst-case 1-hour concentrations all occurred at or very near the indicated intersections.

As indicated in the table, the highest estimated 1-hour concentration within the project vicinity for the present (1997) case was 7.5 mg/m^3. This was projected to occur during the afternoon peak hour at the intersection of Pohakulani Street/Ainaola Drive and Kawailani Street and was mainly attributable to westbound traffic on Kawailani Street. The next highest predicted concentration was 6.9 mg/m^3 during the morning peak traffic hour at the same intersection and was mainly attributable to northbound traffic on Pohakulani Street/Ainaola Drive. Predicted worst-case 1-hour concentrations near the intersection of Iwalani Street and Kawailani Street were somewhat lower, ranging from 5.0 mg/m^3 during the morning peak hour to 6.0 mg/m^3 during the afternoon peak hour. All estimated worst-case 1-hour concentrations are within both the national standard of 40 mg/m^3 and the more stringent state limit of 10 mg/m^3.

In the year 2018 without the proposed project, the predicted worst-case 1-hour concentrations in the project area increased substantially compared to the existing case. The highest worst-case 1-hour concentration, 13.7 mg/m^3, was predicted to occur during the afternoon near the intersection of Pohakulani Street/Ainaola Drive and Kawailani Street. The majority of this concentration is attributable to westbound traffic on Kawailani Street which the traffic report forecasts will experience poor level of service conditions. Worst-case concentrations during the morning at this location were predicted to be somewhat lower at 9.3 mg/m^3. Worst-case concentrations near the intersection of Iwalani Street and Kawailani Street were predicted to range between 6.0 and 6.6 mg/m^3. All predicted worst-case 1-hour concentrations for this scenario are within both the national and the state AAQS except for the afternoon period near the intersection of Pohakulani Street/Ainaola Drive and Kawailani Street which exceeds the state AAQS.

Predicted 1-hour worst-case concentrations for the 2018 with project Alternatives 1A/2A scenario ranged from 5.4 mg/m^3 during the afternoon at the intersection of Pohakulani Street/Ainaola Drive and Kawailani Street to 7.0 mg/m^3 during the morning at Iwalani Street and Kawailani Street. Compared to the without project case, predicted worst-case concentrations increased slightly or remained about the same at Iwalani Street/Kawailani Street and decreased substantially near Pohakulani Street/Ainaola Drive/Kawailani Street. All of the predicted worst-case 1-hour concentrations for this scenario met both the state and the national AAQS.

Predicted 1-hour worst-case concentrations for the 2018 with project Alternatives 1B/2B case ranged from 5.8 mg/m³ during the afternoon at the intersection of Iwalani Street and Kawailani Street to 7.5 mg/m³ during the morning at Pohakulani Street/Ainaola Drive and Kawailani Street. The predicted concentrations were substantially the same as for the Alternatives 1A/2A scenario with all of the predicted worst-case 1-hour concentrations meeting both the state and the national AAQS.

Predicted Worst-Case 8-Hour Concentrations

Worst-case 8-hour carbon monoxide concentrations were estimated by multiplying the worst-case 1-hour values by a persistence factor of 0.5. This accounts for two factors: (1) traffic volumes averaged over eight hours are lower than peak 1-hour values, and (2) meteorological dispersion conditions are more variable (and hence more favorable) over an 8-hour period than they are for a single hour. Based on monitoring data, 1-hour to 8-hour persistence factors for most locations generally vary from 0.4 to 0.8 with 0.6 being the most typical. One recent study based on modeling [11] concluded that 1-hour to 8-hour persistence factors could typically be expected to range from 0.4 to 0.5. EPA guidelines [12] recommend using a value of 0.6 to 0.7 unless a locally derived persistence factor is available. Monitoring data for Honolulu reported by the Department of Health suggest that this factor may range between about 0.35 and 0.55 depending on location and traffic variability. Considering the location of the project and the traffic pattern for the area, a 1-hour to 8-hour persistence factor of 0.5 will likely yield reasonable estimates of worst-case 8-hour concentrations.

The resulting estimated worst-case 8-hour concentrations are indicated in Table 4. For the 1997 scenario, the estimated worst-case 8-hour carbon monoxide concentrations were 3.8 mg/m^3 near the intersection of Pohakulani Street/Ainaola Drive and Kawailani Street and 3.0 mg/m^3 near Iwalani Street and Kawailani Street. These are in compliance with both the state standard of 5 mg/m^3 and the national limit of 10 mg/m^3. Without the project in the year 2018, the worst-case concentration was predicted to increase to 6.8 mg/m^3 near the intersection of Pohakulani Street/Ainaola Drive and Kawailani Street, which would remain in compliance with the national standard but exceed the state limit. The concentration at Iwalani Street/Kawailani Street was predicted to remain within both standards, increasing only slightly to 3.3 mg/m^3. With either of the with-project alternatives studied, the maximum 8-hour concentrations in the year 2018 were estimated to remain at about the existing levels.

Conservativeness of Estimates

The results of this study reflect several assumptions that were made concerning both traffic movement and worst-case meteorological conditions. One such assumption concerning worst-case 1-hour meteorological conditions is that a wind speed of 1 meter per second with a steady direction for one hour will occur. A steady wind of 1 meter per second blowing from a single direction for an hour is extremely unlikely and may occur only once a year or less. With wind speeds of 2 meters per second, for example, computed carbon monoxide concentrations would be only about half the values given above. The 8-hour estimates are also conservative and are probably less reliable than the 1-hour estimates due to the methodology used to compute the estimates. Further, it is unlikely that anyone would occupy the assumed receptor sites (within 3 m of the roadways) for a period of 8 hours.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Although very little ambient air quality data are available to characterize existing conditions, it is likely that state and federal ambient air quality standards are currently being met in the project area, except perhaps for occasional exceedances of the state carbon monoxide standards within small "hot-spot" areas near traffic-congested intersections.

If not controlled properly, fugitive dust emissions during project construction could have a temporary impact on the air quality of areas adjacent to the project. Uncontrolled fugitive dust emissions from construction activities are estimated to amount to about 1.2 tons per acre per month or more, depending on rainfall. However, because the project area has a relatively wet climate and the winds are typically relatively light, dust emissions will be naturally mitigated. During dry periods, it may be necessary to water active work areas at least twice daily to control dust. Dirt-hauling trucks should be covered when traveling on roadways to prevent windage. A routine road cleaning and/or tire washing program will also help to reduce fugitive dust emissions that may occur as a result of trucks tracking dirt onto paved roadways in the project area.

During construction phases, emissions from engine exhausts (primarily consisting of carbon monoxide and nitrogen oxides) will also occur from on-site construction equipment, from vehicles used by construction workers, from trucks traveling to and from the project area and from road work which disrupts the normal flow of traffic. Increased vehicular emissions due to disruption of traffic by construction equipment and/or commuting construction workers can be alleviated by moving equipment and personnel to the site during off-peak traffic hours. Increased vehicular emissions due to the disruption of traffic can be mitigated by minimizing road closures during peak traffic hours.

After construction, emissions from motor vehicle traffic using the proposed roadway improvements will occur on a long-term basis. Motor vehicle related emissions of carbon monoxide are the greatest concern. Based on the projected peak-hour traffic volumes and the roadway configurations and laneages given for the roadway intersections affected by the project, air quality model projections for the year 2018 indicate that on a microscale level overall air quality conditions in the project area will benefit from the project. Without the project, worst-case concentrations in the year 2018 may meet the national standards but may exceed the more stringent state standards near the intersection of Pohakulani Street/Ainaola Drive/Kawailani Street. With the project, compliance with both state and national standards will likely be achieved and air quality levels comparable to existing conditions will likely be maintained. Thus, measures to mitigate any long-term air quality impacts of the project appear to be either unnecessary or unwarranted.

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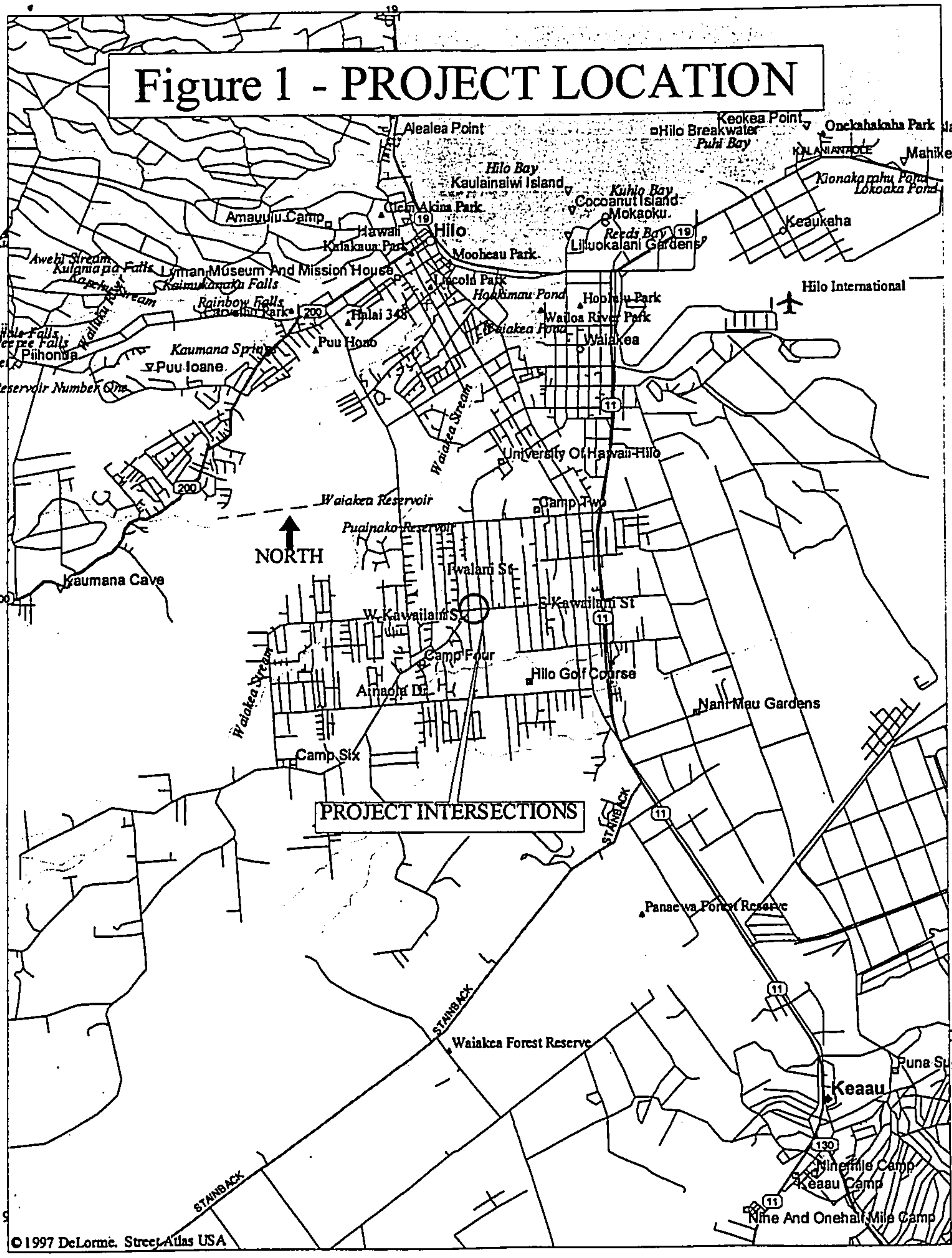
Figure 1 - PROJECT LOCATION
Alealea Point
Hilo Breakwater
Keokea Point
Onekahakaha Park
Puhi Bay
Mahikea Isl
Hilo Bay
Kaulainaiwi Island
Kuhio Bay
Cocoanut Island
Mokaoku
Amauulu Camp
Hilo
Reeds Bay
Liliuokalani Gardens
Keaukaha
Mooheau Park
Kalakaua Park
Lyman Museum And Mission House
Hilo International
Rainbow Falls
Hoolulu Park
Wailoa River Park
Waiakea
Puu Hono
Kaumana Springs
Puu Ioane
Piihonua
Reservoir Number One
Waiakea Stream
University Of Hawaii-Hilo
Waiakea Reservoir
Camp Two
Puainako Reservoir
NORTH
Kaumana Cave
Iwalani St
W Kawailani St
E Kawailani St
Camp Four
Hilo Golf Course
Ainaola Dr
Nani Mau Gardens
Camp Six
PROJECT INTERSECTIONS
STAINBACK
Panaewa Forest Reserve
Waiakea Forest Reserve
Puna Sugar C
Keaau
Ninemile Camp
Keaau Camp
Nine And Onehalf Mile Camp
©1997 DeLorme. Street Atlas USA

Table 1

SUMMARY OF STATE OF HAWAII AND NATIONAL
AMBIENT AIR QUALITY STANDARDS

Pollutant	Units	Averaging Time	Maximum Allowable Concentration		
			National Primary	National Secondary	State of Hawaii
Particulate Matter (<10 microns)	µg/m3	Annual 24 Hours	50[a] 150[b]	50[a] 150[b]	50 150[c]
Particulate Matter (<2.5 microns)	µg/m3	Annual 24 Hours	15[a] 65[d]	15[a] 65[d]	- -
Sulfur Dioxide	µg/m3	Annual 24 Hours 3 Hours	80 365[c] -	- - 1300[c]	80 365[c] 1300[c]
Nitrogen Dioxide	µg/m3	Annual	100	100	70
Carbon Monoxide	mg/m3	8 Hours 1 Hour	10[c] 40[c]	- -	5[c] 10[c]
Ozone	µg/m3	8 Hours 1 Hour	157[e] 235[f]	157[e] 235[f]	- 100[c]
Lead	µg/m3	Calendar Quarter	1.5	1.5	1.5
Hydrogen Sulfide	µg/m3	1 Hour	-	-	35[c]

[a]Three-year average of annual arithmetic mean.

[b]99th percentile value averaged over three years.

[c]Not to be exceeded more than once per year.

[d]98th percentile value averaged over three years.

[e]Three-year average of fourth-highest daily 8-hour maximum.

[f]Standard is attained when the expected number of exceedances is less than or equal to 1.

Table 2

AIR POLLUTION EMISSIONS INVENTORY FOR
ISLAND OF HAWAII, 1993

Air Pollutant	Point Sources (tons/year)	Area Sources (tons/year)	Total (tons/year)
Particulate	30,311	9,157	39,468
Sulfur Oxides	9,346	nil	9,346
Nitrogen Oxides	4,054	8,858	12,912
Carbon Monoxide	3,357	23,934	27,291
Hydrocarbons	1,478	203	1,681

Source: Final Report, "Review, Revise and Update of the Hawaii Emissions Inventory Systems for the State of Hawaii", prepared for Hawaii Department of Health by J.L. Shoemaker & Associates, Inc., 1996

Table 3

ESTIMATED WORST-CASE 1-HOUR CARBON MONOXIDE CONCENTRATIONS ALONG ROADWAYS NEAR KAWAILANI-IWALANI-AINALOA TRAFFIC SIGNAL IMPROVEMENT PROJECT
(milligrams per cubic meter)

Roadway Intersection	Year/Scenario							
	1997 Present		2018 Without Project		2018 With Project Alternatives 1A/2A		2018 With Project Alternatives 1B/2B	
	AM	PM	AM	PM	AM	PM	AM	PM
Iwalani Street at Kawailani Street	5.0	6.0	6.6	6.0	7.0	5.9	6.4	5.8
Pohakulani Street/ Ainaola Drive at Kawailani Street	6.9	7.5	9.3	13.7	6.4	5.4	7.5	6.7

Hawaii State AAQS: 10
National AAQS: 40

Table 4

ESTIMATED WORST CASE 8-HOUR CARBON MONOXIDE CONCENTRATIONS ALONG ROADWAYS NEAR KAWAILANI-IWALANI-AINALOA TRAFFIC SIGNAL IMPROVEMENT PROJECT (milligrams per cubic meter)

Roadway Intersection	Year/Scenario			
	1997 Present	2018 Without Project	2018 With Project Alternatives 1A/2A	2018 With Project Alternatives 1B/2B
Iwalani Street at Kawailani Street	3.0	3.3	3.5	3.2
Pohakulani Street/ Ainaola Drive at Kawailani Street	3.8	6.8	3.2	3.8

Hawaii State AAQS: 5
National AAQS: 10

APPENDIX 3

ACOUSTIC STUDY

ACOUSTIC STUDY FOR THE KAWAILANI–IWALANI–AINAOLA TRAFFIC SIGNAL IMPROVEMENTS PROJECT HILO, HAWAII

Prepared for:

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JULY 1998

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CHAPTER I. SUMMARY

The existing and future traffic noise levels along in the environs of the proposed Kawailani–Iwalani–Ainaola Traffic Signal Improvement Project in Hilo on the island of Hawaii were studied to evaluate potential noise impacts associated with the four Build Alternatives. Noise measurements were obtained, traffic noise predictions developed, and noise abatement alternatives evaluated.

Existing traffic noise levels in the project area do not exceed the U.S. Federal Highway Administration (FHWA) and Hawaii State Department of Transportation, Highways Division (HDOT) noise abatement criteria. Future (CY 2018) traffic noise levels with the proposed roadway improvement project are expected to exceed the "66 Leq" HDOT noise abatement criteria at four to six existing residences. Traffic noise mitigation measures in the form of noise barrier construction may be applied at these residences, but should be examined according to the criteria of reasonable and feasible. Because of the potential visual impacts of the noise barriers and the potential for graffiti, landscaping should be used on the roadway side of the barrier.

The following general conclusions can be made in respect to the number of impacted structures and lands which can be expected by CY 2018 under the four Build Alternatives. These conclusions are valid as long as the future vehicle mixes and average speeds do not differ from the assumed values.

A. The proposed HDOT's ">15 dB increase" criteria for substantial change in traffic noise levels will not be exceeded at any noise sensitive structure. Maximum increases in traffic noise levels in the project area should not exceed 4.3 dB as a result of growth in traffic volumes and construction of additional traffic lanes.

B. Under Alternatives 1A and 2A, future traffic noise levels at four and five homes, respectively, are expected to exceed the HDOT "66 Leq" criteria. Under Alternatives 1B or 2B, future traffic noise levels at six homes are expected to exceed the HDOT "66 Leq" criteria.

C. No parks or public use structures should be affected by the proposed project or require noise mitigation measures.

D. No commercial structures should be affected by the proposed project or require noise mitigation measures.

Potential short term construction noise impacts are possible during the project construction period. However, minimizing these types of noise impacts is possible using standard curfew periods, properly muffled equipment, administrative controls, and construction barriers as required.

CHAPTER II. GENERAL STUDY METHODOLOGY

Noise Measurements. Existing traffic and background ambient noise levels at twelve locations in the project area were measured in October 1997. The traffic noise measurements were used to calibrate the traffic noise model which was used to calculate the Base Year (CY 1997) and future (CY 2018) traffic noise levels under the No Build and Build Alternatives. The background ambient noise measurements were used to define existing noise levels at noise sensitive receptors which may be affected by the project. Also, the measurements were used in conjunction with forecasted traffic noise levels to determine if future traffic noise levels are predicted to "substantially exceed" existing background ambient noise levels at these noise sensitive receptors, and therefore exceed FHWA and HDOT noise standards and criteria.

The noise measurement locations ("A" thru "L") are shown in Figure 1. The results of the traffic noise measurements are summarized in Table 1. In the table, Leq represents the average (or equivalent), A-Weighted, Sound Level. A list and description of the acoustical terminology used are contained in APPENDIX B.

Traffic Noise Predictions. The Federal Highway Administration (FHWA) Traffic Noise Model (or TNM, see Reference 1) was used as the primary method of calculating Base Year and future traffic noise levels, with model parameters adjusted to reflect terrain, ground cover, and local shielding conditions. At the twelve traffic noise measurement locations along the project corridor (Locations "A" thru "L"), the measured noise levels were compared with model predictions to insure that measured and calculated noise levels for the existing conditions were consistent and in general agreement. As indicated in Table 1, spot counts of traffic volumes were also obtained during the measurement periods and were used to generate the Equivalent Sound Level (Leq) predictions shown in the table. The agreement between measured and predicted traffic noise levels was considered to be good at locations with moderately high traffic volumes and with visual line-of-sight to the roadway. At locations with very low traffic volumes ("B", "D", "E", "F", "J", "K", and "L"), local traffic noise levels did not exceed other background ambient noise levels, traffic noise model calibration was not possible. However, for those conditions where hourly traffic volumes were greater than 100 vehicles per hour, the traffic noise model used was considered to be sufficiently accurate to formulate the Base Year and future year traffic noise levels.

Base Year traffic noise levels were then calculated along the project corridor using Base Year (1997) traffic volume data for the AM and PM peak hours from Reference 2. Traffic mix by vehicle types and average vehicle speeds for the various

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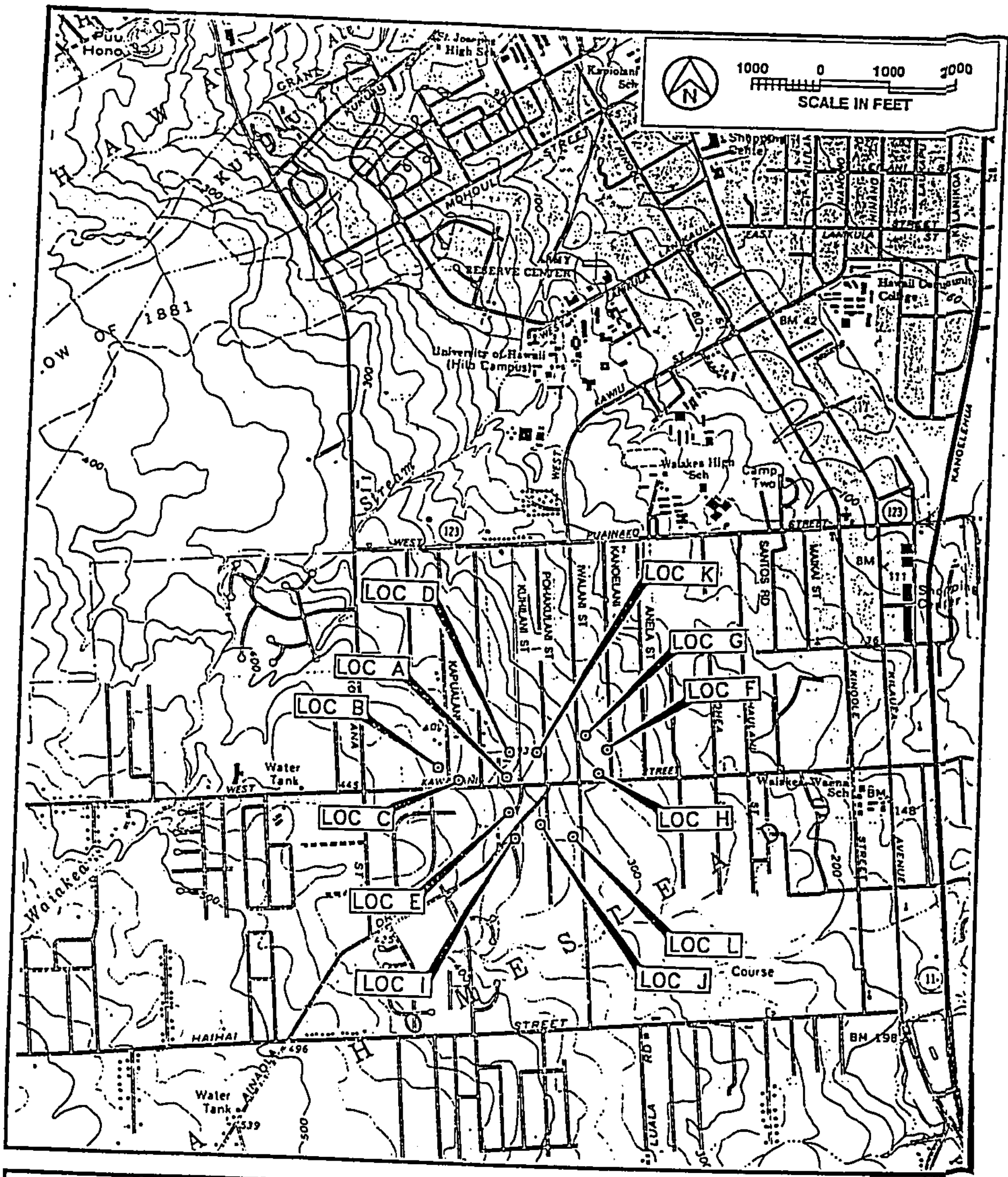

LOCATIONS OF NOISE MEASUREMENT SITES

FIGURE 1

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TABLE 1

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. 35 FT from the center-line of Kawailani St. (10/20/97)	0700 TO 0800	32	554	8	1	62.4	62.7
A. 35 FT from the center-line of Kawailani St. (10/22/97)	0930 TO 1030	32	365	5	2	61.7	61.2
B. 35 FT from the center-line of Kapualani St. (10/20/97)	0815 TO 0915	35	29	1	0	50.7	50.9
B. 35 FT from the center-line of Kapualani St. (10/22/97)	1500 TO 1600	35	33	2	0	51.5	52.1
C. 35 FT from the center-line of Kawailani St. (10/20/97)	0930 TO 1030	32	364	3	2	60.2	61.0
C. 35 FT from the center-line of Kawailani St. (10/22/97)	1600 TO 1700	32	713	17	5	62.9	64.5
D. 30 FT from the center-line of Kuhilani St. (10/20/97)	1045 TO 1145	35	49	2	0	56.5	55.2

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TABLE 1 (CONTINUED)

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)
E. 50 FT from the center-line of Ehehene Pl. (10/20/97)	1200 TO 1300	25	5	1	0	44.0	41.6
F. 35 FT from the center-line of Kanoelani St. (10/20/97)	1345 TO 1445	35	17	0	0	47.6	47.7
F. 35 FT from the center-line of Kanoelani St. (10/22/97)	1345 TO 1445	35	15	0	0	45.9	47.2
G. 35 FT from the center-line of Iwalani St. (10/20/97)	1500 TO 1600	32	420	30	0	61.5	62.9
G. 35 FT from the center-line of Iwalani St. (10/22/97)	0700 TO 0800	32	596	17	8	64.7	64.3
H. 50 FT from the center-line of Kawailani St. (10/20/97)	1600 TO 1700	32	950	21	0	60.3	62.2
H. 50 FT from the center-line of Kawailani St. (10/22/97)	1245 TO 1345	32	541	14	6	62.0	60.9

TABLE 1 (CONTINUED)

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)
I. 35 FT from the center-line of Ainaola Dr. (10/21/97)	0700 TO 0720	34	708	15	23	66.2	66.6
I. 35 FT from the center-line of Ainaola Dr. (10/21/97)	0915 TO 1015	34	390	15	10	64.4	64.0
I. 35 FT from the center-line of Ainaola Dr. (10/21/97)	1600 TO 1700	34	715	22	5	64.9	65.3
J. 40 FT from the center-line of Pohakulani St. (10/21/97)	1030 TO 1053	35	26	1	0	51.5	49.8
J. 40 FT from the center-line of Pohakulani St. (10/21/97)	1400 TO 1500	35	21	1	0	49.9	49.2
K. 25 FT from the center-line of Pohakulani St. (10/21/97)	1500 TO 1600	35	20	0	0	50.5	51.5
L. 35 FT from the center-line of Iwalani St. (10/22/97)	0815 TO 0915	30	67	0	0	54.2	53.5

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sections of the existing and future roadway were derived from observations during the noise monitoring periods and from References 3 and 4. Determinations of the periods of highest hourly traffic volumes along the project corridor were made after reviewing the AM and PM peak hour traffic volumes from References 2 thru 4, and Figures 2 thru 4. The Equivalent (or Average) Hourly Sound Level [Leq(h)] noise descriptor was used to calculate the Base Year and CY 2018 traffic noise levels as required by Reference 5. Aerial photomaps, topographic maps, and project plans (where available) of the area were used to determine terrain, ground cover, and local shielding effects from building structures, which were entered into the noise prediction model.

Future year (2018) *traffic noise levels* were then developed for the No Build and Build (roadway improvement) Alternatives using the future traffic assignments of Reference 2, the topographic and existing development features described previously, and the roadway alignment of the Build Alternative. Forecasted traffic mixes and speeds for Year 2018 were assumed to be similar for the No Build and Build Alternatives.

The CY 2018 traffic assignments for the Build Alternative reflected the forecasted traffic volumes along the project corridor during the AM or PM peak hour, whichever is expected to have the highest hourly traffic volume. Future traffic conditions under the No Build Alternative may actually worsen, with average vehicle speeds declining as a result of increased congestion. Under the Build Alternative, average vehicle speeds are expected to remain the same as current values.

Impact Assessments and Mitigation. Following the calculation of the future traffic noise levels for the No Build and Build Alternatives, comparisons of the future traffic noise levels and impacts among the alternatives were made. Comparisons of predicted future traffic noise levels with FHWA and HDOT noise abatement criteria (see Table 2) were made to determine specific locations where the noise abatement criteria are exceeded. In addition, the HDOT's criteria of "greater than 15 dB increase above existing background noise levels" was also used as a noise abatement threshold for this project (from Reference 6). Along the project corridor, the locations of the 66 thru 72 Leq(h) traffic noise contours, without the benefit of shielding from natural terrain or man-made sound barriers, were provided for siting future land uses along the project corridor, and for defining the adequate buffer space between the roadway sections and these land uses. The FHWA 67 Leq(h) standard shown in Table 2 and the HDOT "greater than 15 dB increase" criteria were applied to all noise sensitive buildings along the project corridor. In addition, the possibility of exceeding the 66 Leq(h) level was also examined for this study, since, by Reference 6, the HDOT

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FIGURE 2

HOURLY VARIATIONS OF TRAFFIC NOISE AT 100 FT SETBACK DISTANCE FROM THE CENTERLINE OF KAWAILANI STREET WEST OF IWALANI STREET (AUGUST 7, 1996)

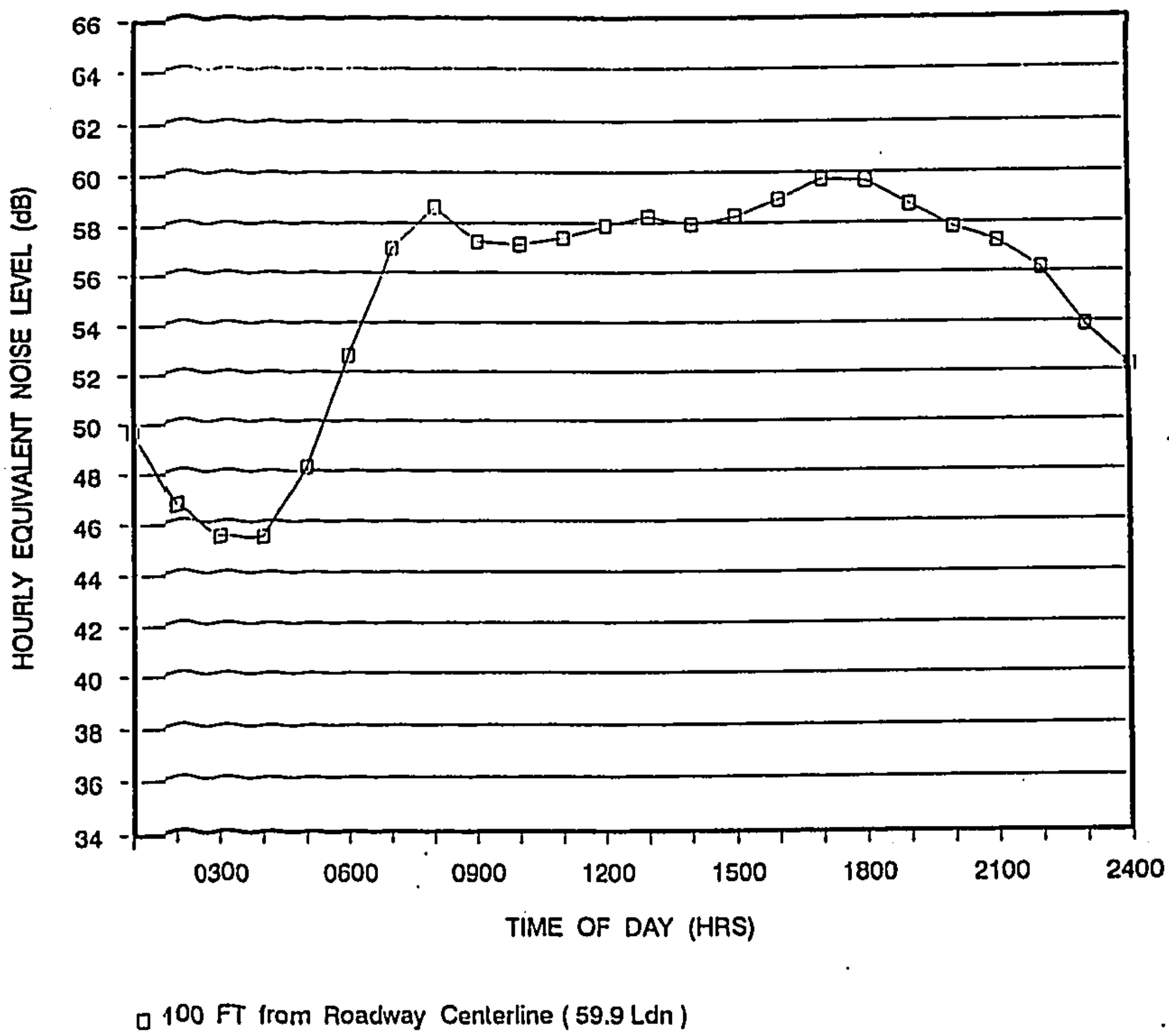

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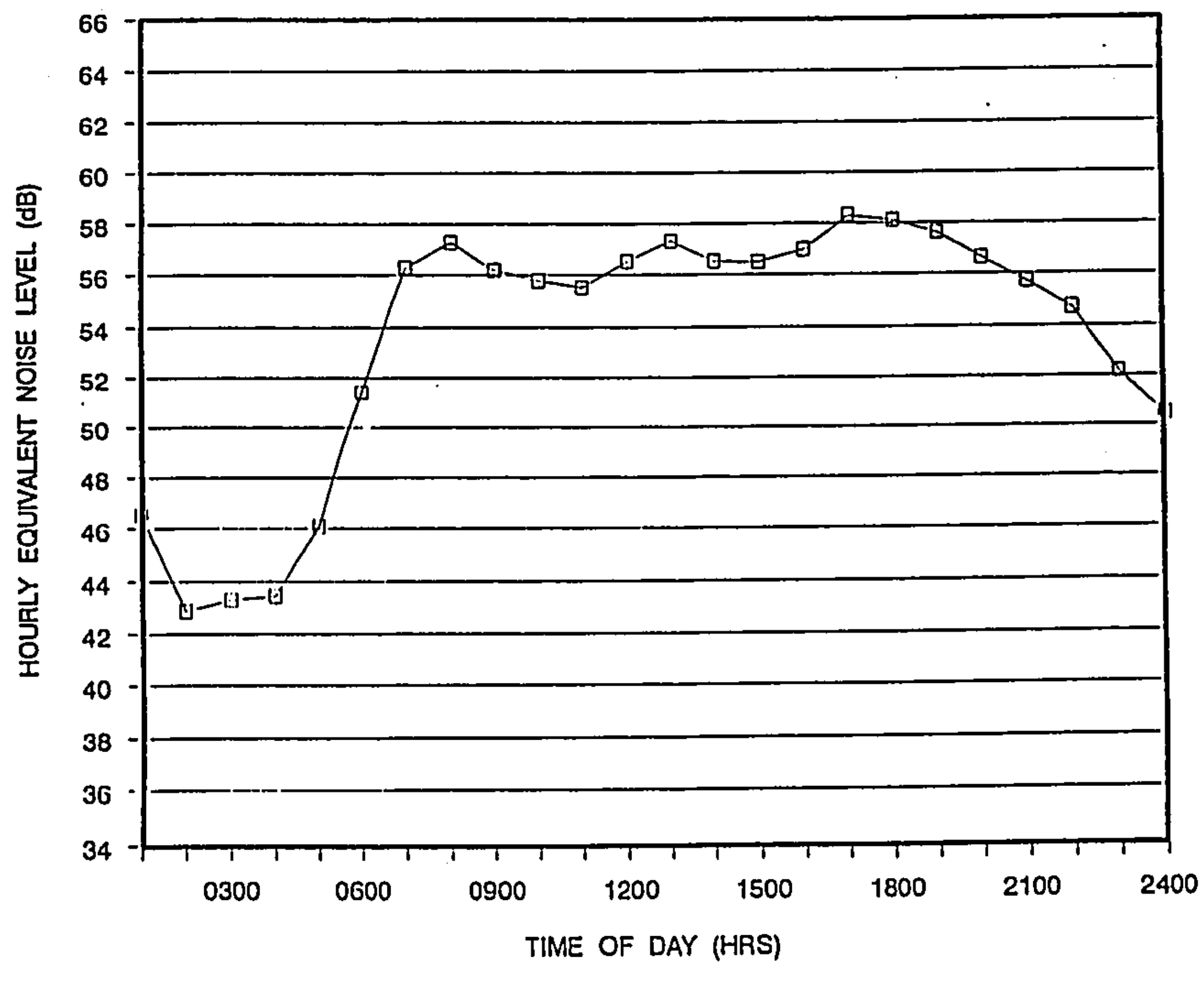
FIGURE 3

HOURLY VARIATIONS OF TRAFFIC NOISE AT 100 FT SETBACK DISTANCE FROM THE CENTERLINE OF KAWAILANI STREET EAST OF IWALANI STREET (AUGUST 7, 1996)



□ 100 FT from Roadway Centerline (58.5 Ldn)

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FIGURE 4

HOURLY VARIATIONS OF TRAFFIC NOISE AT 100 FT SETBACK DISTANCE FROM THE CENTERLINE OF IWALANI STREET NORTH OF KAWAILANI STREET (JUNE 26, 1996)

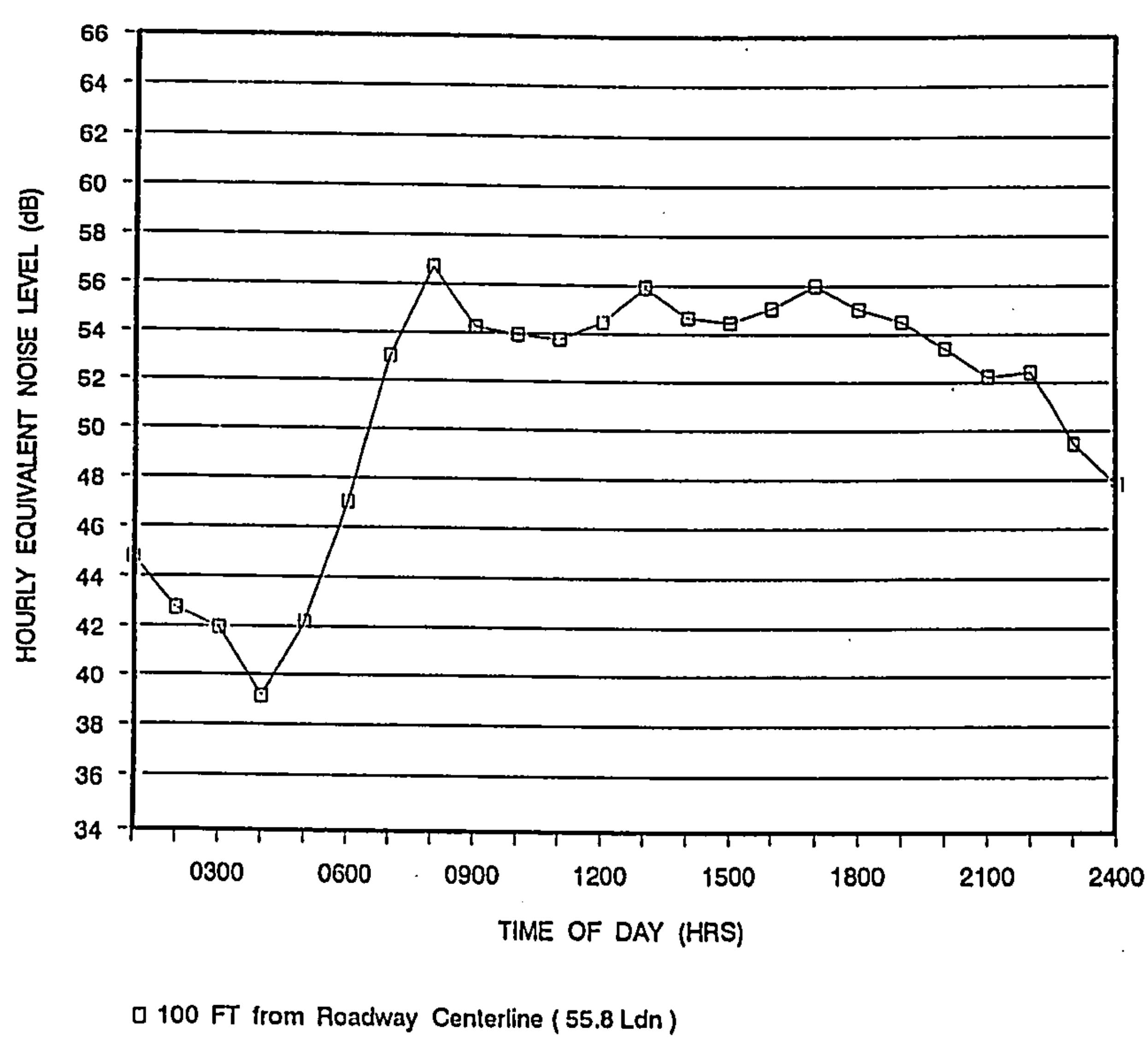

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TABLE 2

FHWA NOISE ABATEMENT CRITERIA
[Hourly A-Weighted Sound Level--Decibels (dBA)]

ACTIVITY CATEGORY	LEQ (h)*	DESCRIPTION OF ACTIVITY CATEGORY
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the areas are to continue to serve their intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, activity sports areas, parks, residences, motels, hotels, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	------	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

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* The Hawaii State Department of Transportation, Highways Division, utilizes Leq criteria levels which are 1 Leq unit less than the FHWA values shown.

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has replaced the FHWA 67 Leq(h) criteria with their 66 Leq(h) criteria. At the commercial establishments along the project corridor, the FHWA 72 Leq(h) and the HDOT 71 Leq(h) noise abatement criteria were applied to identify commercial establishments where noise abatement measures could also be applied. Where noise mitigation measures were indicated for this project, the effectiveness of sound attenuating barriers and other possible noise mitigation measures were evaluated. The ability to meet the HDOT criteria of 5 dBA noise reduction was also examined for various noise barrier heights. Where excessive wall heights above the 6 foot local code limit were required to meet noise abatement criteria, the HDOT "66 Leq" and "greater than 15 dBA increase" criteria took precedence over the HDOT "5 dBA reduction" requirement for noise abatement measures.

CHAPTER III. EXISTING ACOUSTICAL ENVIRONMENT

For the purposes of this study, 1997 was used as the Base Year for computing changes in traffic noise levels between the No Build and Build Alternatives. The Base Year noise environment along the project corridor was described by computing the Hourly Equivalent Sound Levels [Leq(h)] along the existing roadway during the AM and PM peak traffic hours for the 1997 time period. The hourly sound level, expressed in decibels, represents the average levels of traffic noise along the project roadways during the AM and PM peak hours of the study's Base Year.

Table 3A presents the traffic volume, speed, and mix assumptions used to calculate the Base Year noise levels during the AM peak hour along the existing roadways in the project area. Shown in Table 3A are the calculated AM peak hour Leq(h)'s at reference distances of 50 and 100 FT from the centerline of the roadways. Table 3B presents similar calculations of existing noise levels along the same roadway sections during the PM peak hour. The calculated distances to the 57, 60, 66, 67, and 72 Leq noise contour lines under unobstructed, line-of-sight conditions to the roadway segment are shown in Tables 4A and 4B for the AM and PM peak hours, respectively. The actual distances to the contour lines will generally be less than indicated in Tables 4A or 4B when intervening structures or terrain obstructions exist between the roadway and a receptor. This reduction (or shrinkage) of the traffic noise contour distances from the roadway's centerline is the result of noise shielding (or attenuation) effects caused by the intervening structures or natural terrain features.

By using the traffic noise data shown in Tables 3A thru 4B, and aerial photos of the existing improvements on the west side of the project corridor, the relationship of the existing free-field traffic noise contours to existing noise sensitive dwellings in the project area were obtained. Similar evaluations were provided for those areas where commercial structures are located. A tabulation of public and private structures or park lands where the FHWA and/or the proposed HDOT noise abatement criteria may be exceeded along the project corridor during the Base Year is provided in Table 5. From Table 5, it was concluded that both the FHWA and the proposed HDOT noise abatement criteria were not exceeded in the project area during the AM or PM peak traffic hours during the Base Year.

At areas removed from the higher volume roadways, Base Year noise levels are much lower than along the roadways' Rights-of-Way due to distance factors and local shielding effects from buildings. Base Year noise levels in areas removed from

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TABLE 3A

EXISTING (CY 1997) TRAFFIC VOLUMES AND NOISE LEVELS ALONG ROADWAYS IN PROJECT AREA (AM PEAK HOUR)

LOCATION	SPEED (MPH)	TOTAL VPH	**** VOLUMES (VPH) ******			50' Leq	100' Leq
			AUTOS	M TRUCKS	H TRUCKS		
Kawailani Street, Segment (A)	32	886	859	18	9	62.6	58.1
Kawailani Street, Segment (B)	32	886	859	18	9	63.6	59.1
Kawailani Street, Segment (C)	35	872	846	17	9	62.5	58.0
Kawailani Street, Segment (D)	30	1,543	1,497	31	15	65.0	60.5
Kawailani Street, Segment (E)	32	1,297	1,258	26	13	64.2	59.7
Kuhilani Street	35	118	115	2	1	52.2	47.7
Ehehene Place	25	28	27	1	0	40.9	36.4
Pohakulani Street, North	35	32	31	1	0	44.2	39.7
Pohakulani Street, Middle	35	189	184	4	1	51.9	47.4
Pohakulani Street, South	35	30	29	1	0	43.9	39.4
Ainaola Drive	34	643	611	19	13	63.0	58.4
Iwalani Street, North	34	581	557	12	12	60.7	56.2
Iwalani Street, South	34	156	152	3	1	51.1	46.6

Note:

1. For identification of Kawailani Street segments, see TABLE 3C.

TABLE 3B

EXISTING (CY 1997) TRAFFIC VOLUMES AND NOISE LEVELS ALONG ROADWAYS IN PROJECT AREA (PM PEAK HOUR)

LOCATION	SPEED (MPH)	TOTAL VPH	**** VOLUMES (VPH) ****** AUTOS	M TRUCKS	H TRUCKS	50' Leq	100' Leq
Kawailani Street, Segment (A)	32	745	666	15	64	61.8	57.3
Kawailani Street, Segment (B)	32	745	666	15	64	62.8	58.3
Kawailani Street, Segment (C)	35	689	616	14	59	61.5	57.0
Kawailani Street, Segment (D)	30	1,448	1,294	29	124	64.7	60.2
Kawailani Street, Segment (E)	32	980	955	5	20	63.0	58.5
Kuhilani Street	35	148	144	1	3	53.2	48.6
Ehehene Place	25	21	21	0	0	39.7	35.1
Pohakulani Street, North	35	38	37	0	0	44.9	40.4
Pohakulani Street, Middle	35	561	550	6	6	56.6	52.1
Pohakulani Street, South	35	49	48	0	0	46.0	41.5
Ainaola Drive	34	749	734	7	7	63.6	59.1
Iwalani Street, North	34	534	523	5	5	60.4	55.9
Iwalani Street, South	34	101	99	1	1	49.2	44.7

Note:

1. For Identification of Kawailani Street segments, see TABLE 3C.

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TABLE 3C

IDENTIFICATION OF KAWAILANI STREET ROADWAY SEGMENTS

SEGMENTS	BOUNDING INTERSECTIONS
(a)	Kapualani St. to Private Drive
(b)	Private Drive to Kuhilani St.
(c)	Kuhilani St. to Pohakulani St.
(d)	Pohakulani St. to Iwalani St.
(e)	Iwalani St. to Kanoelani St.

TABLE 4A

EXISTING CONDITIONS ; YEAR 1997; AM PEAK HR. SETBACK DISTANCES

ROADWAY SEGMENT	SPEED	VEHICLE MIX (%A/%MT/%HT)	TOTAL VPH	Leq @ 100' (dB)	** DISTANCE (FT) FROM CENTERLINE ** 57 Leq	60 Leq	66 Leq	67 Leq	72 Leq
Kawailani St. (A)	32 MPH	97.0/2.0/1.0	886	58.1	120	73	28	23	10
Kawailani St. (B)	32 MPH	97.0/2.0/1.0	886	59.1	141	86	32	28	12
Kawailani St. (C)	35 MPH	97.0/2.0/1.0	872	58.0	118	72	27	23	10
Kawailani St. (D)	30 MPH	97.0/2.0/1.0	1,543	60.5	177	109	41	35	15
Kawailani St. (E)	32 MPH	97.0/2.0/1.0	1,297	59.7	155	95	36	30	13
Kuhilani Street	35 MPH	97.5/2.0/0.5	118	47.7	22	13	N/A	N/A	N/A
Ehehene Place	25 MPH	97.5/2.0/0.5	28	36.4	N/A	N/A	N/A	N/A	N/A
N. Pohakulani St.	35 MPH	97.5/2.0/0.5	32	39.7	N/A	N/A	N/A	N/A	N/A
M. Pohakulani St.	35 MPH	97.5/2.0/0.5	189	47.4	21	13	N/A	N/A	N/A
S. Pohakulani St.	35 MPH	97.5/2.0/0.5	30	39.4	N/A	N/A	N/A	N/A	N/A
Ainaola Drive	34 MPH	95.0/3.0/2.0	643	58.4	126	77	29	25	11
N. Iwalani St.	34 MPH	97.0/2.0/1.0	581	56.2	88	54	20	17	N/A
S. Iwalani St.	34 MPH	97.5/2.0/0.5	156	46.6	18	11	N/A	N/A	N/A

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TABLE 4B

EXISTING CONDITIONS ; YEAR 1997; PM PEAK HR. SETBACK DISTANCES

ROADWAY SEGMENT	SPEED	VEHICLE MIX (%A/%MT/%HT)	TOTAL VPH	Leq @ 100' (dB)	** DISTANCE (FT) FROM CENTERLINE **				
					57 Leq	60 Leq	66 Leq	67 Leq	72 Leq
Kawailani St. (A)	32 MPH	97.0/2.0/1.0	745	57.3	105	64	24	20	N/A
Kawailani St. (B)	32 MPH	97.0/2.0/1.0	745	58.3	124	76	28	24	11
Kawailani St. (C)	35 MPH	97.0/2.0/1.0	689	57.0	100	61	23	20	N/A
Kawailani St. (D)	30 MPH	97.0/2.0/1.0	1,448	60.2	169	103	39	33	15
Kawailani St. (E)	32 MPH	97.0/2.0/1.0	980	58.5	128	78	29	25	11
Kuhilani Street	35 MPH	97.5/2.0/0.5	148	48.6	25	16	N/A	N/A	N/A
Ehehene Place	25 MPH	97.5/2.0/0.5	21	35.1	N/A	N/A	N/A	N/A	N/A
N. Pohakulani St.	35 MPH	97.5/2.0/0.5	38	40.4	N/A	N/A	N/A	N/A	N/A
M. Pohakulani St.	35 MPH	97.5/2.0/0.5	561	52.1	45	28	10	N/A	N/A
S. Pohakulani St.	35 MPH	97.5/2.0/0.5	49	41.5	N/A	N/A	N/A	N/A	N/A
Ainaola Drive	34 MPH	95.0/3.0/2.0	749	59.1	141	86	32	28	12
N. Iwalani St.	34 MPH	97.0/2.0/1.0	534	55.9	84	51	19	16	N/A
S. Iwalani St.	34 MPH	97.5/2.0/0.5	101	44.7	13	N/A	N/A	N/A	N/A

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TABLE 5

LIST OF NOISE IMPACTED STRUCTURES AND LAND AREAS DURING BASE YEAR (CY 1997)

ROADWAY SEGMENT	*** NUMBER OF IMPACTED UNITS (BASE YEAR LEQ) *** PRIVATE STRUCTURES	PUBLIC USE STRUCTURES	PARK LANDS
Kawailani St. (A)	0	0	None
Kawailani St. (B)	0	0	None
Kawailani St. (C)	0	0	None
Kawailani St. (D)	0	0	None
Kawailani St. (E)	0	0	None
Kuhilani Street	0	0	None
Ehehene Place	0	0	None
N. Pohakulani St.	0	0	None
M. Pohakulani St.	0	0	None
S. Pohakulani St.	0	0	None
Ainaola Drive	0	0	None
N. Iwalani St.	0	0	None
S. Iwalani St.	0	0	None
TOTALS:	0	0	0

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the higher volume roadways are typically less than 50 Leq(h), and possibly as low as 40 Leq(h). This was evident from measurements of existing background ambient noise levels at Locations B", "E", "F", "J", "K", and "L", as shown in Table 1.

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CHAPTER IV. DESCRIPTION OF FUTURE TRAFFIC NOISE LEVELS

The future traffic noise levels in the immediate vicinity of the project during CY 2018 were evaluated for the No Build and Build study alternatives. The same methodology that was used to calculate the Base Year noise levels was also used to calculate the Year 2018 noise levels. It should be noted that forecasted traffic volumes for both the No Build and Build Alternatives were not available at all of the street segments which were evaluated for the Base Year. Under both the No Build and Build Alternatives, average vehicle speeds and traffic mix were assumed to be identical to the Base Year values.

Tables 6A and 6B summarize the traffic conditions, noise levels, and setback distances for the No Build Alternative during the AM and PM peak hours in CY 2018. Traffic noise levels in the immediate vicinity of the project are predicted to increase by 0.8 to 2.7 dB between CY 1997 and CY 2018 as a result of projected traffic volume increases. However, Table 7 indicates that both the FHWA and the proposed HDOT noise abatement criteria should not be exceeded in the project area during the AM or PM peak traffic hours during CY 2018 under the No Build Alternative.

The future (CY 2018) traffic volume, speed, and mix assumptions used for the Build Alternatives during the AM and PM peak traffic hours, respectively, are shown in Tables 8A and 8B. Also shown in the tables are the future traffic noise levels at reference distances of 50 and 100 FT from the roadways' baselines. Table 8A and 8B apply to all four Build Alternatives (1A, 2A, 1B, and 2B). Only the roadways' configurations and striping varied among the four Build Alternatives.

Figure 5 presents the fifteen noise sensitive receptor locations where future traffic noise levels were calculated for the four Build Alternatives using the FHWA Traffic Noise Model. The predicted CY 2018 traffic noise levels at these fifteen receptor locations are shown in Tables 9A and 9B. At seven of the fifteen locations, future traffic noise levels are expected to exceed the HDOT "66 Leq" noise abatement criteria, with predicted increases of 2.2 to 4.3 Leq between CY 1997 and CY 2018. These seven receptor locations represent the locations of six existing homes where potential traffic noise impacts are possible from the roadway improvements.

The following general conclusions can be made in respect to the number of impacted structures and lands which can be expected by CY 2018 under the four Build Alternatives. These conclusions are valid as long as the future vehicle mixes and average speeds do not differ from the assumed values.

TABLE 6A

NO BUILD CONDITIONS ; YEAR 2018 ; AM PEAK HR. SETBACK DISTANCES

ROADWAY SEGMENT	SPEED	VEHICLE MIX (%A/%MT/%HT)	TOTAL VPH	Leq @ 100' (dB)	CHANGE	*** DISTANCE (FT) FROM CENTERLINE *** 57 Leq	60 Leq	66 Leq	67 Leq	72 Leq
Kawailani St. (C)	35 MPH	97.0/2.0/1.0	1,095	59.0	1.0	139	85	32	27	12
Kawailani St. (D)	30 MPH	97.0/2.0/1.0	1,883	61.3	0.8	202	124	46	39	17
Kawailani St. (E)	32 MPH	97.0/2.0/1.0	1,550	60.5	0.8	177	109	41	35	15
N. Pohakulani St.	35 MPH	97.5/2.0/0.5	60	42.4	2.7	N/A	N/A	N/A	N/A	N/A
M. Pohakulani St.	35 MPH	97.5/2.0/0.5	240	48.4	1.0	25	15	N/A	N/A	N/A
S. Pohakulani St.	35 MPH	97.5/2.0/0.5	50	41.6	2.2	N/A	N/A	N/A	N/A	N/A
Ainaola Drive	34 MPH	95.0/3.0/2.0	805	59.4	1.0	148	91	34	29	13
N. Iwalani St.	34 MPH	97.0/2.0/1.0	725	57.2	1.0	103	63	24	20	N/A
S. Iwalani St.	34 MPH	97.5/2.0/0.5	205	47.8	1.2	22	14	N/A	N/A	N/A

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TABLE 6B

NO BUILD CONDITIONS ; YEAR 2018 ; PM PEAK HR. SETBACK DISTANCES

ROADWAY SEGMENT	SPEED	VEHICLE MIX (%A/%MT/%HT)	TOTAL VPH	Leq @ 100' (dB)	CHANGE	*** DISTANCE (FT) FROM CENTERLINE *** 57 Leq	60 Leq	66 Leq	67 Leq	72 Leq
Kawailani St. (C)	35 MPH	97.0/2.0/1.0	845	57.9	0.9	116	71	27	23	10
Kawailani St. (D)	30 MPH	97.0/2.0/1.0	1,798	61.1	0.9	195	120	45	38	17
Kawailani St. (E)	32 MPH	97.0/2.0/1.0	1,225	59.5	1.0	150	92	35	29	13
N. Pohakulani St.	35 MPH	97.5/2.0/0.5	60	42.4	2.0	N/A	N/A	N/A	N/A	N/A
M. Pohakulani St.	35 MPH	97.5/2.0/0.5	690	53.0	0.9	52	32	12	10	N/A
S. Pohakulani St.	35 MPH	97.5/2.0/0.5	75	43.4	1.9	11	N/A	N/A	N/A	N/A
Ainaola Drive	34 MPH	95.0/3.0/2.0	930	60.1	1.0	166	102	38	32	14
N. Iwalani St.	34 MPH	97.0/2.0/1.0	675	56.9	1.0	98	60	23	19	N/A
S. Iwalani St.	34 MPH	97.5/2.0/0.5	140	46.1	1.4	17	N/A	N/A	N/A	N/A

TABLE 7

LIST OF NOISE IMPACTED STRUCTURES AND LAND AREAS IN CY 2018 UNDER NO-BUILD ALTERNATIVE

ROADWAY SEGMENT	** NUMBER OF IMPACTED UNITS (YEAR 2018 Leq) ** PRIVATE STRUCTURES	PUBLIC USE STRUCTURES	PARK LANDS
Kawailani St. (A)	N/A	0	None
Kawailani St. (B)	N/A	0	None
Kawailani St. (C)	0	0	None
Kawailani St. (D)	0	0	None
Kawailani St. (E)	0	0	None
Kuhilani Street	N/A	0	None
Ehehene Place	N/A	0	None
N. Pohakulani St.	0	0	None
M. Pohakulani St.	0	0	None
S. Pohakulani St.	0	0	None
Ainaola Drive	0	0	None
N. Iwalani St.	0	0	None
S. Iwalani St.	0	0	None
TOTAL:	0	0	0

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TABLE 8A

FUTURE (CY 2018) TRAFFIC VOLUMES AND NOISE LEVELS
ALONG ROADWAYS IN PROJECT AREA
(AM PEAK HOUR)

LOCATION	SPEED (MPH)	TOTAL VPH	**** VOLUMES (VPH) ****** AUTOS	M TRUCKS	H TRUCKS	50' Leq	100' Leq
Kawailani Street, Segment (C)	35	1,095	1,062	22	11	63.5	59.0
Kawailani Street, Segment (D)	30	1,695	1,644	34	17	65.4	60.9
Kawailani Street, Segment (E)	32	1,560	1,513	31	16	65.0	60.5
Pohakulani Street, North	35	240	234	5	1	52.9	48.4
Ainaola Drive	34	845	803	25	17	64.1	59.6
Iwalani Street, North	34	545	523	11	11	60.5	56.0
Iwalani Street, South	34	215	210	4	1	52.5	47.9

Note:

1. For identification of Kawailani Street segments, see TABLE 3C.

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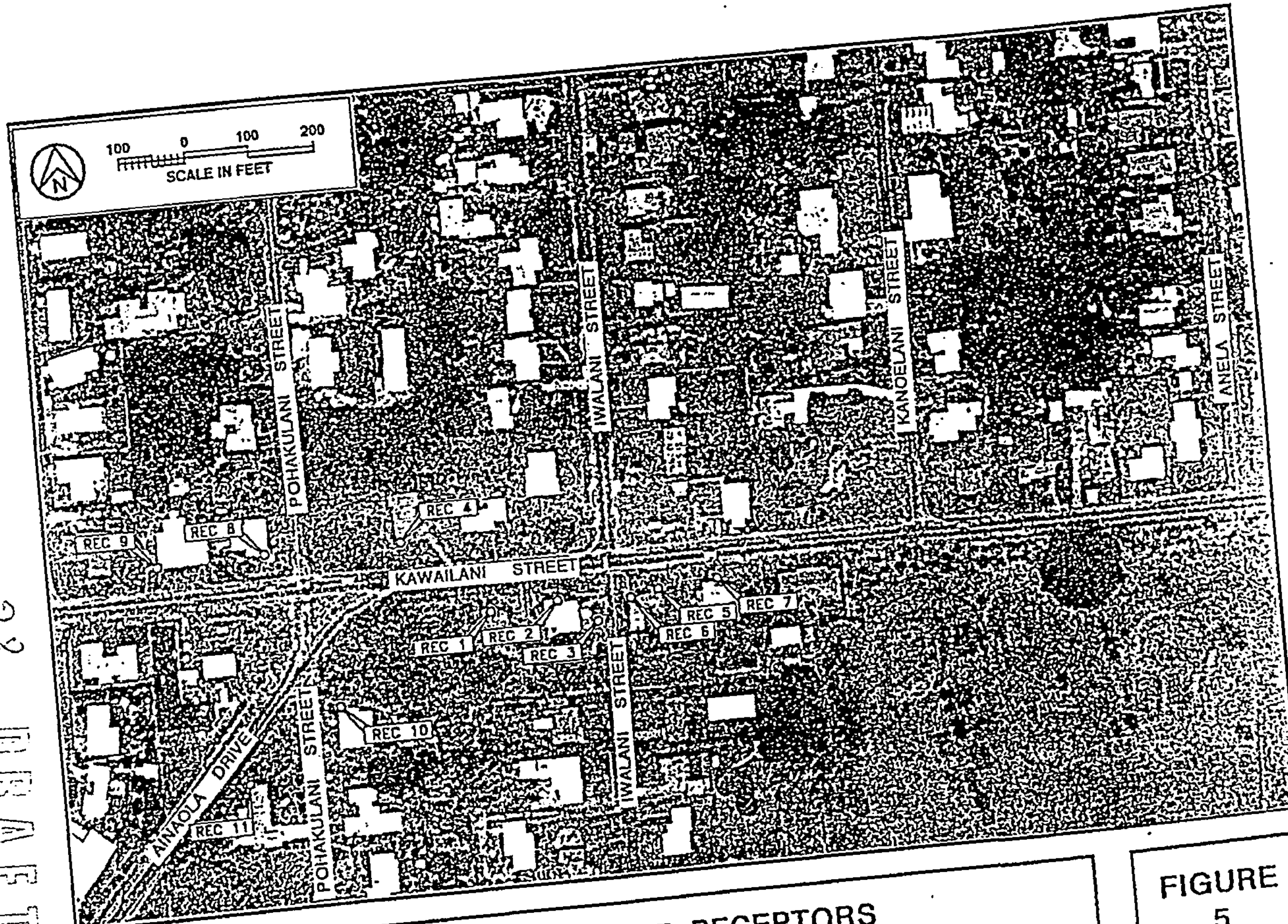
TABLE 8B

FUTURE (CY 2018) TRAFFIC VOLUMES AND NOISE LEVELS ALONG ROADWAYS IN PROJECT AREA (PM PEAK HOUR)

LOCATION	SPEED (MPH)	TOTAL VPH	**** VOLUMES (VPH) ****** AUTOS	M TRUCKS	H TRUCKS	50' Leq	100' Leq
Kawailani Street, Segment (C)	35	845	820	17	8	62.4	57.9
Kawailani Street, Segment (D)	30	1,600	1,552	32	16	65.1	60.6
Kawailani Street, Segment (E)	32	1,225	1,188	25	12	64.0	59.5
Pohakulani Street, North	35	255	249	5	1	53.2	48.7
Ainaola Drive	34	1,010	960	30	20	64.9	60.4
Iwalani Street, North	34	475	455	10	10	59.9	55.4
Iwalani Street, South	34	140	136	3	1	50.6	46.1

Note:

1. For identification of Kawailani Street segments, see TABLE 3C.



LOCATIONS OF NOISE SENSITIVE RECEPTORS
#1 THRU #15

FIGURE
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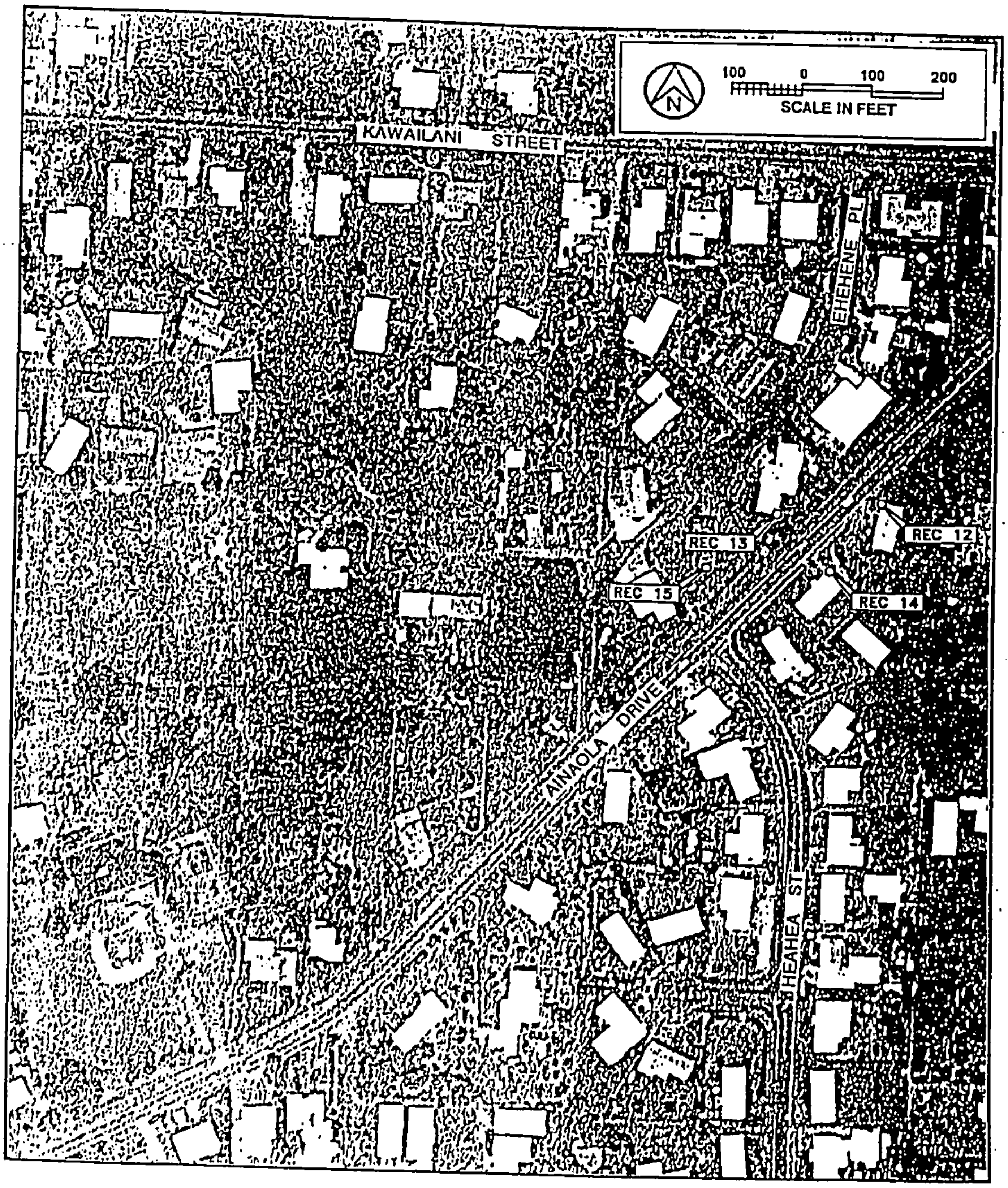

LOCATIONS OF NOISE SENSITIVE RECEPTORS #1 THRU #15

FIGURE 5(CONT.)

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TABLE 9A

SUMMARY OF EXISTING AND PREDICTED TRAFFIC NOISE LEVELS AT NOISE SENSITIVE RECEPTOR LOCATIONS #1 THROUGH #15
(4.92 FT RECEPTOR, AM PEAK HOUR)

RECEPTOR LOCATION	DISTANCE FROM C/L	EXISTING (CY 1997) Leq	-------- FUTURE (CY 2018) Leq --------			
			ALT. 1A / (CHANGE)	ALT. 2A / (CHANGE)	ALT. 1B / (CHANGE)	ALT. 2B / (CHANGE)
1 (Dwelling)	60 FT	63.8	65.5/(1.7)	65.5/(1.7)	66.2/(2.4) **	66.2/(2.4) **
2 (Dwelling)	57 FT	64.1	66.1/(2.0) **	66.1/(2.0) **	66.6/(2.5) **	66.6/(2.5) **
3 (Dwelling)	86 FT	61.5	64.3/(2.8)	64.3/(2.8)	64.2/(2.7)	64.1/(2.6)
4 (Dwelling)	60 FT	63.8	64.9/(1.1)	64.9/(1.1)	64.8/(1.0)	64.8/(1.0)
5 (Dwelling)	50 FT	64.2	67.0/(2.8) **	67.0/(2.8) **	67.8/(3.6) **	67.8/(3.6) **
6 (Dwelling)	60 FT	63.0	66.7/(3.7) **	66.7/(3.7) **	67.2/(4.2) **	67.2/(4.2) **
7 (Dwelling)	50 FT	64.2	66.5/(2.3) **	66.5/(2.3) **	67.2/(3.0) **	67.1/(2.9) **
8 (Dwelling)	59 FT	61.4	64.9/(3.5)	65.0/(3.6)	64.9/(3.5)	64.9/(3.5)
9 (Dwelling)	60 FT	61.3	63.3/(2.0)	63.2/(1.9)	63.2/(1.9)	63.2/(1.9)
10 (Dwelling)	100 FT	58.4	61.6/(3.2)	61.5/(3.1)	61.9/(3.5)	62.0/(3.6)
11 (Dwelling)	50 FT	63.0	66.2/(3.2) **	67.1/(4.1) **	67.2/(4.2) **	67.1/(4.1) **
12 (Dwelling)	45 FT	63.6	65.1/(1.5)	66.8/(3.2) **	66.8/(3.2) **	67.9/(4.3) **
13 (Dwelling)	65 FT	61.2	62.1/(0.9)	61.7/(0.5)	61.9/(0.7)	62.0/(0.8)
14 (Dwelling)	55 FT	62.3	63.0/(0.7)	63.6/(1.3)	63.6/(1.3)	63.9/(1.6)
15 (Dwelling)	80 FT	59.9	60.8/(0.9)	60.7/(0.8)	61.0/(1.1)	61.0/(1.1)

Notes:

1. Right-of-Way (R/W) wall locations as shown in FIGURES 9D through 9F.
2. * Denotes exceedance of State DOT ">15 dB Increase" Criteria.
3. ** Denotes exceedance of State DOT 66 Leq Criteria for Residences.

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TABLE 9B

SUMMARY OF EXISTING AND PREDICTED TRAFFIC NOISE LEVELS AT NOISE SENSITIVE RECEPTOR LOCATIONS #1 THROUGH #15 (4.92 FT RECEPTOR, PM PEAK HOUR)

RECEPTOR LOCATION	DISTANCE FROM C/L	EXISTING (CY 1997) Leq	--------- FUTURE (CY 2018) Leq ---------- ALT. 1A / (CHANGE)	ALT. 2A / (CHANGE)	ALT. 1B / (CHANGE)	ALT. 2B / (CHANGE)
1 (Dwelling)	60 FT	63.5			65.1/(1.6)	65.2/(1.7)
2 (Dwelling)	57 FT	63.9			65.4/(1.5)	65.4/(1.5)
3 (Dwelling)	86 FT	61.2			63.5/(2.3)	63.5/(2.3)
4 (Dwelling)	60 FT	63.5			64.9/(1.4)	64.9/(1.4)
5 (Dwelling)	50 FT	63.0			66.1/(3.1)**	66.1/(3.1)**
6 (Dwelling)	60 FT	61.8			65.3/(3.5)	65.3/(3.5)
7 (Dwelling)	50 FT	63.0			65.3/(2.3)	65.3/(2.3)
8 (Dwelling)	59 FT	60.4			65.0/(4.6)	65.1/(4.7)
9 (Dwelling)	60 FT	60.3			62.5/(2.2)	62.5/(2.2)
10 (Dwelling)	100 FT	59.1			62.1/(3.0)	62.4/(3.3)
11 (Dwelling)	50 FT	63.6			66.4/(2.8)**	66.4/(2.8)**
12 (Dwelling)	45 FT	64.3			66.5/(2.2)**	67.4/(3.1)**
13 (Dwelling)	65 FT	61.9			62.9/(1.0)	62.9/(1.0)
14 (Dwelling)	55 FT	63.0			63.8/(0.8)	64.0/(1.0)
15 (Dwelling)	80 FT	60.6			61.9/(1.3)	61.9/(1.3)

Notes:

1. Right-of-Way (R/W) wall locations as shown in FIGURES 9F through 9H.
2. * Denotes exceedance of State DOT ">15 dB Increase" Criteria.
3. ** Denotes exceedance of State DOT 66 Leq Criteria for Residences.

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A. The proposed HDOT's ">15 dB increase" criteria for substantial change in traffic noise levels will not be exceeded at any noise sensitive structure. Maximum increases in traffic noise levels in the project area should not exceed 4.3 dB as a result of growth in traffic volumes and construction of additional traffic lanes.

B. Under Alternatives 1A and 2A, future traffic noise levels at four and five homes, respectively, are expected to exceed the HDOT "66 Leq" criteria. Under Alternatives 1B or 2B, future traffic noise levels at six homes are expected to exceed the HDOT "66 Leq" criteria.

C. No parks or public use structures should be affected by the proposed project or require noise mitigation measures.

D. No commercial structures should be affected by the proposed project or require noise mitigation measures.

CHAPTER V. POSSIBLE NOISE MITIGATION MEASURES

Possible noise mitigation measures considered included the following:

A. Restricting the Growth In the Number of Noisy Buses, Heavy Trucks, Motor-cycles, and Automobiles with Defective Mufflers. The percentage contribution to the total traffic noise by heavy trucks, buses, and noisy vehicles is currently in the order of 55 percent, and elimination of these noise sources would reduce total traffic noise levels by approximately 3 dB. Restricting the growth rate of these vehicles (to growth rates below passenger automobile growth rates) could produce noise reductions in the order of 1 or 2 dB, which are not considered significant for the level of regulatory efforts required.

B. Alteration of the Horizontal Or Vertical Alignment of the Roadway. Major alterations of the horizontal or vertical alignment of the existing roadways were not considered appropriate due to the scope of this roadway improvement project and due to the Right-of-Way constraints on all sides of the affected roadways. The possible roadway alignments are controlled by the required intersection improvements. At the Kawailani and Iwalani Street intersection where four homes qualify for noise mitigation measures, the alignment of Kawailani Street is essentially constrained by existing buildings north and south of Kawailani Street. Lateral displacement of Kawailani Street toward the north would require demolition of the south side of the existing Hawaiian Telephone Building, as well as a bend toward the north of the existing roadway alignment at the intersection. A similar situation exists along Ainaola Drive where two homes at Receptor Locations 11 and 12 are situated. A bend toward the northwest of Ainaola Drive would be required just southwest of the intersection with Kawailani Street. Vertical realignment of the existing roadways upward would result in adverse visual impacts, and vertical realignment of the roadway via a cut would not be possible without obtaining additional Right-of-Way. For these reasons, realignment of the existing roadways away from the affected homes was not considered to be a reasonable noise mitigation measure.

C. Acquisition of Property Rights for Construction of Noise Barriers, and/or Construction of Noise Barriers Along the Right-of-Way. For single story, noise sensitive buildings, construction of a sound attenuating wall is normally the preferred noise mitigation measure. The 6 to 7 dB of noise attenuation achievable with a 6 FT high wall is normally sufficient for single story structures. Because five of the six affected homes are one-story structures, construction of a sound attenuating barrier could possibly provide sufficient noise reduction benefits to the affected homes. It should be noted, however, that the sound barrier will block the views to the roadway which some of the residents may enjoy. For this reason, concurrence from the affected homeowners should be obtained prior to construction of a sound barrier as a noise mitigation measure.

D. Acquisition of Real Property Interests To Serve As A Noise Buffer Zone. Where tall (or multistory) structures are expected to be impacted by future traffic noise, the use of sound attenuating barriers (see para. C above) will not be practical due to the excessive heights required to shield the upper levels from traffic noise. In these situations, the only other noise mitigation possibilities are sound insulation of the affected upper level units or acquisition of the property interests. Noise buffer zones extending approximately 65 to 70 feet from the roadways' baselines and at substantial cost would be required to meet the HDOT 66 Leq criteria. In general, the acquisition of property for the creation of noise buffer zones or noise mitigation has seldom been applied in Hawaii.

E. Noise Insulation of Public Use or Nonprofit Institutional Structures. Public use or nonprofit institutional structures should not be impacted by this project. For this reason, noise insulation of public use or nonprofit institutional structures should not be required.

CHAPTER VI. FUTURE TRAFFIC NOISE IMPACTS AND RECOMMENDED NOISE MITIGATION MEASURES

Future traffic noise levels are predicted to exceed the HDOT 66 Leq(h) and FHWA 67 Leq(h) noise abatement criteria by CY 2018 with the project at existing noise sensitive dwellings along Kawailani Street and Ainaola Drive. Table 10 presents the predicted performances of sound attenuation walls located along the Right-of-Way and in front of the affected homes. Figures 6 thru 11 depict the locations of the affected homes and the sound attenuation walls which were evaluated. Mitigation of future traffic noise at the second floor of the existing home at Location 2 will not be feasible using a sound wall along the roadway Right-of-Way, since a wall height in excess of 8 feet above roadway grade is required to shield the elevated living unit from traffic noise. Use of alternate noise mitigation measures, such as window air conditioning units for the second floor living areas is recommended.

The use of a 5.5 to 6.0 foot high sound attenuating walls is recommended where shown in Figures 6 thru 11 for the various Build Alternatives. The predicted future noise levels for the recommended wall heights shown in Figures 6 thru 11 are shown in Table 10 under the "RECOM. WALL" column. Although the HDOT "5 dBA noise reduction" criteria will not be met at Locations #1, #7, and #12 by the recommended wall heights, the construction of walls exceeding 6 feet in height is not considered to be reasonable since the HDOT "66 Leq" noise abatement criteria will be met with wall heights of 6 feet or less in all ground level living areas. A variance from local building codes will be required to construct the 6.5 to 7.0 foot high walls which are required to achieve 5 dBA of noise reduction vs. the 4.3 to 4.9 dBA of noise reduction provided by the recommended wall heights. The sound attenuating walls must be continuous without see-through openings, and may be constructed from solid materials which have a minimum surface weight of 5 pounds per square foot. Use of landscaping on the roadway side of the wall is also recommended to soften the visual impacts of the walls and to minimize the potential for graffiti.

It is anticipated that potential noise impacts at any new noise sensitive or commercial establishments located in the project area may be mitigated through the inclusion of sound walls or other noise mitigation measures within the individual lot development plans. In addition, any new commercial establishments or housing units which may be planned alongside the roadway represent areas of potential adverse noise impacts if adequate noise mitigation measures are not incorporated into the planning of these future projects. It is anticipated that the project's roadway improvements will be completed prior to any redevelopment of the presently open

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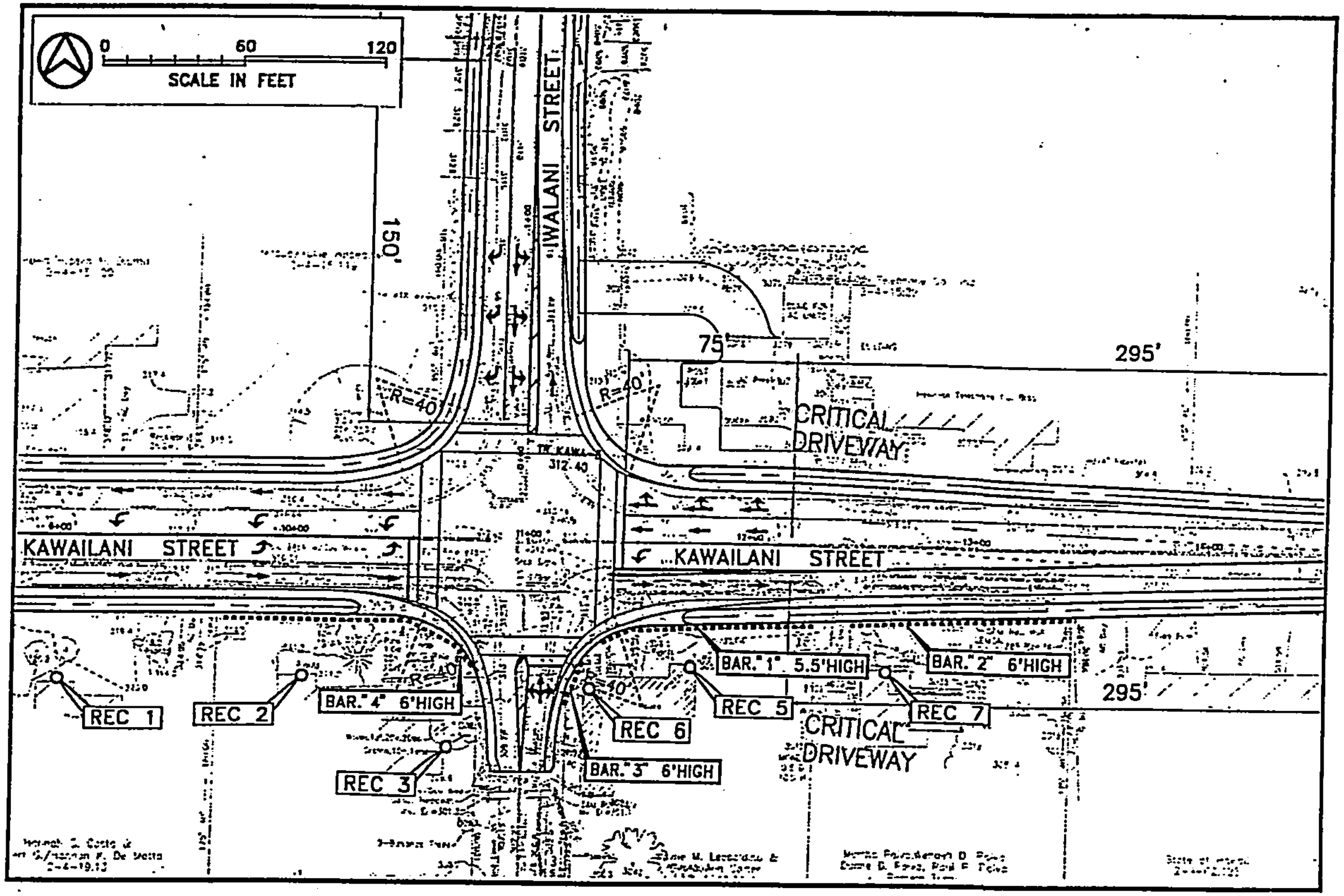
TABLE 10

PREDICTED TRAFFIC NOISE ATTENUATION VS. BARRIER HEIGHTS
(4.92 FT RECEPTOR, AM OR PM PEAK HOUR)

RECEPTOR LOCATION	SETBACK DIST. FROM EXIST. C/L	EXISTING (CY 1997) Leq	FUTURE (CY 2018) Leq: W/O BAR./ (CHANGE)	FUTURE (CY 2018) Leq: 5.5 FT WALL (CHANGE)	FUTURE (CY 2018) Leq: 6.0 FT WALL (CHANGE)	FUTURE (CY 2018) Leq: 6.5 FT WALL (CHANGE)	FUTURE (CY 2018) Leq: RECOM. WALL (CHANGE)
ALTERNATIVES 1A & 2A – AM PEAK HOUR:							
Receiver #2	57 FT	64.1	66.1/(2.0)**	61.1/(−3.0)	60.7/(−3.4)	60.3/(−3.8)	60.7/(−3.4)
Receiver #5	50 FT	64.2	67.0/(2.8)**	61.6/(−2.6)	61.0/(−3.2)	60.5/(−3.7)	61.5/(−2.5)
Receiver #6	60 FT	63.0	66.7/(3.7)**	62.0/(−1.0) ***	61.5/(−1.5)	61.2/(−1.8)	61.7/(−1.3)
Receiver #7	50 FT	64.2	66.5/(2.3)**	62.4/(−1.8) ***	62.1/(−2.1) ***	61.8/(−2.4) ***	62.1/(−2.1) ***
Receiver #11	48 FT	63.9	67.0/(3.1)**	61.0/(−2.9)	60.6/(−3.3)	60.0/(−3.9)	61.0/(−2.9)
Receiver #12 (2A)	45 FT	63.6	66.8/(3.2)**	62.6/(−1.0) ***	62.2/(−1.4) ***	61.9/(−1.7) ***	62.2/(−1.4) ***
ALTERNATIVES 1B & 2B – AM OR PM PEAK HOUR:							
Receiver #1 (AM)	60 FT	63.8	66.2/(2.4)**	61.7/(−2.1) ***	61.3/(−2.5) ***	61.0/(−2.8)	61.3/(−2.5) ***
Receiver #2 (AM)	57 FT	64.1	66.6/(2.5)**	61.3/(−2.8)	60.8/(−3.3)	60.3/(−3.8)	60.8/(−3.3)
Receiver #5 (AM)	50 FT	64.2	67.8/(3.6)**	61.5/(−2.7)	60.8/(−3.4)	60.2/(−4.0)	61.5/(−2.7)
Receiver #6 (AM)	60 FT	63.0	67.2/(4.2)**	61.8/(−1.2)	61.3/(−1.7)	60.9/(−2.1)	61.6/(−1.4)
Receiver #7 (AM)	50 FT	64.2	67.2/(3.0)**	62.7/(−1.5) ***	62.4/(−1.8) ***	62.0/(−2.2)	62.4/(−1.8) ***
Receiver #11 (1B, AM)	48 FT	63.9	67.2/(3.3)**	60.9/(−2.0)	60.0/(−3.9)	59.2/(−4.7)	60.9/(−2.0)
Receiver #12 (2B, PM)	45 FT	64.3	67.4/(3.1)**	63.5/(−0.8) ***	63.1/(−1.2) ***	62.9/(−1.4) ***	63.1/(−1.2) ***

Notes:

1. Right–of–Way (R/W) wall locations as shown in FIGURES 6 through 11.
2. * Denotes exceedance of State DOT ">15 dB Increase" Criteria.
3. ** Denotes exceedance of State DOT "66 Leq" Criteria for Residences.
4. *** Denotes need for additional barrier height to meet State DOT "5 dBA Minimum Attenuation" Criteria.
5. Second floor of two–story home at Receiver Location 2 will not benefit from wall.
6. 7' wall height required to obtain 5 dBA noise reduction at Receivers #7 and #12..



LOCATIONS OF RECOMMENDED NOISE BARRIERS ALONG KAWAILANI STREET FOR ALTERNATIVES 1A AND 2A

FIGURE 6

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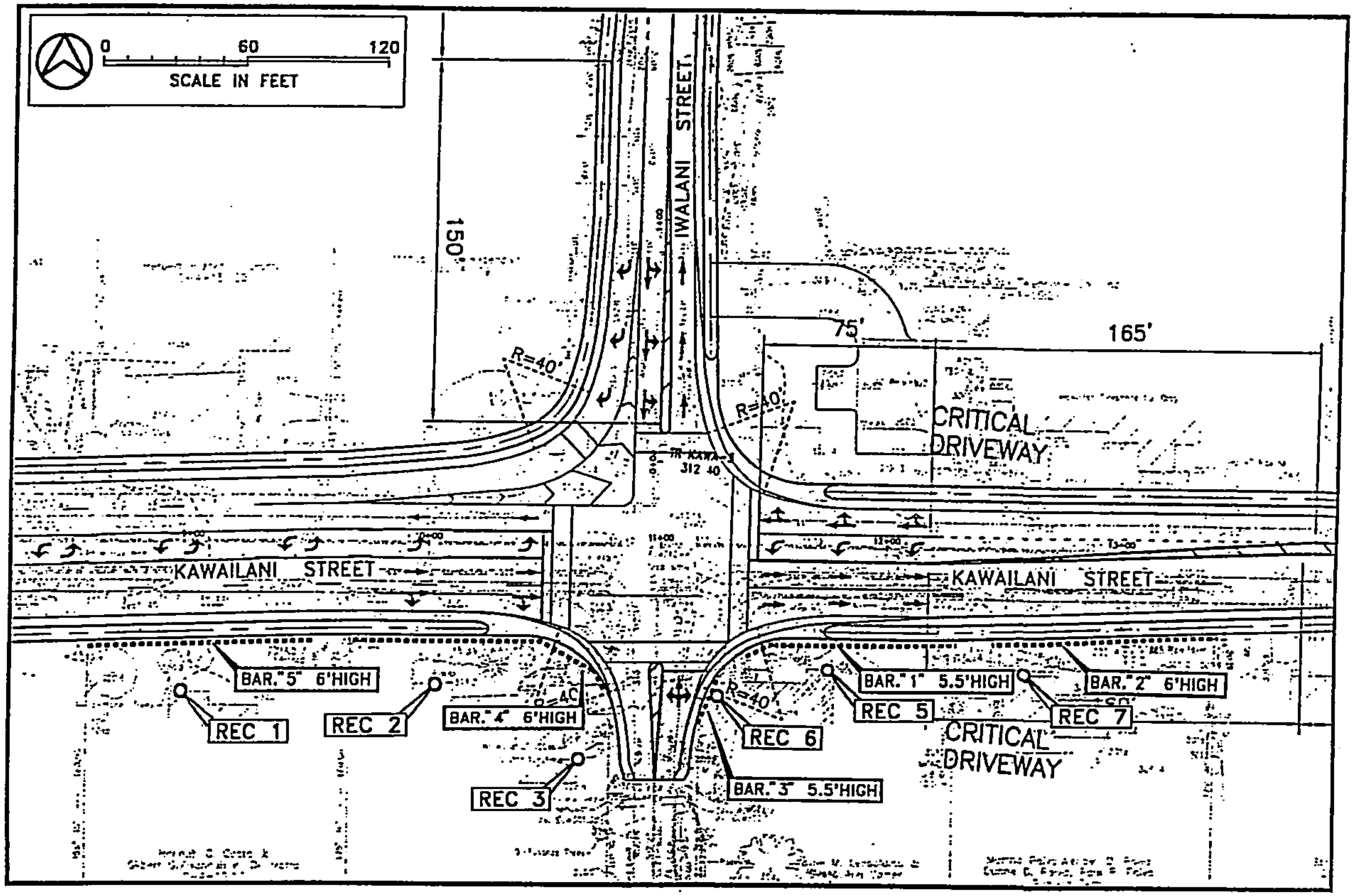
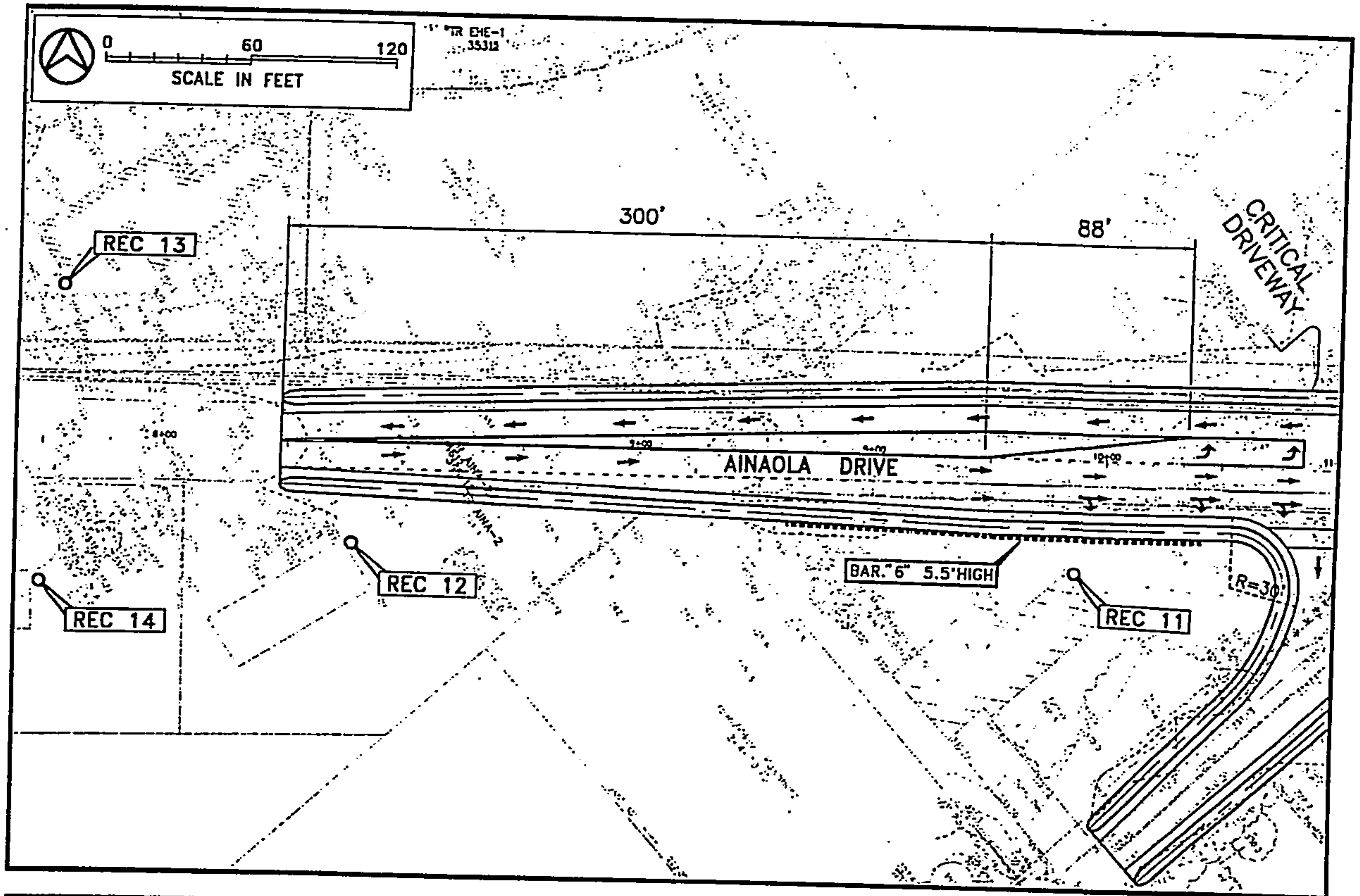


LOCATIONS OF RECOMMENDED NOISE BARRIERS ALONG KAWAILANI STREET FOR ALTERNATIVES 1B AND 2B

FIGURE 7



LOCATION OF RECOMMENDED NOISE BARRIER
ALONG AINALOA DRIVE FOR ALTERNATIVE 1A

FIGURE
8

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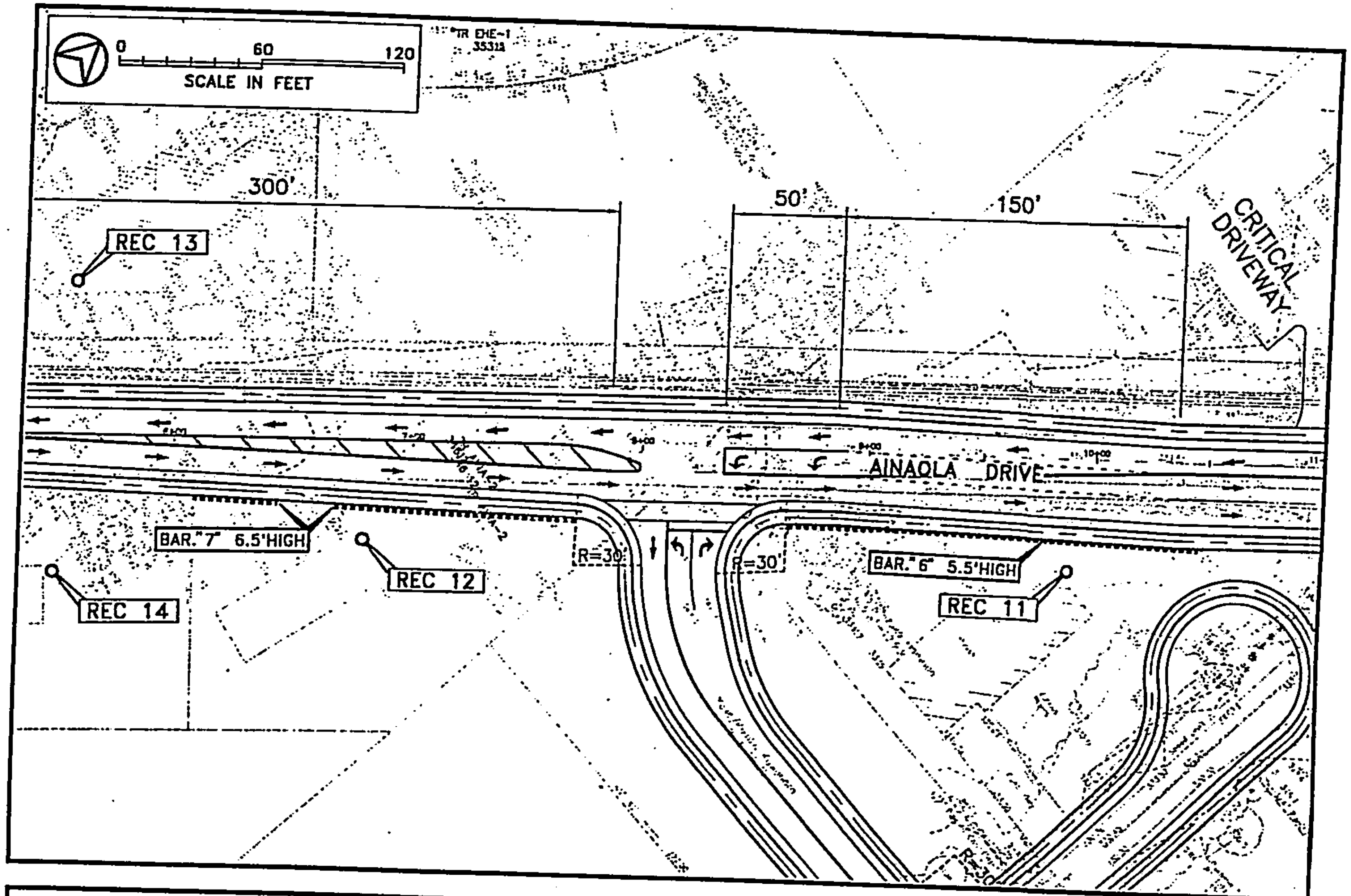

LOCATIONS OF RECOMMENDED NOISE BARRIERS ALONG AINALOA DRIVE FOR ALTERNATIVE 2A

FIGURE 9

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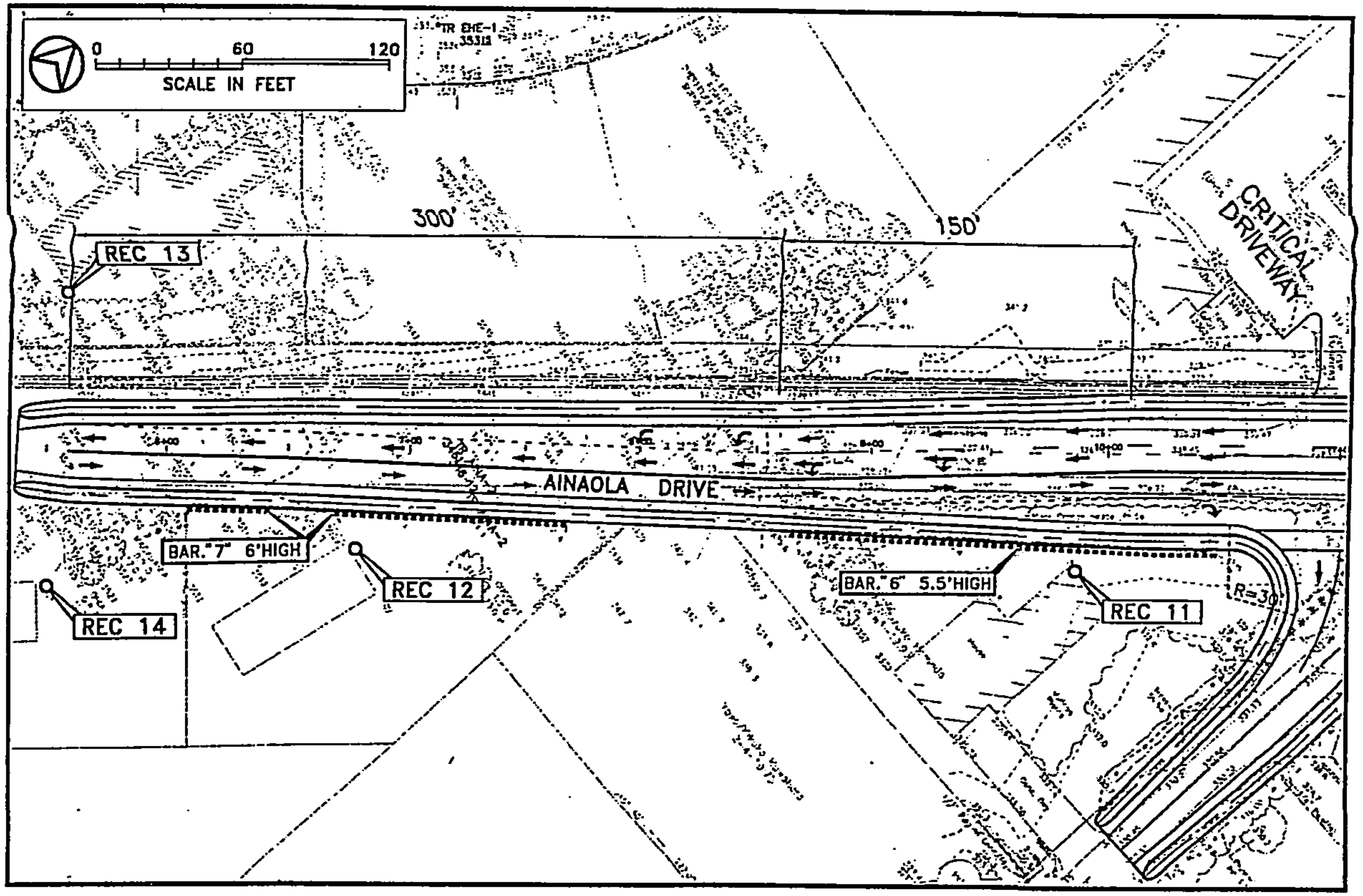

LOCATIONS OF RECOMMENDED NOISE BARRIERS
ALONG AINALOA DRIVE FOR ALTERNATIVE 1B

FIGURE
10

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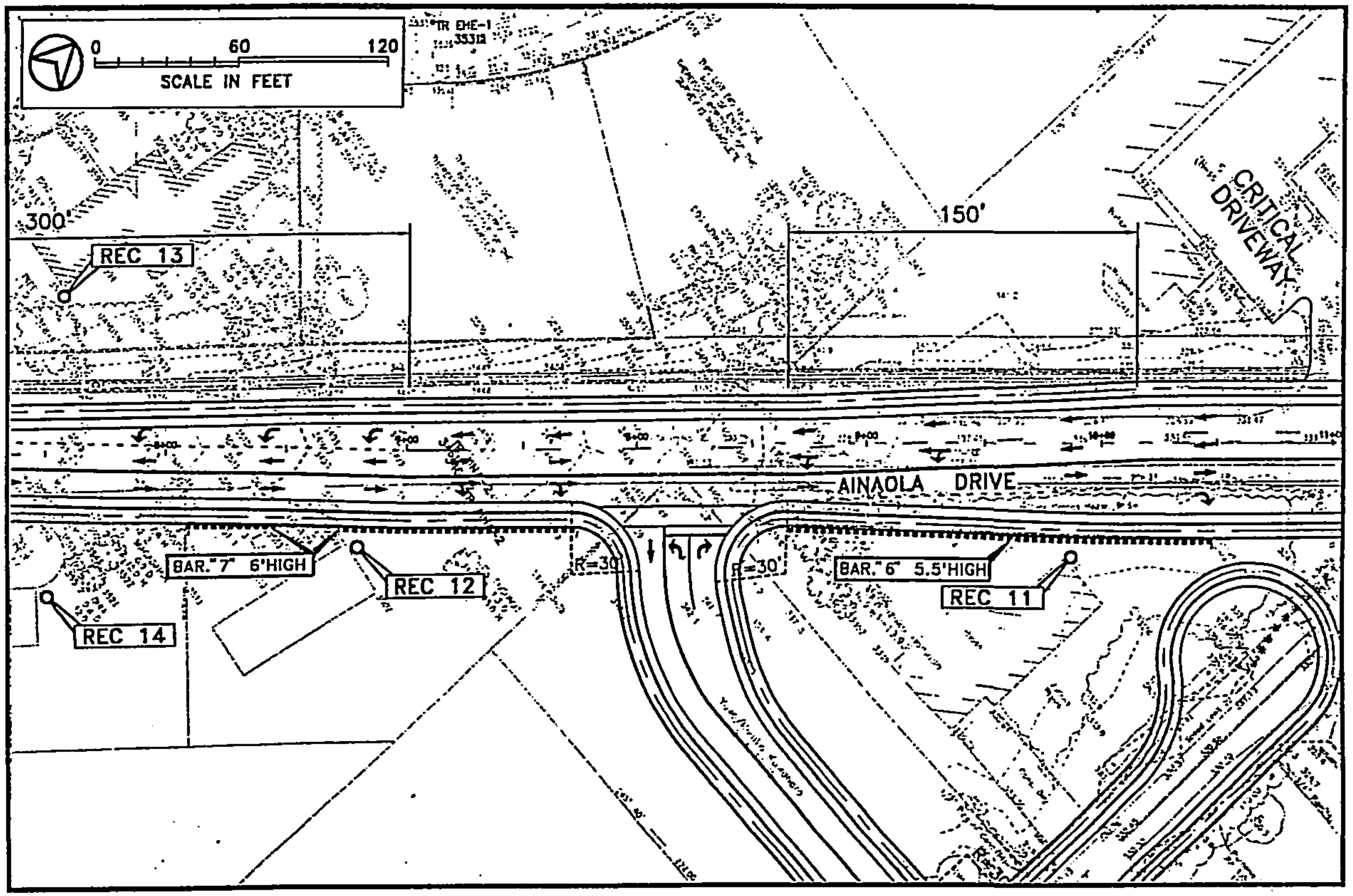


LOCATIONS OF RECOMMENDED NOISE BARRIERS ALONG AINALOA DRIVE FOR ALTERNATIVE 2B

FIGURE 11

areas or commercial lots adjacent to a roadway, and that noise abatement measures such as adequate setbacks, sound attenuating walls or berms, or closure and air conditioning will be incorporated into these new developments along a roadway as required. In any event, new structures whose building permits were obtained after the date of this noise study will not qualify for noise abatement measures under existing HDOT procedures.

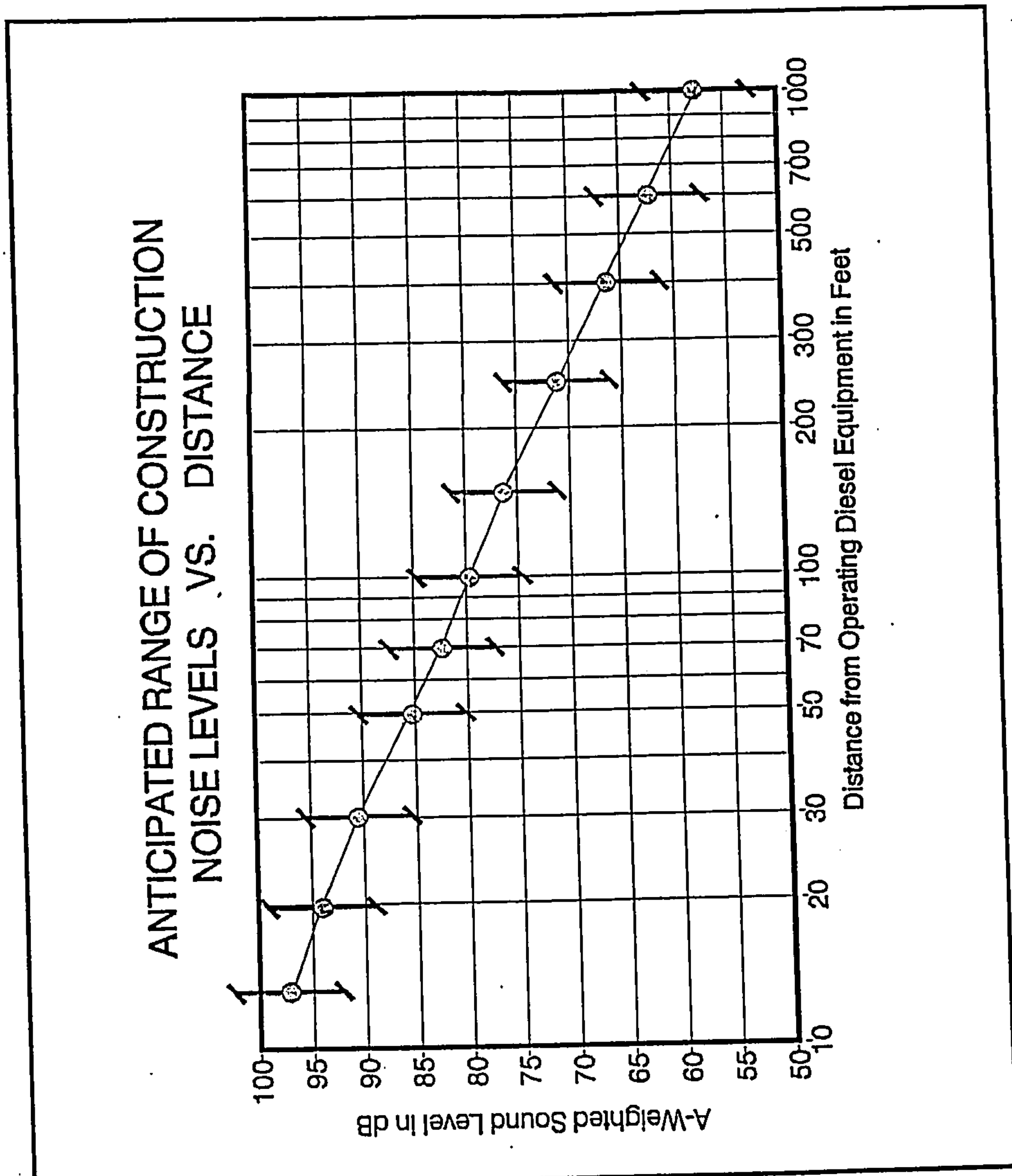
CHAPTER VII. CONSTRUCTION NOISE IMPACTS

Short-term noise impacts associated with construction activities along the existing roadway may occur. These impacts can occur as a result of the short distances (less than 100 FT) between existing dwelling units and commercial establishments to the anticipated construction corridor. The total duration of the construction period for the proposed project is not known, but noise exposure from construction activities at any one receptor location is not expected to be continuous during the total construction period.

Noise levels of diesel powered construction equipment typically range from 80 to 90 dB at 50 FT distance. Typical levels of noise from construction activity (excluding pile driving activity) are shown in Figure 12. 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 and due to the administrative controls available for its regulation. 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.

Construction noise levels at existing structures can intermittently exceed 90 dB when work is being performed at close distances in front of these structures. Along the north portion of the roadway improvement project, distances between the construction sites and receptors are expected to be between 10 and 100 FT, and construction noise levels may intermittently exceed 90 dB. The State Department of Health currently regulates noise from construction activities under a permit system (Reference 7). Under current permit procedures (see Table 11), noisy construction activities are restricted to hours between 7:00 AM and 6:00 PM, from Monday through Friday, and exclude certain holidays. Noisy construction activities are normally restricted to the hours of 9:00 AM to 6:00 PM on Saturdays, with construction not permitted on Sundays. These restrictions minimize construction noise impacts on noise sensitive receptors along the roadway project corridor, and have generally been successfully applied. In this way, construction noise impacts on noise sensitive receptors can be minimized.

In addition, the use of quieted portable engine generators and diesel equipment should be specified for use within 500 FT of noise sensitive properties. Heavy truck and equipment staging areas should also be located at areas which are at least 500 FT from noise sensitive properties whenever possible. Truck routes which avoid residential communities should be identified wherever possible. The use of 8 to 12 FT



CONSTRUCTION NOISE LEVELS VS. DISTANCE

FIGURE 12

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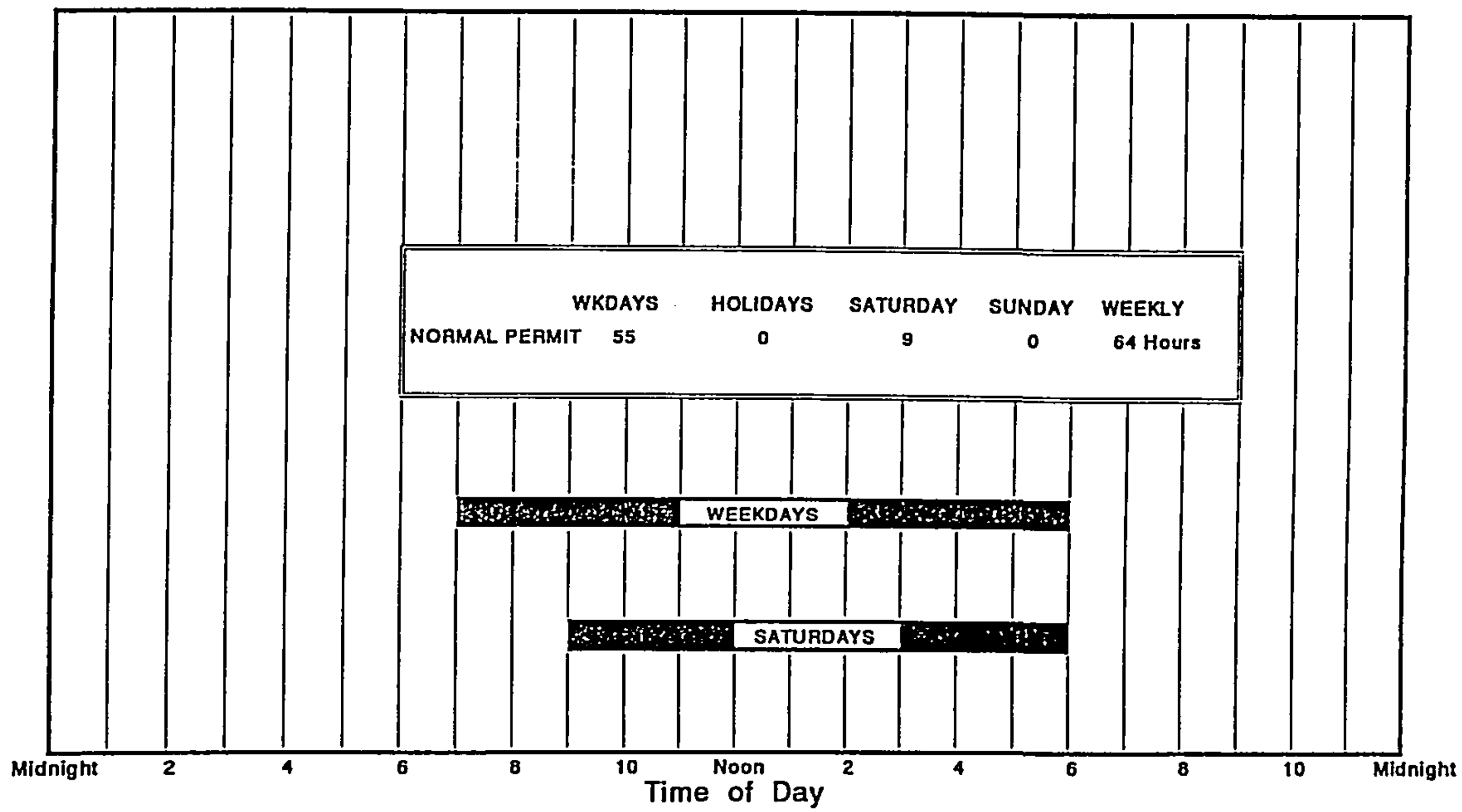

AVAILABLE WORK HOURS UNDER DOH PERMIT PROCEDURES FOR CONSTRUCTION NOISE

TABLE 11

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high construction noise barriers may also be used where close–in construction work to noise sensitive structures is unavoidable.

APPENDIX A. REFERENCES

(1) "FHWA Highway Traffic Noise Model User's Guide;" FHWA-PD-96-009, Federal Highway Administration; Washington, D.C.; January 1998.

(2) Draft Traffic Data and Forecasts for the Proposed Kawailani-Iwalani-Ainaola Traffic Signal Improvements Project; Transmittals from The Traffic Management Consultant; 10/23/97 and 6/29/98.

(3) 24-Hour Traffic Counts and Vehicle-Type Classification, Station 18-77, Kawailani Street at Iwalani Street; June 25-26, 1996; Hawaii State Department of Transportation.

(4) 24-Hour Traffic Counts and Vehicle-Type Classification, Station 18-77, Kawailani Street at Iwalani Street; August 7, 1996; Hawaii State Department of Transportation.

(5) Federal Highway Administration; "Procedures for Abatement of Highway Traffic Noise and Construction Noise;" 23 CFR Chapter I, Subchapter H, Part 772; April 1, 1995.

(6) "Noise Analysis and Abatement Policy;" Hawaii State Department of Transportation, Highways Division, Materials Testing and Research Branch; October 1996.

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

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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,

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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.

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APPENDIX C

SUMMARY OF BASE YEAR AND FUTURE YEAR
TRAFFIC VOLUMES

ROADWAY LANES	**** CY AM VPH	1997 ***** PM VPH	CY 2018 (SCH A) AM VPH	PM VPH	CY 2018 (SCH B) AM VPH	PM VPH
Kawailani-Seg b (EB)	484	313	N/A	N/A	N/A	N/A
Kawailani-Seg b (WB)	402	432	N/A	N/A	N/A	N/A
Two-Way	886	745	N/A	N/A	N/A	N/A
Kawailani-Seg c (EB)	480	314	600	380	600	380
Kawailani-Seg c (WB)	392	375	495	465	495	465
Two-Way	872	689	1,095	845	1,095	845
Kawailani-Seg d (EB)	990	531	1,060	600	1,060	600
Kawailani-Seg d (WB)	554	918	635	1,000	635	1,000
Two-Way	1,543	1,448	1,695	1,600	1,695	1,600
Kawailani-Seg e (EB)	772	381	905	480	905	480
Kawailani-Seg e (WB)	525	599	655	745	655	745
Two-Way	1,297	980	1,560	1,225	1,560	1,225
Kuhilani (NB)	57	36	N/A	N/A	N/A	N/A
Kuhilani (SB)	61	112	N/A	N/A	N/A	N/A
Two-Way	118	148	N/A	N/A	N/A	N/A
Ehehene (NB)	17	7	N/A	N/A	N/A	N/A
Ehehene (SB)	11	14	N/A	N/A	N/A	N/A
Two-Way	28	21	N/A	N/A	N/A	N/A
Pohakulani-North (NB)	7	24	150	95	150	95
Pohakulani-North (SB)	25	14	90	160	90	160
Two-Way	32	38	240	255	240	255
Pohakulani-Center (NB)	8	5	N/A	N/A	N/A	N/A
Pohakulani-Center (SB)	181	556	N/A	N/A	N/A	N/A
Two-Way	189	561	N/A	N/A	N/A	N/A
Pohakulani-South (NB)	26	20	N/A	N/A	N/A	N/A
Pohakulani-South (SB)	4	29	N/A	N/A	N/A	N/A
Two-Way	30	49	N/A	N/A	N/A	N/A
Ainaola (NEB)	467	228	610	295	610	295
Ainaola (SWB)	176	521	235	715	235	715
Two-Way	643	749	845	1,010	845	1,010
Iwalani-North (NB)	449	172	425	160	425	160
Iwalani-North (SB)	132	362	120	315	120	315
Two-Way	581	534	545	475	545	475
Iwalani-South (NB)	128	25	170	40	170	40
Iwalani-South (SB)	28	76	45	100	45	100
Two-Way	156	101	215	140	215	140

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KAWAILANI STREET INTERSECTION IMPROVEMENTS
ENVIRONMENTAL ASSESSMENT

APPENDIX 4

PUBLIC INVOLVEMENT

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4 7 ...

Stephen K. Yamashiro
Mayor

Virginia Goldstein
Director

Russell Kokubun
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
25 Aupuni Street, Room 109 • Hilo, Hawaii 96720-4252
(808) 961-8288 • Fax (808) 961-8742

June 3, 1998

RECEIVED JUN 10 1998 OKAHARA & ASSOC., INC. HILO OFFICE

Mrs. Donna Fay K. Kiyosaki, P.E.
Chief Engineer
Department of Public Works
25 Aupuni Street
Hilo, HI 96720

Dear Mrs. Kiyosaki:

Preliminary Comments Regarding Preparation of Draft Environmental Assessment for
Intersection Improvements at Ainaola Drive and Kawailani Streets, Hilo, Hawaii

Thank you for your letter dated May 27, 1998, requesting our preliminary comments regarding the preparation of a draft environmental assessment for proposed improvements to Kawailani Street at its intersections with Ainaola Drive-Pohakulani Street and Iwalani Street. We have completed our preliminary review and have the following comment to offer for your consideration.

While we support the improvement of these intersections to maximize traffic safety and minimize traffic congestion, the material included with your letter does not clearly indicate the various improvement alternatives being explored. Your letter does state that several alternative intersection designs are being developed. Therefore, we are not able to provide you with any comments specific to the proposed improvements at this time. These alternative designs should be included within the draft environmental assessment.

In general terms, we should have no objections should the redesign of these intersections be limited to the installation of traffic signals, the widening of the roadway, or a combination thereof. However, should there be a need to widen or realign portions of the existing road right-of-way, then the requirements of Chapter 23, Hawaii County (Subdivision) Code must be complied with and the impacts of such widening discussed within the environmental assessment.

Mrs. Donna Fay K. Kiyosaki, P.E.
Chief Engineer
Department of Public Works
Page 2
June 3, 1998

Thank you for giving our office the opportunity to comment. We look forward to reviewing the draft environmental assessment. Should you have any questions, please contact Daryn Arai of this office at 961-8288.

Sincerely

Virginia Goldstein

VIRGINIA GOLDSTEIN
Planning Director

DSA:cjf
f:\wp60\czm\Ch343\LDPW01.dsa

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wr
Faxing 2 pages - FS.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Blvd, Rm 3-122
Box 50088
Honolulu, HI 96850

JUN 26 1998

In Reply Refer To: EAS

1998

OKAHARA & ASSOC., INC.
HILO OFFICE

Donna Fay K. Kiyosaki, P.E.
County of Hawaii
Department of Public Works
25 Aupuni Street, Room 202
Hilo, Hawaii 96720-4252

RE: Environmental Assessment, Intersection Improvements at Ainaola Drive and Kawailani Streets, Hilo, Hawaii

Dear Ms. Kiyosaki:

Thank you for the opportunity to review and comment on your letter dated May 27, 1998, concerning the Environmental Assessment (EA) for intersection improvements at Ainaola Drive and Kawailani Streets in Hilo, Hawaii.

The County of Hawaii Department of Public Works, in conjunction with the Hawaii State Department of Transportation, and the Federal Highway Administration's Hawaii Division is beginning a design for a safety-related intersection project in Hilo. The proposed project would improve the two closely spaced intersections of Kawailani Street with Iwalani Street and Ainaola Drive with Pohakulani Street. The intersections have a greater than average rate of accidents and are subject to congested traffic conditions during morning and afternoon peak hours. The purpose of the project is to redesign the intersections in such a way as to maximize traffic safety and minimize peak hour traffic congestion.

No threatened or endangered species are known to occur in the vicinity of the proposed intersection improvements and no significant adverse impacts to fish and wildlife resources are expected to result from the proposed project.

The Fish and Wildlife Service appreciates the opportunity to comment on the proposed intersection improvements. If you have questions regarding these comments, please contact Fish and Wildlife Biologist Elizabeth Sharpe by telephone at 808/541-3441 or by facsimile transmission at 808/541-3470.

Sincerely,

ACTING

Brooks Harper
Field Supervisor
Ecological Services

cc: NMFS-PAO, Honolulu
USEPA-Region IX, San Francisco

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

COPY

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

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

JUL 13 1998

July 10, 1998

LOG NO: 21939
DOC NO: 9806MS02

Ms. Donna Fay K. Kiyosaki, P.E.
County of Hawaii Department of Public Works
25 Aupuni Street, Room 202
Hilo, Hawaii 96720

Dear Ms. Kiyosaki:

SUBJECT: **Section 106 Review: Historic Preservation Concerns for Environmental Assessment, Intersection Improvements at Ainaola Drive and Kawailani Streets**
Waiakea Homesteads, South Hilo, Hawaii
TMK: (3)2-4-19:roadway

Thank you for the opportunity to review this project. As Federal Highway Administration funds are involved, a Section 106 review is required to remain in compliance with the National Historic Preservation Act of 1966, as amended.

A sight inspection to the project area was made by Historic Preservation Division staff archaeologist Marc Smith on June 17, 1998. Following this inspection, he concurs with your assessment that the project area has been modified in the past, and it would be very unlikely to have any significant historic sites present in the project area. We believe that the proposed action will have no effect on significant historic sites.

If you should have any further questions please call Pat McCoy at 587-0006 (Honolulu), or Marc Smith at 933-0482 (Hilo).

Aloha,

Gilbert S. Coloma-Agaran
for Michael D. Wilson, Chairperson and
State Historic Preservation Officer

MS:amk

c. Okahara & Associates, Inc.
Ron Terry, Geo Metrician Associates

RECEIVED
JUL 17 1998
OKAHARA & ASSOC., INC.
HILO OFFICE

faxed 5/26 2pm FROM: PUAINAKO ST. EXTENSION DEIS

also: Lanakila Homes 11/97 FEA
Hilo Judiciary Complex 3/97 FEIS
DHHL Scattered Houselots 10/97 FEIS

Table 4-12

Projects with Potential to Produce Cumulative Impacts

Project	Location/Timeframe	Resources Affected/Mitigation Measures
Sum of Projects That Have Resulted in Existing Housing, Facilities and Road Infrastructure in Hilo	City of Hilo: (Existing)	All* [Many Impacts Prior to or not Subject to Requirements for Mitigation Measures]
Alenaio Stream Flood Control	North of Project Area: 1994-1996	Floodplains [Beneficial Impact] Relocations [Mitigated by Compensation, etc]
Mohouli Street Extension 6.4 km (4.0 mi.) of New 2-lane Roadway	Direct Project Area: 1999-2000	Air Quality [Beneficial Impact] Water Quality [Best Mgmt. Practices Implement. Through Water Quality Permits] Floodplains [Minimal Impact] Native Biota [Minimal Impact] Wetlands [Minimal Impact]
Sunrise Estates Increment 2 140-150 residential lots	Adjacent Upper Portion: 1999	Water Quality [Best Mgmt. Practices Implement. Through Water Quality Permits] Floodplains [Minimal Impact] Native Biota [Minimal Impact] Wetlands [Minimal Impact] Historic Sites [Probable Minimal Impact]
Brilhante Subdivision 15-20 residential lots	Adjacent Upper Portion: 1999-2002	[Impacts and Mitigation Similar to Above]
Kaumana Homesteads 112 1-acre ag./resid. lots	Intersects Upper Portion: 1999: 1st Phase	[Impacts and Mitigation Similar to Above]
Saddle Road Improvements 78 km (48 mi.) of improved and/or New 2-lane Roadway	At Southern Terminus of Project: 2000-2010?	Air Quality Water Quality Floodplains Native Biota Threat.& End. Spp [Habitat Replacement] Wetlands Noise Historic Sites Visual Quality Growth Induction [Limited Development Potential]
Gentry Subdivision 700 sing./multifam. homes	Adjacent Upper Portion: [no current timetable]	[Impacts and Mitigation Similar to Subdiv. Above]
M10 Inc. Subdivision 40-50 single family homes	Adjacent Upper Portion: [no current timetable]	[Impacts and Mitigation Similar to Above]
Kupulau-Ponahawai Road Extension	Intersect Upper Portion: 2005? [no current timetable]	Air Quality [Beneficial Impact] Water Quality [Best Mgmt. Practices Implement. Through Water Quality Permits] Floodplains [Minimal Impact] Native Biota [Minimal Impact] Wetlands [Minimal Impact]
University Expansion 100-acre campus	W. of Komohana Street: No current plans.	[Impacts and Mitigation Similar to Above]

Source: Hawaii County General Plan; Hawaii County Planning Department Records; Hawaii State DOT *Hawaii Transportation Masterplan* (Draft, 1997); *Kaumana Homesteads Final Environmental Assessment* (subm. to Hawaii State Department of Land & Natural Resources, October 1998); *Preliminary Drainage Study, Sunrise Estates Unit II* (Inaba &Associates, 1995).
* Water Quality, Air Quality, Noise, Floodplains, Native Biota, Threatened and Endangered Species, Wetlands, Relocation, Historic Sites, Visual Quality, Growth Induction, and others.

KAWAILANI STREET IMPROVEMENTS
ENVIRONMENTAL ASSESSMENT
APPENDIX 4, Part 2

Public Informational Meeting Notice/Newspaper Article
for June 17, 1999 Public Informational Meeting

NOTICE OF PUBLIC MEETING

Notice is given that the Hawaii County Department of Public Works in cooperation with the State Department of Transportation and the Federal Highway Administration will hold a public meeting on June 17 (Thursday), 1999, at 6:30pm, at Campus Center 301, University of Hawaii at Hilo, 200 W. Kawili Street, Hilo, Hawaii.

The purpose of the meeting is to explain, receive comments, and answer questions concerning the Kawailani Street Improvements project, which would widen the intersections of Ainaola Drive and Iwalani Street with Kawailani Street and install traffic signals.

An Environmental Assessment has been prepared for the project. The County of Hawaii will discuss the project alternatives, environmental effects, and tentative schedules for right-of-way acquisition and construction. Interested persons with comments on the social, economic or environmental impact of any of the alternatives are invited to be heard.

Persons unable or not desiring to appear at the meeting may file signed statements presenting their views on the project. Such statements should be submitted on or before July 7, 1999, and should be addressed to the Deputy Chief Engineer, Hawaii County Department of Public Works, 25 Aupuni Street, Hilo, Hawaii 96720.

Jiro Sumada
Deputy Chief Engineer

(120468 Hawaii Tribune-Herald: June 8, 1999)

Kawailani subject of meeting

A public meeting will be held at 6:30 p.m. today on proposed improvements to Kawailani Street in Hilo.

The meeting is being held to take comments and inform the public about the project which includes widening of the Ainaola Drive and Iwalani Street intersections and installation of traffic signals. The meeting to include county, state and federal officials will be held at the University of Hawaii at Hilo's Campus Center Room 301.

Hawaii Tribune-Herald, Thursday, June 17, 1999—9

KAWAILANI STREET IMPROVEMENTS
ENVIRONMENTAL ASSESSMENT
APPENDIX 4, Part 3: Sign-In Sheet

KAWAILANI STREET IMPROVEMENTS
PUBLIC MEETING

DATE: June 17, 1999
TIME/PLACE: 6:30 PM - UH-Hilo Campus Center 301

SIGN-IN SHEET

NAME (please print)	GROUP (if applicable)	PHONE (optional)
RALPH YOSHIZUMI	AHUALANI Community Assn	959-6923
	1007 ULANA PL	
	HILO HI 96720	
Theo Kuske	~~[illegible]~~ Iwalani Kuwini	630 Iwalani St. Hilo, HI 96720
~~[illegible] Kaid~~	"	959-9541
Kazue Kaide	"	720 Iwalani St H 9672
GALEN KUBO		959-6052
KEITH AKIYAMA		717 IWALANI ST, HILO
Raymond Mishina		600 IWALANI ST HILO
Jim Arakaki	Hi County Council	
Arnold Okamura		959 8019
STEVE Hunt	General Interest	966 6190

KAWAILANI STREET IMPROVEMENTS
ENVIRONMENTAL ASSESSMENT
APPENDIX 4, Part 4

Meeting Notes and Summary of Public Informational Meeting Issues/Responses

A public informational meeting on the project was held on June 17, 1999, at Campus Center 301 at the University of Hawaii at Hilo. Below are notes from the meetings. Following is a summary of each issue raised and the responses of the team after considering and researching outstanding issues.

MEETING NOTES.

During a half-hour open house, the project team informally explained the project on an individual basis with the aid of poster-size graphics showing alternatives, cross-sections, intersection details, and noise impacted properties. Afterwards, there was a brief presentation explaining the Environmental Assessment process and explaining the project's purpose and need, alternatives, impacts and mitigation. The role of written public comments was explained and attendees were informed on how they could officially comment. Afterwards there was a comment/question and answer session.

The first commenter stated that sight distance is currently inadequate for right turns from north-bound Ainaola Drive and south-bound Iwalani Street traffic. He wondered if the free right turn lanes shown in Alternative B would be less safe than under At. Several others stated that they agreed with this. One wondered if even in Alternative A right-turns should be prohibited after stopping on red for these two movements. Another wondered whether sight distance adjustments would be undertaken.

Another commenter expressed a preference for Alternative A schemes. She said that the advantages of Alternative B seem to be for PM, mauka-bound traffic. People are in more of a hurry during the morning, and the PM peak hour is not as sharp.

One commenter stated that any Build Alternative would be much preferable to the existing situation or the future situation without improvements. A number of others agreed, some adding that the safety benefit, particularly the opportunity to save lives, was vital.

Another said that because of the need to adapt to the new signal lights and the multiple lanes there may be "fender-benders" during the adjustment period. He wondered whether any special measures would be undertaken to reduce such incidences.

Another question was how certain was the County that the project would be built. The County representative answered that there are a number of federal-aid projects in development and not all could be built at the same time. Prioritization would depend on a number of factors that were hard to predict. It was noted by some that public support for this particular project would possibly elevate its priority, especially if other road projects were experiencing community opposition.

Several commenters noted that the distance between intersections was very short. The project team responded that they had attempted to visualize other solutions but none were practical without substantial residential relocations, which were considered an excessive tradeoff.

One commenter noted that because Iwalani/Kawailani was the intersection with the most accidents, maybe it would be wise to simply signalize it and perform lane improvements but omit signalization at Ainaola Drive. Several people responded that this would be difficult for motorists attempting to exit Pohakulani Drive, which even with the current two-lane profile is difficult.

One person asked whether the County planned to extend Pohakulani Street to Puainako Street. The County representative replied that there were no current plans to do so, although it could conceivably occur. Project team explained that the Puainako Extension re-routing would radically change the function of the existing Puainako Street.

SUMMARY OF OUTSTANDING QUESTIONS AND RESPONSES

1. ISSUE: Will sight distance for right turns from north-bound Iinaola Drive and south-bound Iwalani Street traffic be adequate?

   RESPONSE: Review of topography at the intersection determined that sight distance was adequate under Alternative B. Alternative A would require additional design work during final design in order to ensure adequate sight distance.

2. ISSUE: Will there be any measures to help public adapt to the new pattern and reduce the likelihood of "fender-benders"?

   RESPONSE: Prior to installation of signals, signs will be erected to warn motorists of new traffic facilities and lane additions.

KAWAILANI STREET IMPROVEMENTS
ENVIRONMENTAL ASSESSMENT
APPENDIX 4, Part 5

Comments and Responses to Draft EA

Stephen K. Yamashiro
Mayor

Virginia Goldstein
Director

Russell Kokubun
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
25 Aupuni Street, Room 109 • Hilo, Hawaii 96720-4252
(808) 961-8288 • Fax (808) 961-8742

June 23, 1999

Mr. Jiro Sumada
Deputy Chief Engineer
County of Hawaii Department of Public Works
25 Aupuni Street
Hilo, HI 96720

Dear Mr. Sumada:

Draft Environmental Assessment for Kawailani Street Improvements

We are in receipt of a letter dated June 3, 1999, from GeoMetrician, transmitting a copy of the above-described environmental assessment for our review and comment. We have completed our review, and have the following comments to offer for your consideration. All comments are regarding Section 3.4.2-Planning.

1. Hawaii County General Plan - Lands surrounding the project corridor are designated for both Low and Medium Density Urban uses by the General Plan LUPAG Map. The existing Wiki Wiki Mart complex located at the mauka-Puna side of the Kawailani-Ainaola Street intersection is designated for Medium Density Urban uses. The remain area is designated Low Density Urban.

2. County Zoning - Section correctly states that the project is a permitted use within all zoned districts [Section 25-4-11(c)]. However, road widening or realignment activities must also conform to the requirements of the Zoning Code relative to minimum building site area and yard setbacks and should be emphasized within the Final Environmental Assessment.

3. Impact of Project on Planning - Section correctly mentions that widening and realignment improvements which involves land acquisition would require compliance with Chapter 23, Hawaii County Code relating to Subdivisions. More specifically, Section 23-11 of the Subdivision Code states that "*The requirements, including lot sizes, and standards of this*

Mr. Jiro Sumada
Deputy Chief Engineer
County of Hawaii Department of Public Works
Page 2
June 23, 1999

chapter shall not be applicable to public utility or public rights-of-way subdivisions and their remnant parcels; provided that the [Planning] *director upon conferring with the chief engineer and manager of the department of water supply may require necessary improvements to further the public welfare and safety.*" Therefore, road widening or realignment activities requiring subdivision action may be accommodated under this section of the Subdivision Code.

Please feel free to contact Daryn Arai of this office should you have any questions.

Sincerely,

Virginia Goldstein

VIRGINIA GOLDSTEIN
Planning Director

DSA:gp
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c: Mr. Abraham Wong, Federal Highway Administration
Mr. Kazu Hayashida, State Department of Transportation
Mr. Colin Hashiro, Okahara and Associates
Director, State Office of Environmental Quality Control
Mr. Ron Terry, GeoMetrician

Stephen K. Yamashiro
Mayor

Jiro A. Sumada
Deputy Chief Engineer

County of Hawaii

DEPARTMENT OF PUBLIC WORKS
25 Aupuni Street, Room 202 · Hilo, Hawaii 96720-4252
(808) 961-8321 · Fax (808) 961-8630

July 20, 1999

VIRGINIA GOLDSTEIN, DIRECTOR
HAWAII COUNTY PLANNING DEPARTMENT
25 AUPUNI STREET
HILO HI 96720

SUBJECT: ENVIRONMENTAL ASSESSMENT KAWAILANI STREET IMPROVEMENTS

Thank you for your comment letter dated 23 June 1999 on the subject project. The following is a detailed response:

1. *Hawaii County General Plan.* The EA has been clarified to reflect the presence of both Low and Medium Density Urban Use near the project site.

2. *County Zoning.* We have added the information that project activities must conform to the requirements of the Zoning Code relative to minimum building site area and yard setbacks.

3. *Impacts of Project on Planning.* DPW and consultant engineers will consider this when proposing any subdivision plans for the improvements.

Again, thank you for your review and comments.

JIRO A. SUMADA
Deputy Chief Engineer

c: Colin Hashiro, Okahara & Associates
Ron Terry
Eng (G. Kuba)

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BENJAMIN J. CAYETANO
GOVERNOR
SEIJI F. NAYA, Ph.D.
DIRECTOR
BRADLEY J. MOSSMAN
DEPUTY DIRECTOR
DAVID W. BLANE
DIRECTOR, OFFICE OF PLANNING

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING
235 South Beretania Street, 6th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Telephone: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-8155

June 28, 1999

Mr. Jiro A. Sumada
Deputy Chief Engineer
Department of Public Works
County of Hawaii
25 Aupuni Street, Room 202
Hilo, Hawaii 96720-4252

Dear Mr. Sumada:

Subject: Hawaii Coastal Zone Management (CZM) Program Federal Consistency Review for the Kawailani Street Improvements - Iwalani to Pohakulani Streets, South Hilo, Hawaii

The joint proposal by the County of Hawaii Department of Public Works, the State Department of Transportation and the Federal Highway Administration to construct improvements for safety and traffic congestion at two intersections on Kawailani Street, at Iwalani Street and at Ainaola Drive/Pohakulani Street in Hilo has been reviewed for consistency with Hawaii's CZM Program. We concur with the determination that the project is consistent to the maximum extent practicable.

CZM consistency concurrence is not an endorsement of the project nor does it convey approval with any other regulations administered by any State or county agency. Thank you for your cooperation in complying with Hawaii's CZM Program. If you have any questions, please call John Nakagawa of our CZM Program at 587-2878.

Sincerely,

David W. Blane
Director
Office of Planning

c: U.S. Army Corps of Engineers, Operations Branch
U.S. Fish and Wildlife Service, Pacific Islands Ecoregion
Department of Health, Clean Water Branch
Department of Land & Natural Resources,
Planning & Technical Services Branch
Planning Department, County of Hawaii
Ron Terry, Ph.D.

Stephen K. Yamashiro
Mayor

Jiro A. Sumada
Deputy Chief Engineer

County of Hawaii
DEPARTMENT OF PUBLIC WORKS
25 Aupuni Street, Room 202 · Hilo, Hawaii 96720-4252
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July 20, 1999

DAVID W. BLANE, DIRECTOR
OFFICE OF PLANNING
HAWAII STATE DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT AND TOURISM
P.O. BOX 2359
HONOLULU, HAWAII 96804

SUBJECT: ENVIRONMENTAL ASSESSMENT KAWAILANI STREET IMPROVEMENTS

Thank you for your letter dated 28 June 1999 in which you stated that you concurred with our determination that the project is consistent to the maximum extent practicable with the Hawaii Coastal Zone Management Program. This information will be added to the Final EA.

JIRO A. SUMADA
Deputy ~~Chief~~ Engineer

c: Colin Hashiro, Okahara & Associates
Ron Terry
Eng (G. Kuba)

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APPENDIX 5
LIST OF PROPERTIES AFFECTED BY RIGHT-OF-WAY TAKING

	Alternate 1A	Alternate 1B	Alternate 2A	Alternate 2B
2-4-02:001		√		√
2-4-02:128	√	√	√	√
2-4-12:043	√	√	√	√
2-4-12:097	√	√	√	√
2-4-15:027	√	√	√	√
2-4-15:029	√	√	√	√
2-4-15:030	√	√	√	√
2-4-15:032	√	√	√	√
2-4-15:034	√	√	√	√
2-4-15:119	√	√	√	√
2-4-15:120	√	√	√	√
2-4-15:225	√	√	√	√
2-4-19:011	√	√	√	√
2-4-19:012	√	√	√	√
2-4-19:013	√	√	√	√
2-4-19:025	√	√	√	√
2-4-19:035	√	√	√	√
2-4-19:060			√	√
2-4-19:073			√	√
2-4-19:075	√	√	√	√
2-4-19:087	√	√	√	√
2-4-19:092			√	√
2-4-19:093	√	√	√	√
2-4-19:126				√
2-4-19:127	√	√	√	√
2-4-19:128	√	√	√	√
2-4-19:158			√	√