EXECUTIVE CHAMBERS

HONOLULU

May 18, 2000

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OFC. OF ENVIRONMENTAL QUALITY CONTROL

BENJAMIN J. CAYETANO
GOVERNOR

Mr. Robert Yanabu, Director
Department of Public Works
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Dear Mr. Yanabu:

With this letter, I accept the Final Environmental Impact Statement for Puainako Street Extension & Widening on the island of Hawaii, as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes. The economic, social and environmental impacts, which will likely occur should this project be implemented, are adequately described in the statement. The analysis, together with the comments made by reviewers, provides useful information to policymakers and the public.

My acceptance of the statement is an affirmation of the adequacy of that statement under the applicable laws but does not constitute an endorsement of the proposed action.

I find that the mitigation measures proposed in the environmental impact statement will minimize the negative impacts of the project. Therefore, if this project is implemented, the Department of Public Works and/or its agents should perform these or alternative and at least equally effective mitigation measures at the discretion of the permitting agencies. The mitigation measures identified in the environmental impact statement are listed in the enclosed document.

With warmest personal regards,

Aloha,

/s/

BENJAMIN J. CAYETANO

Enclosure

c: Honorable Bruce S. Anderson, Ph.D., M.P.H.
Office of Environmental Quality Control

2000 FEIS HAWAII
PUAINAKO STREET EXPANSION & WIDENING
1 OF 2

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FHWA-HI-FEIS-98-01-0

PUAINAKO STREET EXTENSION AND WIDENING SOUTH HILO, HAWAII

FINAL

ENVIRONMENTAL IMPACT STATEMENT AND SECTION 4(f) EVALUATION

April 2000

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

PUAINAKO STREET EXTENSION AND WIDENING
SOUTH HILO, HAWAII

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

This document and all ancillary documents were prepared under my direction.

April 3, 2000
Date of Approval

Robert Yanabu, Chief Engineer
Hawaii County Department of Public Works

Stephen K. Yamashiro
Mayor

Robert K Yanabu
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

May 3, 2000

TO ALL PARTIES RECEIVING THE FINAL EIS FOR THE PUAINAKO STREET EXTENSION AND WIDENING PROJECT:

The Hawaii State Office of Environmental Quality Control has requested us to include the following material in the Final EIS. These sheets supplement, and do not replace, material in the EIS. The supplementary signature page should be inserted after the first title page at the beginning of the document. The response letter should be inserted in Appendix A3, after our first response to the subject letter of February 19, 1999. Thank you for your understanding and your involvement in the EIS process.

Robert Yanabu,
Chief Engineer

attach: May 3, 2000, letter to Mr, and Mrs. Kaina
Supplementary signature page

Stephen K. Yamashiro
Mayor

Robert K. Yanabu
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

May 3, 2000

MS. DEBRA S. AND MR. STANLEY K. KAINA JR.
412 PUAINAKO ST
HILO HI 96720

Subject: Comment to Puainako Street Extension and Widening Draft Environmental Impact Statement (EIS)

This letter is being written in response to a comment from the Hawaii State Office of Environmental Quality Control. This agency has asked us to amplify our April 3, 2000 point-by-point response to your comment letter of February 15, 1999.

Your letter quoted the questions you asked along with the answers you received at the public hearing on January 19, 1999. We would like to emphasize that the answers given at the public hearing and repeated in your letter are accurate. Your letter went on to state that you favored Alignment A and Alignment 2 because of safety and noise concerns.

Although Alignment B has for many years been identified as the route for the realignment of Puainako Street, our Department tried to relocate the route to the north in order to reduce noise at homes on the existing Puainako Street. Unfortunately, we found that archaeological sites determined by the State Historic Preservation Division to be significant for preservation in place would have been impacted by any shift to the north. We have therefore been required by federal law to adopt Alignment B instead of Alignment A. The project will include 6 to 7 foot barriers behind your home, which will reduce noise below federal Noise Abatement Criteria. The front of your home will become far less noisy than it is now, because the existing Puainako Street will be converted to a local street by restricting turning movements at the Komohana Street and Kawili Street intersections.

In terms of safety, we expect that the noise abatement wall will essentially block any access between your property and Puainako Street. Indeed, this is one of the main advantages of rerouting Puainako Street, which is becoming a major state highway. The existing Puainako Street, with its many driveways and close-set homes, can become quieter and safer. Safety is one of the main reasons our Department has pursued this project, and we expect your section of Puainako Street, portions makai of Kawili Street, Komohana Street, and Kaumana Drive to all experience improved safety as a result.

Please recognize that your comments have been thoughtfully considered by the Hawaii County Department of Public Works, the Hawaii State Department of Transportation, and the U.S. Department of Transportation, Federal Highway Administration.

Robert Yanabu
Chief Engineer

cc: Richelle Suzuki, FHWA, Highways Division
Nancy Heinrich, Hawaii State OEQC

FHWA-HI-FEIS-98-01-0

PUAINAKO STREET EXTENSION AND WIDENING
SOUTH HILO, HAWAII

FINAL
ENVIRONMENTAL IMPACT STATEMENT
AND SECTION 4(f) EVALUATION

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

April 3, 2000
Date of Approval

Robert Yanabu, Chief Engineer
Hawaii County Department of Public Works

4/5/00
Date of Approval

Kazu Hayashida, Director
Hawaii State Department of Transportation

4/6/00
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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Honolulu, Hawaii 96813
(808) 587-2150

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

The proposed Project would improve traffic circulation of the State Highway system and adjacent streets by directly linking Puainako Street (Highway 2000) and the Saddle Road (Highway 200). It would alleviate congested and unsafe traffic conditions on Puainako Street and Kaumana Drive. The Project termini are at the Puainako Street/Kilauea Avenue intersection and on the Saddle Road near Country Club Drive. Alternatives include the No-Build Alternative, and Build Alternatives consisting of two alternative alignments for the Lower Portion (which extends east of Komohana Street) and three alignments for the Upper Portion (which extends west of Komohana Street). The Build Alternative would produce substantial improvements in safety levels, travel times, circulation efficiency and air quality relative to the No-Build Alternative. Adverse Build Alternative impacts include noise, relocation, wetlands fill and construction-phase disturbance. Mitigation measures include noise barriers, relocation assistance benefits, wetlands enhancement, and construction phase conditions.

TABLE OF CONTENTS

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LIST OF APPENDICES

Note: Only those appendices that present new, supplementary, or revised information are included in the Final EIS. Appendices that were not revised subsequent to the Draft EIS are not included. Readers interested in unrevised appendices may consult the Draft EIS. The following is a list of appendices not included in the Final EIS:

LIST OF ACRONYMS

AAQS	Ambient Air Quality Standards
AASHTO	American Association of State Highway and Transportation Officials
ACC/MVM	Accidents per million vehicle miles
ADT	Average daily traffic
ALISH	Agricultural Lands of Importance to the State of Hawaii
BMP	Best Management Practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Cm	Centimeters
CMP	Corrugated metal pipe
CO	Carbon monoxide
CWA	Clean Water Act
CWRM	Commission on Water Resources Management
CZM	Coastal Zone Management
dB	Decibels
dBA	A-weighted decibel scale
DEIS	Draft Environmental Impact Statement
DHHL	State of Hawaii Department of Hawaiian Home Lands
DLNR	State of Hawaii Department of Land and Natural Resources
DOFAW	State of Hawaii Division of Forestry and Wildlife
DOE	State of Hawaii Department of Education
DOH	State of Hawaii Department of Health
DPW	County of Hawaii Department of Public Works
EIS	Environmental Impact Statement
EISPN	Environmental Impact Statement Preparation Notice
EPA, US-EPA	Environmental Protection Agency
ESA	Endangered Species Act
FCIR	Farmland Conversion Impact
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FHWA	Federal Highway Administration
FPPA	Farmland Protection Policy Act
ha	Hectares
HAR	Hawaii Administrative Rules
HC	Hydrocarbons
HCM	Highway Capacity Manual
HCZM(P)	Hawaii Coastal Zone Management (Program)

HDOH	State of Hawaii Department of Health
HDOT	State of Hawaii Department of Transportation
HELCO	Hawaiian Electric Light Company, Inc.
HERR	State of Hawaii Department of Health, Office of Hazard Evaluation and Emergency Response
HRS	Hawaii Revised Statutes
IHLRHP	Island of Hawaii Long Range Highway Transportation Plan
ISTEA	Intermodal Surface Transportation Efficiency Act
Km	Kilometers
KV	Kilovolt
l	Liters
LEDPA	Least Environmentally Damaging Practicable Alternative
L_{eq}	Average noise level over a 1-hour period
LOS	Level of Service
LUPAG	Land Use Pattern Allocation Guide
m	Meters
m^2	Square meters
m^3	Cubic meters
mm	Millimeters
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NO_x	Nitrogen oxides
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	U.S. Natural Resource Conservation Service
NRHP	National Register of Historic Places
OEQC	Hawaii State Office of Environmental Quality Control
OHA	Office of Hawaiian Affairs
OKP	Olaa-Kilauea Partnership
PM_{10}	Particulate matter smaller than ten microns in diameter
PTA	Pohakuloa Training Area
RCP	Reinforced concrete pipe
ROD	Record of Decision
ROW	Right of way
SCAP	Stream Channel Alteration Permit
SFHA	Special Flood Hazard Area

SHPD	State Historic Preservation Division
SHPO	State Historic Preservation Officer
SLU	State Land Use
SMA	Special Management Area
TEA-2000	Reauthorization of ISTEA
URARPAPA	Uniform Relocation Assistance & Real Property Acquisition Act
U.S. DOT	U.S. Department of Transportation
USACOE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USNRCS	U.S. Natural Resources Conservation Service
USGS	U.S. Geological Survey
Vpd	Vehicles per day
Vmt	Vehicle miles traveled

SUMMARY OF MAJOR CHANGES FROM DRAFT TO FINAL EIS

The Final EIS has been revised in a number of locations. Minor updates, revisions or corrections are not necessarily noted. In general, deleted text in EIS is noted by strikeouts; added text is denoted by dotted underlines. The following table provides a guide to major updates in the text.

SECTION	CHANGE	REASON FOR CHANGE
Executive Summary	General update	Reflect main text changes
All Sections	Add discussion of Alignment 10	New alternative developed post-Draft EIS
Sec. 2.1 - Alternatives	Discussion of development of Alignment 10	Ditto
Sec. 2.3.2.2.3, Build Alternatives	New section, describing Alignment 10	Ditto
Sec. 2.4.3, Costs	Updated cost figures	New alignment and revised costs
Sec. 2.6, Preferred Alternative (new section)	Add Preferred Alternative section	Provides decision and rationale for Preferred Alternative
Sec. 3, Introduction	Summary of Hilo history	Based on comment from Hawaii OEQC
Sec. 3.1.1, Geology (& Sec. 4.1.1)	Discussion of Sunrise Estates Cave	Discovery of cave in alignment
Sec. 3.2.2, Wetlands (and Sec. 4.2.2)	Re-written section	Incorporation of Alignment 10, delineation data, and based on comment from EPA
Sec. 3.3.6, Archaeological and Cultural Sites	Incorporation of cultural information	To incorporate new material based on historical and cultural consultation per new National Historic Preservation Act guidelines and based on comment from Office of Hawaiian Affairs.
Sec. 4.1.6.2, Noise Impacts	New mitigation measures for noise impacts at Kinoole Baptist Church	Design change prompted by comments and compliance with revised FHWA/HDOT noise impacts policy
Sec. 4.3.4.3, Impacts to Community Facilities and Public Services.	Revised mitigation for impacts to Waiakea schools complex	Based on comment from Hawaii Dept. Of Education and meetings with DOE officials
Sec. 4.6, Cumulative Impacts	Expansion of cumulative impacts to include wetlands category; consideration of additional projects	Based on comments by Hawaii OEQC and the EPA
Sec. 6.3, State Land Use Districts	Addition of State Land Use District Map	Based on comment by Hawaii State Land Use Commission
Sec. 7.4, Unresolved Issues	Removal of Section 404 Wetlands Fill Permit issues from Unresolved Issues	Nature of permit and mitigation is now specified
Sec. 9.4, Chronology of Consultation	Updated consultation discussion	Document continued community consultation
Appendix A3	Comments and Responses to Draft EIS	New appendix based on finalization of EIS
Appendix A4	Public Hearing Publicity, Materials and Transcript	New appendix based on finalization of EIS
Appendix A5	Agency Correspondence Subsequent to Close of Draft EIS Comment Period	New appendix based on finalization of EIS

Appendix B2	Revised Wetlands Report	Substantially revised to reflect input from NEPA 404 MOU partners
Appendix E3	Chronology of Archaeological and Cultural Resource Studies	Guide to archaeology and cultural studies, Section 106 compliance
Appendix E4	Supplemental Archaeological Inventory Studies, Revised Alignment 1 Corridor & Alignment 10	Revised draft study of revised alignment and study of new alignment developed post-Draft EIS
Appendix K2	Acoustic Study Supplement	To analyze effects of design change prompted by comments and compliance with revised FHWA/HDOT noise impacts policy
Appendix N	Interim Project Description for Memorandum of Understanding for Offsite Wetlands Mitigation	New mitigation agreement per NEPA 404 MOU process

NATIONAL ENVIRONMENTAL POLICY ACT STATEMENT

The National Environmental Policy Act (NEPA) 42 U.S.C. 4321-4347, became effective January 1, 1970. This law requires that all federal agencies shall prepare a detailed Environmental Impact Statement (EIS) for every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment. The Federal Highway Administration (FHWA) is, therefore, required to have an EIS prepared on proposals funded under its authority if the proposal is determined to be a major action significantly affecting the quality of the human environment.

EISs are required for many transportation projects as outlined in NEPA. The processing of an EIS is carried out in two stages. Draft EISs are first written and forwarded for review and comment to federal, state and local agencies with jurisdiction by law or special expertise and are made available to the public. This availability to the public must occur at least 15 days before the public hearing and not later than the time of the first public hearing notice or notice of opportunity for a hearing. Normally, 45 days, plus mailing time, will be allowed for comments to be made on the Draft EIS unless a time extension is granted by the Hawaii State Department of Transportation (HDOT). After this period has elapsed, preparation can begin on the Final EIS.

A Final EIS is prepared to reflect the distribution of the Draft EIS by including the following:

1. Basic content of the Draft EIS is amended due to internal agency comments, editing, additional alternatives being considered, and changes due to the time-lag between the Draft and Final EIS.
2. Summary of public hearing comments.
3. Summary of comments received on the Draft EIS.
4. Evaluation and disposition of each substantive comment.

Administrative action cannot take place sooner than 90 days after circulation of the Draft EIS to the U.S. Environmental Protection Agency (USEPA) or 30 days after submittal of the Final EIS to the EPA.

Both the Draft and Final EIS are full disclosure documents which provide a full description of the proposed Project, the existing environment, and analysis of the anticipated beneficial and adverse environmental effects.

General Reviewer Information

In compliance with the Metric Conversion Act of 1975 (amended in 1988) and a 1991 Presidential Executive Order, numbers throughout this Draft EIS are presented in metric units with the English equivalents in parentheses.

EXECUTIVE SUMMARY

PROJECT DESCRIPTION, PURPOSE AND NEED

The proposed Project is to widen, partially realign, and extend Puainako Street in Hilo, Hawaii (Fig. S-1). Along the 2.4-km (1.5-mi.) long section between Kilauea Avenue and Komohana Street, Puainako Street (Lower Portion) would be widened from two to four lanes. The 37-meter (120-foot) right-of-way would also accommodate dual sidewalks and bicycle lanes (Fig. S-2). Improvements to vertical grade yielding satisfactory sight distances and upgrades to intersections, including two new traffic signals, would also occur. Along the westernmost 1.0-km (0.6-mi.) section of this portion, Puainako Street would be routed north of its current alignment. Puainako Street would be extended approximately 7.3 km (4.5 mi.) between Komohana Street and the Saddle Road (State Highway 200, also designated Kaumana Drive) (Upper Portion) as a two-lane road (Fig. S-3). The eastern project terminus is at the intersection of Puainako Street and Kilauea Avenue, and the western terminus is at approximately the 10 km (6 mi.) marker on the Saddle Road.

The Project's purposes are: 1) to improve arterial traffic flow of the State Highway system by providing a direct link between the existing Puainako Street (Highway 2000) and the Saddle Road (Highway 200), and 2) to alleviate congested and unsafe traffic conditions on the existing Puainako Street and Kaumana Drive.

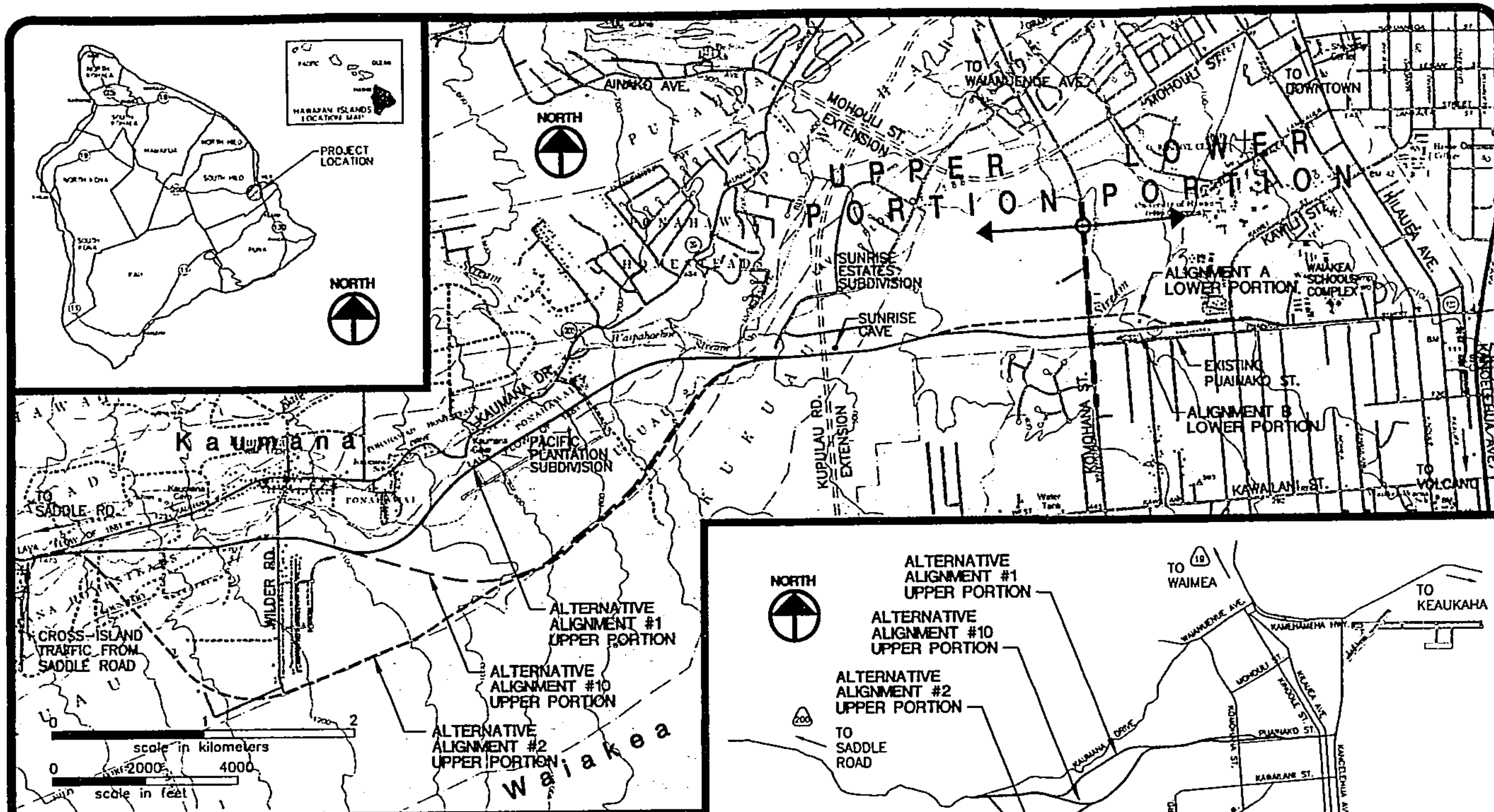
The current ratio of traffic volume to capacity along several segments of Puainako Street approaches or exceeds 1.0 during peak hours. This leads to a Level of Service described as unstable or forced, producing severe traffic congestion. Traffic engineers calculate a substantial worsening of Level of Service if no improvements are made.

Accident rates along segments of Puainako Street vary between 2.25 and 3.86 per 1.0 million miles (1.6 million km) of vehicle travel, compared to the Hawaii County average of 1.57. The corresponding figure for Kaumana Drive, a narrow and curving two-lane road that must currently conduct all traffic from Upper Kaumana and the Saddle Road to Hilo, is 7.89. These excessive accident rates are influenced by congestion and unsatisfactory vertical and horizontal alignments which could be alleviated by the proposed Project.

LEAD AGENCIES AND APPROVING OFFICIAL/ACCEPTING AUTHORITY

The Federal Highways Administration (FHWA) and the Hawaii State Department of Transportation (HDOT) are serving as joint lead agencies to prepare an Environmental Impact Statement in compliance with federal and State of Hawaii requirements, with the assistance of the Hawaii County Department of Public Works. The approving official for the EIS under the National Environmental Policy Act is the Hawaii Division Administrator of FHWA. The Governor of the State of Hawaii is the accepting authority for the EIS, under Chapter 343 HRS, related to Environmental Impact Statements.

The Project was developed out of separate efforts to extend the County's portion of the roadway and to widen the State's portion. These projects were then integrated to optimize planning and

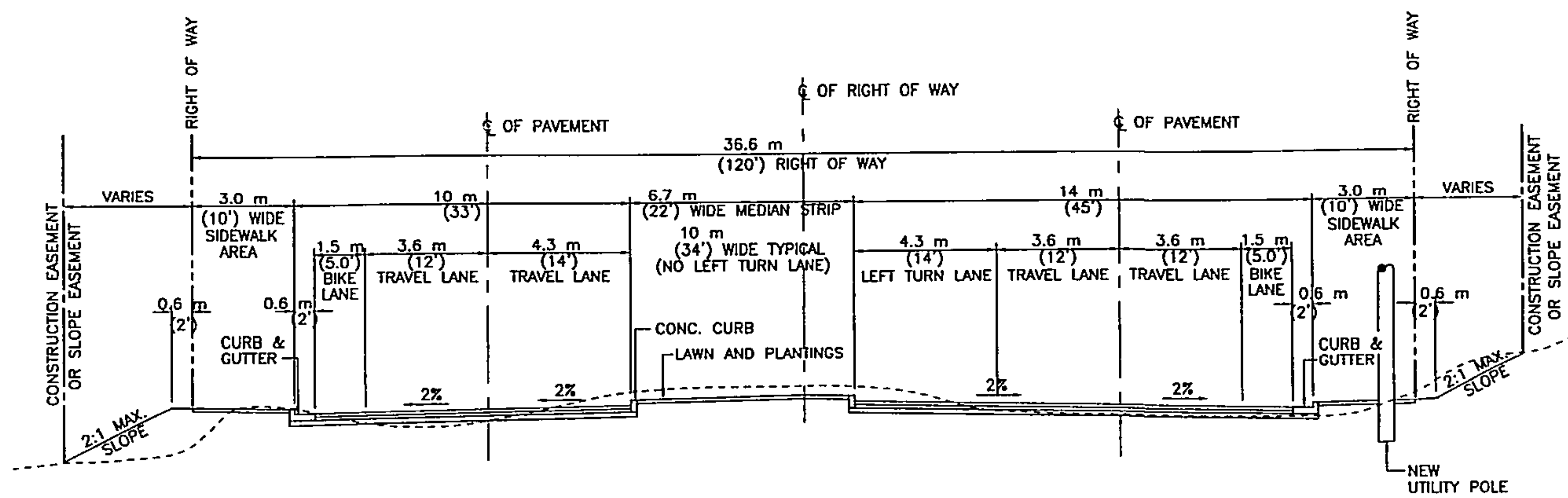


TITLE
PUAINAKO WIDENING/EXTENSION PROJECT LOCATION

FIGURE S-1

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

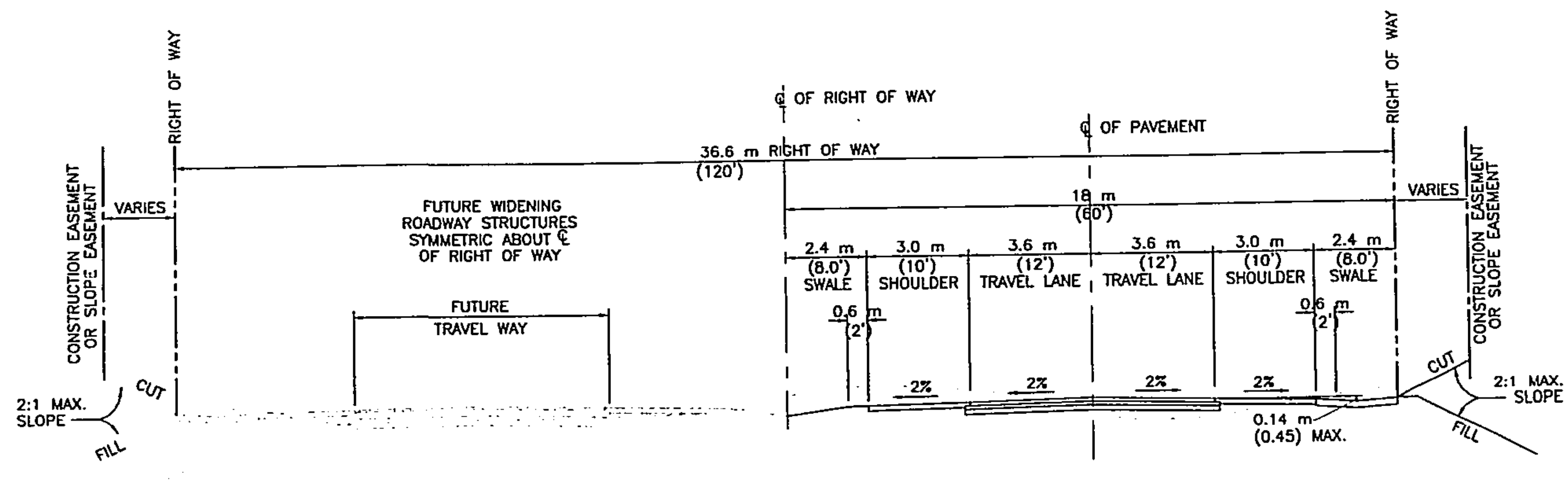
DATE 10/26/98



NOTES:

1. MAXIMUM SIDESLOPE SHALL BE 2:1.
2. UTILITIES WITHIN ROADWAY NOT SHOWN.

TITLE **TYPICAL SECTION LOWER PUAINAKO** KOMOHANA STREET TO KILAUEA AVENUE	FIGURE **S-2**
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000



NOTE:

1. MAXIMUM SIDESLOPE SHALL BE 2:1.

TITLE	FIGURE
TYPICAL SECTION **UPPER PUAINAKO** KAUMANA DRIVE TO KOMOHANA STREET	S-3
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000

design. In that the County had initiated the efforts, it was agreed that the County should continue to organize preparation of the EIS and Project design. During the planning stages of the Project, it was subsequently determined that federal funding under the Intermodal Surface Transportation Efficiency Act (ISTEA) would be utilized, which required the involvement of FHWA.

ALTERNATIVES UNDER CONSIDERATION

Alternative 1: The No-Build Alternative. The No-Build Alternative provides for very limited improvements to Puainako Street, including widening shoulders and consideration of traffic signals at Komohana Street and the Waiakea School Complex.

Alternative 2: The Build Alternatives. The project corridor consists of a Lower Portion, along Puainako Street between Kilauea Avenue and Komohana Street; and an Upper Portion, between Komohana Street and Kaumana Drive near the Country Club Drive Intersection. Each portion contains a set of alternative alignments. The Lower Portion has two: Alignments A and B, and the Upper Portion has three: Alignments 1, 2 and 10. Six distinct combinations of these alignments are possible (see Fig. S-1).

In the Lower Portion, Puainako Street would be widened to four lanes by acquiring right-of-way on primarily the north side of Puainako Street between Kilauea Avenue and the Waiakea School Complex and widening within the new right-of-way ~~northward from the existing road~~. Most existing intersections would be altered through some combination of widening, turning movement restrictions and signalization.

Between the Waiakea School Complex and Komohana Street, Puainako Street would be realigned north of the existing housing on Puainako Street and a new four-lane road would be created. Two alternative alignments were developed for the section west (mauka) of Kawili Street. Alignment A is farther from existing houses, minimizes encroachment on the Waiakea flood control channel, and avoids crossing of Komohana Street at the flood control channel. Alignment B runs directly behind a row of 33 houses and occupies a corridor that has been identified for several decades as the ultimate location of Puainako Street.

In the Upper Portion, Puainako Street would be extended as a new two-lane road within a 37-meter (120-ft.) right-of-way from Komohana Street to Kaumana Drive near Country Club Drive. West (mauka) of Sunrise Estates the project area divides into first two and then three branches. Alignment 1 provides a more direct route and passes between Kaumana Drive and several existing and planned subdivisions to the south. Alignment 2 passes to the south of these subdivisions along a more circuitous route. Alignment 10 is a hybrid of Alignments 1 and 2 with one unique segment. For purposes of comparison, each alignment is considered to begin at Komohana Street and end on Kaumana Drive.

ALTERNATIVES CONSIDERED AND WITHDRAWN

Alternatives considered and withdrawn from further consideration include Transportation Systems Management strategies, mass transit, four alternative alignments for the Upper Portion, and widening of Kaumana Drive. Chapter 2 discusses these and why they were withdrawn.

PREFERRED ALTERNATIVE

Following the issuance of the Puainako Street Extension and Widening Draft EIS (DEIS), the public hearing, the close of the public comment period, and the consideration of new information related to Alignment 10, the project team agencies (FHWA, HDOT and DPW) evaluated the alternative alignments to determine which could best satisfy the project's purpose and need, with minimum environmental impact. The lead agencies have adopted the combination of **Alignment B and Alignment 10** as the *Preferred Alternative* for the project. In the Lower Portion, Alignments A and B serves the project's purpose and need equally and were approximately equivalent in terms of the severity of environmental impacts. Alignment B is a component of the preferred alternative because it, unlike Alignment A, avoids the use of resources protected by Section 4(f) of the Department of Transportation Act. For the Upper Portion, Alignment 10 was chosen because it minimizes costs, minimizes adverse effects to the environmental resources identified by the public and agencies during the comment period as most critical (noise and Kaumana Cave), and represents the Least Environmentally Damaging Practicable Alternative in terms of the Clean Water Act. The No-Build Alternative was not chosen because it would not satisfy the Project's purpose and need.

COST AND SCHEDULE

The Project would cost an estimated $56.651 to $61.471 million ~~$62.650 to $67.234 million~~ , depending on the combination of alignments chosen, with the State and/or County responsible for 20 percent of funding and the federal government funding the remaining 80 percent. This total includes right-of-way acquisition, design and construction. If approvals are obtained in a timely manner, project design will be completed in 2000 ~~1999~~. Construction would begin in 2000 ~~1999~~ and would be finished in the year 2002 ~~2001~~.

RELATED PROJECTS

The Saddle Road Improvement Project (~~Draft~~ Final EIS completed in 1999 ~~currently in preparation~~) covers the entire 78 km (48 mi.) of Saddle Road, from the terminus of the Puainako Extension in Kaumana to State Highway 190 near Waikoloa. The Saddle Road project would widen, provide shoulders and improve vertical and horizontal alignment. It would be the primary cause of the threefold increase in traffic expected at the western end of Puainako by 2020. Although the Puainako and Saddle Road projects are independent, each would more effectively serve the traffic provided by the other.

The Mohouli Street Extension (scheduled for construction in 2000 ~~1999~~) would fulfill a portion of the goals of the Project by bypassing a 2.8 km (1.7 mi.) segment of Kaumana Drive between Ainako Street and Komohana Street, and a section of Komohana Street between Waianuenue Avenue and Mohouli Street. The Mohouli project does not diminish the need for the extension of Puainako Street. Undesirable traffic congestion and safety conditions along much longer sections of Kaumana Drive and Komohana Street would be improved by the Puainako Extension. The projects are thus complementary.

AFFECTED ENVIRONMENT

The project corridor connects the Waiakea and Upper Kaumana neighborhoods in Hilo. Lava flows from Mauna Loa volcano have produced a gently rolling topography with a moderate slope. In the early 20th century much of the project area supported scattered agriculture. Today, the eastern (makai) end of the project area is low- to medium-density residential intermixed with schools, churches and businesses. The central and western areas contain some vacant land with semi-natural vegetation, along with low-density residential and agricultural uses.

Originally, the natural vegetation of most of the project area was a forest dominated by a deep mat of uluhe (a native fern), scattered 'ohi'a trees, and relatively few other plant species. In the Lower Portion (and parts of the Upper Portion), intense human activity has destroyed the native vegetation almost entirely, especially in former sugar cane fields. The present vegetation in the Lower Portion is a secondary forest dominated by alien trees and ground cover. Vegetation in the Upper Portion comprises four communities: two dominated by native plants, one that is predominantly alien, and one that is mixed. No legally protected threatened or endangered plant species were found or are likely be present in the project area.

ENVIRONMENTAL IMPACTS

The expected environmental impacts of the Project and proposed mitigation are presented below and summarized in Tables S-1 and S-2 for ease of alternative comparison. The information below is a useful guide to areas of concern but should not be interpreted as a rating of the relative environmental soundness of any alternative. The descriptions and tables do not take into account the relative importance of various categories of impact. Unless applicable, No-Build Alternative impacts are not discussed in the text below.

Physical Environment

Floodplains. Alignments A and B each encroach once on a floodplain, for a total of 0.30 ha (0.74 ac.) and 0.05 ha (0.13 ac.), respectively. Alignment 1 makes a total of 6 floodplain crossings, with a total area of 2.24 ha (5.55 ac.), while Alignment 2 would involve 10 floodplain crossings, with a total area of 2.56 ha (6.33 ac.). Alignment 10 makes 7 flood crossings, with a total area of 2.47 ha (6.11 ac.) Through appropriate use of mitigation measures, including drywells and crossing structures, there would be no increase in flood risk, no contribution to incompatible development in the flood zone, and no diminishing of natural floodplain values. The Build Alternative has been determined to be the Only Practicable Alternative, per Executive Order 11988, *Floodplain Management*.

Water Quality. Water quality would not be substantially impacted by the Project. Minor impacts to groundwater, intermittent streams and coastal waters may occur due to pollutants running off expanded pavement surface. Considered in the context of the Hilo region these would be insubstantial. All increased pollution would be within the absorption and assimilation capacity of the surrounding land. Mitigation would include planting disturbed areas and unpaved shoulder areas to absorb and filter runoff.

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

Impact Category	No-Build Alternative	Build Alternative
Water Quality	No impact.	Impact partially mitigable through adherence to Best Management Practices.
Air Quality	Highest CO, NO_x & HC for Lower Portion and Komohana Street. Highest total CO & HC.	Highest CO, NO_x & HC for Upper Portion. Lower total emissions for CO and HC.
Noise	Noise increase approaching or exceeding Noise Abatement Criteria at more than 100 homes on Puainako Street and Kaumana Drive.	Noise impacts to as many as 107 properties, depending on alternatives. Impacts capable of reasonable and feasible mitigation through sound-absorbing walls in part of Lower Portion only. No reasonable and feasible mitigation at up to 39 Upper Portion and 5 Lower Portion properties.
Native Flora	No impact.	Loss of vegetation in Upper Portion right-of-way sections; no sensitive species or ecosystems will be impacted by the Project.
Native Fauna and T & E Species	No impact.	No adverse impacts with mitigation coordinated with USFWS.
Wetlands	No impact.	Fill of between 1,669 m^2 (17,630 $ft.^2$) and 32,570 m^2 (344,020 $ft.^2$), with compensatory mitigation.
Planning	Fail to fulfill transportation and planning goals expressed in General Plan and other documents.	Fulfillment of planning goals.
Relocation	No impact.	Displacement of up to five homes. Relocation assistance would be provided.
Community Facilities	Continued poor circulation near Waiakea School Complex.	Improved circulation at Waiakea school complex, but at cost of some area in school grounds and wider road for pedestrian crossing. Mitigable through pedestrian safety improvements including crosswalks, crossing signals.
Floodplains	No encroachment.	Up to 3.2 ha (7.9 ac.) of encroachment and 10 floodplain crossings. No adverse impacts to natural and beneficial floodplain values. Only Practicable Alternative per EO 11988

Table S-1
Summary of Impacts and Proposed Mitigation Measures (cont.)

Impact Category	No-Build Alternative	Build Alternative
Visual	No impact from minor improvements.	Minor changes mitigable through sensitive design and landscaping.
Cultural	No impact.	Loss of at least some of 14 archaeological sites. Partly mitigable through data recovery (accomplished) and preservation.
Agricultural Land	No impact.	Loss of approximately 3.2 ha (7.9 ac.) of Prime Agricultural land. Negligible in context of farmland supply.
Transportation	Continued and worsened congestion, long travel times, inefficient circulation and high accident rate. LOS of D or worse at most intersections for peak hours.	Improvement in traffic circulation, shorter travel times, increased safety. LOS of C or better at all major intersections for all turning movements at peak hours.
Hazardous Waste	No impact.	No impact.
Energy	Inefficient travel leading to increased energy consumption.	Efficient travel leading to decreased energy consumption.
Construction	No impact.	Unavoidable noise, vehicle emission, traffic and access impacts. Partly mitigable through portable noise barriers (and other DOH Construction Noise Permit measures), properly tuned equipment, optimum scheduling.
Economic	No impact.	At least $56.651 million in expenditures of government funds. Direct income of $24 million. Indirect and induced income of over $40 million. Direct and induced creation of more than 1000 labor years of construction, professional, retail and service jobs. State excise tax revenues of over $2.6 million and State income tax of over $2 million.
Growth-Inducement	No impact.	No growth inducement, but Project would facilitate in-filling of existing subdivisions and might hasten development plans for zoned areas.
Cumulative Impact	No impact.	No cumulative impacts or conflicts identified.

Table has been revised between Draft and Final EIS. Draft numbers, where different from Final, are contained in accompanying text.

Table S-2
Summary of Impacts for Build Alternative Alignments

Impact Category	Build Alternatives				
	Lower Portion		Upper Portion		
	Alignment A	Alignment B	Alignment 1	Alignment 10	Alignment 2
Flood-plains	Encroachment of 0.30 ha. (0.74 ac.), with one crossing	Encroachment of 0.05 ha. (0.13 ac.), with one crossing	2.24 ha (5.55 ac.) of flood zone encroachment, with 6 crossings.	2.47 ha (6.11 ac.) of flood zone encroachment, with 7 crossings	2.56 ha (6.33 ac) of flood zone encroachment with 10 crossings; more-extensive crossing structures.
Water Quality	No difference. Minimal impacts mitigable by adherence to BMPs.		No difference. Minimal impacts mitigable by adherence to BMPs.		
Air Quality	Less effect on nearby residences.	More effect on nearby residences.	More effect on nearby residences.	Less effect on nearby residences.	Less effect on nearby residences.
Noise	40 residences, mitigable	61 residences, mitigable	39 residences, not mitigable.	24 residences, not mitigable.	20 residences, not mitigable.
	4 homes, 3 church buildings in common alignment; 2 mitigable				
Native Flora	No difference.		Somewhat less native vegetation.	Somewhat more native vegetation.	Least native Vegetation.
Native Fauna/ T&E Species	No difference. Negligible impact to fauna or ecosystems.		No adverse impacts with mitigation coordinated with USFWS.		
Wetlands Fill	2 m^2 (20 ft.^{2}), mitigation specified.	No wetlands.	3,442 m^2 (36,366 ft.^{2}), no mitigation specified.	1,669 m^2 (17,630 ft.^{2}), mitigation specified. *Least Environmentally Damaging Practicable Alternative* per NEPA 404 MOU and *No Practicable Alternative* per EO 11990.	32,568 m^2 (344,000 ft.^{2}), no mitigation specified.
Planning	No difference. Both fulfill planning goals.		Best connection; fulfills goals.	Better connection; fulfills goals.	Poorer connection, but fulfills goals.
Relocat.	No difference. [Five homes displaced are on shared segment of Lower Portion]		No homes displaced.		
Commun.	No difference. No adverse effect.		No difference. No adverse effect.		

Table S-2
Summary of Impacts for Build Alternative Alignments (cont.)

Impact Category	BUILD ALTERNATIVES				
	Lower Portion		Upper Portion		
	Alignment A	Alignment B	Alignment 1	Alignment 10	Alignment 2
Visual	Less impact to adjacent residents; impacts minor and mitigable by landscaping.	More impact to adjacent residents, but impacts minor and mitigable by landscaping.	More impact to adjacent residents, but impacts mitigable by landscaping.	Less impact to adjacent residents, impacts mitigable by landscaping.	Least impact to adjacent residents, impacts mitigable by landscaping.
Cultural	Impacts to 5 archaeological sites, (SHPO recom. 3 for preservation)	Impacts to 3 archaeological sites – no further work.	Impact to 1 archaeological site. (also in Al. 10). No further work deemed necessary.	Impact to 1 archaeological site, (also in Al. 1). No further work deemed necessary.	Impact to 1 archaeological site. No further work deemed necessary.
	Shared portion: 4 sites: no further work.				
Agricultur. Land	No difference. No agricultural land.		3.2 ha (7.9 ac.) of conversion, and displacement of portion of a farm.	3.2 ha (7.9 ac.) of conversion, and some displacement of a farm.	3.2 ha (7.9 ac.) of conversion. No displaced farms.
Transpor.	No difference. Both fulfill transportation needs.		More efficient connections, fulfills transportation needs.	Less efficient connections; but fulfills transportation needs.	Least efficient connections; but fulfills transportation needs.
Haz. Waste	No difference. (No impacts).		No difference. (No impacts).		
Energy	No difference. Better energy efficiency than No-Build.		More efficient because of lesser length. Better energy efficiency than No-Build.	More efficient because of lesser length. Better energy efficiency than No-Build.	Less efficient because of greater length. Better energy efficiency than No-Build.
Construction Phase	Less impacts of noise, emissions, visual because of greater separation from residences.	More impacts.	Slightly more impacts.	Less impacts because of greater separation from adjacent residences.	Least impacts because of greater separation from adjacent residences.
Growth-Inducing	No difference. (No growth inducement or facilitation).		No difference. (No growth inducement or facilitation).		
Cumulat. Impact	No difference. (No cumulative impacts identified).		No difference (No cumulative impacts identified).		

Note: Impact degree is rated relative to other alternative alignment(s). Mitigation is discussed in text and in Table S-1. Table has been revised between Draft and Final EIS. Draft numbers, where different from Final, are contained in accompanying text.

Air Quality. No emission concentrations exceeding federal air quality standards would be expected from either Alternative or any alignment within the Build Alternative. Total emission increases over present levels for HC and CO are substantially greater under the No-Build Alternative. NO_x would increase at approximately the same rate under either. Alignments B and 2 are marginally less preferable because of shorter setbacks from residences. State air quality standards for CO are exceeded at several intersections during peak hours, but the No-Build Alternative produces more severe impacts.

Noise. The No-Build Alternative would be less preferable for a segment of the Lower Portion between Kawili and Komohana Streets, where the Build Alternative would mitigate existing and future noise impacts. The Build Alternative produces noise increases approaching or exceeding the FHWA and State DOT Noise Abatement Criteria at several locations with existing structures. In the shared alignment of the Lower Portion and widened side streets, 4 homes and 3 church buildings would be impacted. No reasonable and feasible measures can mitigate these impacts at 5 properties. West of this, a total of 40 residences are impacted on Alignment A versus 61 on Alignment B. Noise impacts on Alignments A and B would be mitigated through noise abatement walls. Alignment 1 would impact a total of 39 homes. Noise would impact 20 homes on Alignment 2, and 24 homes on Alignment 10. Noise barriers capable of mitigating impacts in all alignments of the Upper Portion would have a cost exceeding $100,000 per residence and are thus not considered reasonable.

The final decision on implementation of noise mitigation will not be made until after final design and consideration of comments received during the public involvement process. If conditions change substantially, mitigation measures will be reconsidered.

Natural Environment

Native Flora and Ecosystems. The Project would result in the unavoidable destruction of some or all of the existing vegetation within the right-of-way. However, the flora and vegetation of the project area have minimal conservation value. Field studies, in addition to consultation with the U.S. Fish and Wildlife Service, have determined that no plant species listed (or proposed for listing) as threatened or endangered is known from or is likely to occur in the project area. No unique or high-diversity native plant communities occur in the project area, and no plant community would be eliminated from the region. Construction and operation of this Project may lead to the spread of alien plant species along the right-of-way. This is partly mitigable by minimizing disturbed areas during construction along areas with native vegetation.

Waters of the U.S. Waters of the U.S. in the project area consist of wetlands. The Project would disturb between 1,669 m^2 (17,630 $ft.^2$/0.407 ac.) and 32,570 m^2 (344,020 $ft.^2$/7.934 ac.) ~~0.28 ha and 2.91 ha~~ of wetlands, depending on the combination of alignments. Biological and hydrological impacts are minimal. An application for a Department of the Army Permit for Dredge and Fill in the Waters of the U.S. is being prepared concurrently with this EIS. If Alignment 10 ~~1~~ is selected, an Individual Permit for Dredge and Fill in Waters of the U.S. ~~a Nationwide~~ is expected to be issued, with mitigation including funding a wetlands enhancement project currently being undertaken by a partnership of federal and state agencies in the region. ~~principally of Best Management Practices.~~ ~~Alignment 2 would require an individual permit, and~~

~~mitigation is not yet specified.~~ The Preferred Alternative of Alignments B/10 has been determined to be the Least Environmentally Damaging Practicable Alternative in the context of Section 404 of the Clean Water Act. Furthermore, it has been determined that there is no practicable alternative to the proposed construction in wetlands per Executive Order 11990, *Protection of Wetlands*, and that the proposed action includes all practicable mitigation measures to minimize harm to wetlands which may result from such use (See Sections 4.2.2.4 and 4.2.2.5).

Native Fauna. Native fauna is not abundant in the Project Area. Three endangered bird species and the endangered native bat may make some use of the area. No nests or roosts of these species appear to be present in any of the alternative alignments. Mitigation measures including a pre-construction search for hawk nests and restrictions on construction and operational lighting will prevent impacts to threatened or endangered species or other important native fauna.

Socioeconomic Environment

Consistency with Local Land Use and Planning. The Project has been a part of the Hawaii County General Plan since 1967. The Project is consistent with the current County General Plan (1989) and is specifically listed on the Facilities and Land Use Patterns Allocation Guide Maps of the Plan. The Project also conforms with all other State and County Plans.

Relocation and Right-of-Way Acquisition. Widening the existing Puainako Street between Kilauea Avenue and Kawili Street would necessitate acquisition of five single-family residential units along Puainako Street, displacing current residents. The implementation of the Puainako Street Widening and Extension Project will also require the acquisition of real property for right-of-way purposes. A relocation plan conforming to the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies of 1970 (P.L. 91-646) will be developed, and all right-of-way acquisition will be in conformance with the Act. For remnant parcels created by the right-of-way acquisition, appropriate access will be provided to the landowner. Alternatively, remnant parcels may be acquired as part of the Project right-of-way.

Public Facilities. Approximately 1.2 ha (3.0 ac.) of right-of-way adjacent to the Waiakea School Complex would be required. Driveways for the complex would be redesigned, and signals and crosswalks installed for traffic and pedestrian safety. No school facilities, other than access roads, will be impacted by this project. Kaumana Cave County Park, which is approached by Alignment 1, is an important educational and cultural resource and has been avoided by road design.

Visual Resources. The subtle topography and lack of important viewplanes affected by the Project limit visual impacts to minor levels. Alignments 2 and A would involve less intrusion into the viewplanes of neighboring residences than Alignments 1 (or 10) and B.

Cultural Resources. Archaeological survey in consultation with the State Historic Preservation Division (SHPD) identified the presence of 14 sugar-cane related archaeological sites. No matter which alignments are chosen, four sites in the shared Lower Portion (none recommended for preservation) would be impacted. Depending upon which alignments are selected, a variable number of additional sites would be impacted. Five sites (including the only three ~~two~~ Project sites recommended for preservation by SHPD) would be impacted on Alignment A. Three sites would be impacted by selecting Alignment B. Alignments 1 and 10 share one site, and 2 ~~each~~ contains one site. The recommended mitigation has been: 1) preservation of three sites in Alignment A, and 2) data recovery at portions of other sites, which has already been accomplished as part of the Project.

Agricultural Land. The amount of agricultural land to be removed is negligible, and only one operating farm is contained within the project corridors (in Alignments 1 and 10). A Farmland Conversion Impact Rating assessment determined that Prime farmland potentially converted directly by the Project included approximately 3.2 ha (7.9 ac.) in each of the three Upper Portion Alignments ~~either Alignments 1 and 2~~. No indirect conversion is expected.

Transportation Patterns. Under the No-Build Alternative, the current circulation and safety problems would continue and worsen. Any combination of alignments under the Build Alternative would improve traffic flow on the existing Puainako Street, Komohana Street and Kaumana Drive. The accident rate may be expected to decline with increases in road safety and traffic Level of Service. Safety and congestion would improve at the Waiakea School Complex.

Hazardous Waste. No known hazardous waste sites are present, no active or former generators of hazardous waste are or were present, and no releases of hazardous materials have been reported along the project corridor.

Energy. Improved traffic flow and engine efficiency would result from the Build Alternative. Alignments 1 and 10 are substantially ~~is~~ shorter than Alignment 2 and would thus involve the least consumption of energy for the Upper Portion.

Construction-Phase Impacts. The Build Alternative would impact noise, air quality, and traffic during construction. Air quality concerns would be mitigated by a dust control plan. Noise impacts can be reduced by portable noise barriers, low-noise heavy equipment, or other measures that will be specified in the Construction Noise Permit issued by the State Department of Health. Optimum scheduling can reduce impacts related to noise, emissions, traffic and access. To the extent practicable, construction work fronting the school will be scheduled during the summer.

Growth-Inducing Impacts. The Project is not expected to induce growth, although it may ~~facilitate~~ re-arrange the pattern of the in-filling of existing subdivisions and slightly accelerate development plans for other areas with approved zoning in Upper Kaumana. A number of intervening or competing opportunities for residential or agricultural subdivisions exist in areas within roughly the same distance to the employment and shopping centers of Hilo. No future residential subdivisions in the project area would produce growth-inducing impacts that are unanticipated or in conflict with the Project's needs and goals.

Cumulative Impacts. The impact of the proposed Project in major environmental resource categories was analyzed in relation to other present and proposed actions in the Hilo area in order to determine whether adverse cumulative impacts would occur. The projects analyzed included existing development and programs, as well as other projects that are proposed or now in construction. Such projects included several roadways that intersect or adjoin the Project, and a number of residential subdivisions. The cumulative impact could be severely adverse if no mitigation is associated with such actions. However, the scale of such projects and the mitigation associated with accompanying permits are expected to prevent substantial environmental impact to physical, biological or social resources.

RELATIONSHIP TO PLANS AND POLICIES

The proposed Project is specifically listed as an integral component of the Hawaii County General Plan (1989), the Hilo Community Development Plan (1975), Hawaii County Comprehensive Zoning Maps, and the Long Range Highway Transportation Plans from the Hawaii State Department of Transportation (1991 and 1998). Roadways are identified uses within the Urban and Agriculture State Land Use Districts traversed by the project area. The Project fulfills objectives of the Hawaii State Plan and the Hawaii State Functional Plan for Transportation. As part of the EIS process, the consistency of the Project with the Coastal Zone Management (CZM) policies of the federal and state government has been reviewed by the Hawaii Coastal Zone Management Program, Office of State Planning.

COORDINATION AND AREAS OF CONTROVERSY

Consultation with agencies, groups and individuals has been part of this Project. Section 9 discusses consultation; Appendix A1 contains all correspondence received during consultation on the Project before the Draft EIS; Appendix A3 contains comments and responses to the Draft EIS; Appendix A4 contains materials (including transcripts) related to the public hearing, and a summary of issues raised in oral and written comments; and Appendix A5 has agency correspondence subsequent to the close of the Draft EIS comment period.

The principal areas of concern that have been identified during the process are:

- Right-of-way requirements;
- Preservation of archaeological sites near the University of Hawaii at Hilo;
- Perceived community need to commence Project immediately;
- Noise impacts at Kinoole Baptist Church and Pacific Plantations Subdivision;
- Agreement between NEPA 404 MOU partners on wetlands impacts and mitigation; &
- Cave impacts

Requirements for 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. Archaeological survey and mitigation has been supervised and approved by the State Historic Preservation Officer (SHPO), and all sites determined to be significant for preservation in place will not undergo an adverse effect. Noise impacts at Kinoole Baptist Church have been determined now to be eligible for mitigation, and noise impacts at Pacific Plantation Subdivision would be avoided by adopting the Preferred Alternative. A revised study of wetlands impacts and a compensatory mitigation plan to enhance wetlands offsite have resolved the lack of agreement concerning wetlands. The Preferred Alternative avoids the mapped and visited portions of Kaumana Cave. Sunrise Estates Cave has been determined through consultation with resource agencies to have only limited resource value. Additional mitigation measures related to caves have been refined to include rapid consultation with a wider group of agencies and organizations if lava tube caves are uncovered during construction.

UNRESOLVED ISSUES

~~The Project was granted a provisional Department of the Army Nationwide Permit for Dredge and Fill in the Waters of the U.S on September 10, 1996. This permit lapsed on January 21, 1997. An updated application for a Department of the Army Permit is being prepared concurrently with this EIS. If Alignment 1 is selected, a Nationwide Permit is expected to be issued, with mitigation consisting principally of Best Management Practices. Alignment 2 would require an individual permit, and mitigation is not yet specified.~~ There are no unresolved issues.

PERMITS

A Section 404 Permit would be required from the United States Department of the Army. An application for a Department of the Army Permit is being prepared concurrently with this EIS. The application covers only Alignment 10, the Preferred Alternative, because this Alternative has been determined by the FHWA, HDOT, DPW, EPA, the USFWS and the US Army Corps of Engineers (COE) to be the Least Environmentally Damaging Practicable Alternative. The consistency of the Project with the Coastal Zone Management (CZM) policies of the federal and state government has been ~~will be~~ reviewed by the Hawaii Coastal Zone Management Program, Office of State Planning. This agency has determined that the project is consistent with these policies. The State Department of Health must issue a National Pollutant Discharge Elimination System Permit signifying approval of mitigation measures for construction-related grading impacts. The State Department of Land and Natural Resources must approve a Stream Channel Alteration Permit for any work within identified stream channels. Hawaii County Department of Public Works will issue permits for Excavation of Public Highway, Grading, Grubbing, and Stockpiling, and a Permit for Outdoor Lighting, and Permit for Electrical Work. This agency would also review designs related to encroachment within designated floodplains. The Hawaii County Planning Department will issue a Subdivision Approval related to highway right-of-way.

1 PURPOSE, NEED AND PROJECT DESCRIPTION

1.1 Background

The Federal Highways Administration (FHWA) and the Hawaii State Department of Transportation (HDOT) are serving as joint lead agencies to prepare an Environmental Impact Statement (EIS) in compliance with federal and State of Hawaii requirements, with the assistance of the Hawaii County Department of Public Works. The approving official for the EIS under the National Environmental Policy Act is the Hawaii Division Administrator of FHWA. The Governor of the State of Hawaii is the accepting authority for the EIS, under Chapter 343 HRS, related to Environmental Impact Statements.

The Project developed out of separate efforts to extend the County's portion of the roadway and to widen the State's portion. These projects were then integrated to optimize planning and design. Because the County had initiated the efforts, it was agreed that the County should continue to organize preparation of the EIS and Project design. During the planning stages of the Project, it was subsequently determined that federal funding under the Intermodal Surface Transportation Efficiency Act (ISTEA – since reauthorized as TEA-2000) would be utilized, which required the involvement of FHWA.

This EIS is prepared in compliance with federal law, including the National Environmental Policy Act (NEPA), as well as State of Hawaii law (Chapter 343, HRS)[1]. The purpose of this EIS is to investigate the impacts to the physical, biological and social environments that would result from construction of the proposed Project and to devise mitigation measures to minimize potential adverse impacts. This EIS is a joint Federal-State document fulfilling both State of Hawaii and federal environmental protection laws.

The EIS revises and replaces a State of Hawaii EIS prepared for the Project in 1993 by the County of Hawaii (original EIS). In addition to the inclusion of federal involvement in the Project, several design changes in the Project have been implemented, including intersection improvement and widening and realignment of corridors in certain areas.

1.2 Project Location and Purpose

The proposed Project involves roadways in the town of Hilo, in Hawaii County (Fig. 1-1). The purposes of this Project are: 1) to improve arterial traffic flow of the State Highway system by providing a direct link between the existing Puainako Street (Highway 2000) and the Saddle Road (Highway 200; designated as Kaumana Drive below Country Club Drive); and 2) to alleviate congested and unsafe traffic conditions on Puainako Street and Kaumana Drive. Figure 1-2 depicts the State and County Highway system within Hilo.

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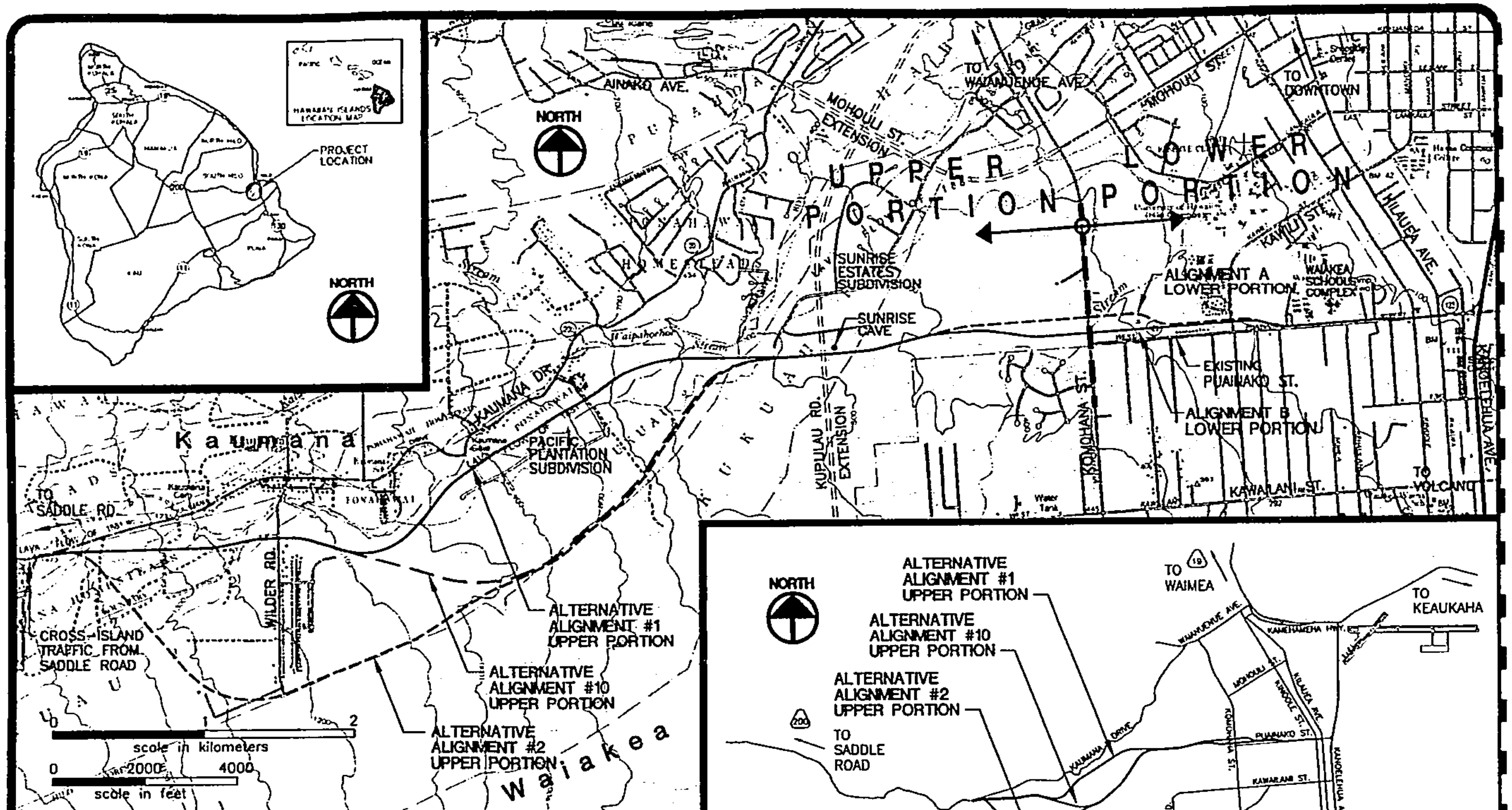
[1]Chapter 343, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapter 200, §11; National Environmental Policy Act (NEPA) 42 U.S.C 4332; (2)(c) Section 4(f) of the Department of Transportation Act (DOT) 49 U.S.C. 303; Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (40 CFR 1500-1508); and Federal Highway Administration's Environmental Impact and Related Procedures (23 CFR 771).



TITLE

**PUAINAKO WIDENING/EXTENSION
PROJECT LOCATION**

FIGURE 1-1

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 10/26/98

1.3 Project Description, Cost and Schedule

Puainako Street would be widened from two to four lanes. Other proposed improvements would include dual sidewalks and bicycle lanes, improvements to intersections, and two new traffic signals (see typical cross-section of Lower Puainako, Figure 1-3).

Puainako Street would be extended as a two-lane road with a 37-meter (120-ft.) right-of-way approximately 7.3 km (4.5 mi.) between Komohana Street and the Saddle Road (see Fig. 1-4, typical cross-section of Upper Puainako). The eastern project terminus is at the intersection of Puainako Street and Kilauea Avenue and the western terminus at approximately the 10 km (6 mi.) marker on the Saddle Road (detailed descriptions of proposed improvements are contained in Section 2.3, *Alternatives*).

This Project is included in the current approved federally required State Transportation Improvement program (STIP). The Project would cost an estimated $56.651 to $61.471 million ~~$62.650 to $67.234 million~~ , depending on the combination of alignments chosen, with the State and/or County responsible for 20 percent of funding and the federal government funding the remaining 80 percent. This total includes right-of-way acquisition, design and construction. If approvals are obtained in a timely manner, project design will be completed in 2000 ~~1999~~. Construction would begin in 2000 ~~1999~~ and would be finished in the year 2002 ~~2001~~.

1.4 Need for Project

1.4.1 System Linkage

Puainako Street is currently a two-lane roadway extending from Railroad Avenue to Komohana Street, in Waiakea. The existing right-of-way has a minimum of 38 m (125 ft.) between Kanoelehua Avenue and Kilauea Avenue. At that point, the right-of-way narrows to 12 m (40 ft.) up to its intersection with Komohana.

According to the *Hawaii County General Plan* Facilities Map, Puainako Street is intended to link the Saddle Road with a future coastal road serving the Puna District (see Figure 1-2). The Zoning Map calls for a 37-meter (120-ft.) right-of-way along the entire length of the roadway.

The State Highway system provides inter-regional connections between communities. The system presently extends along Puainako Street between Kanoelehua Avenue and Komohana Street. A gap in the system occurs between Komohana Street and the Saddle Road, which begins at approximately the 10-km (6-mi.) marker above the residential area of Kaumana. The Saddle Road provides a cross-island link with Mauna Kea, Pohakuloa Training Area and on to West Hawaii. There is currently no convenient connection between Komohana Street and the Saddle Road. The proposed Project would provide that important link in the State Highway system by directly connecting the existing Puainako Street with Saddle Road.[1]

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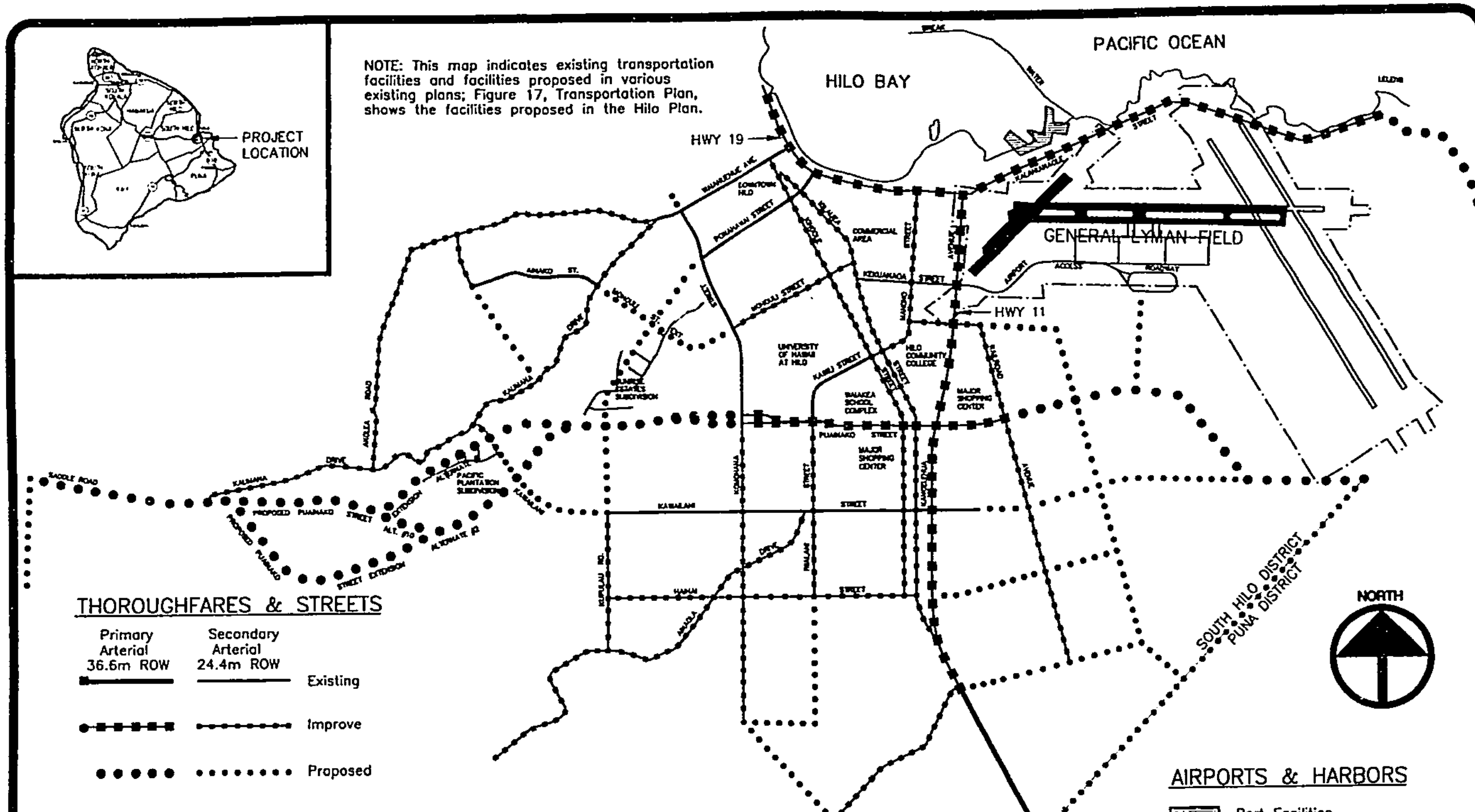
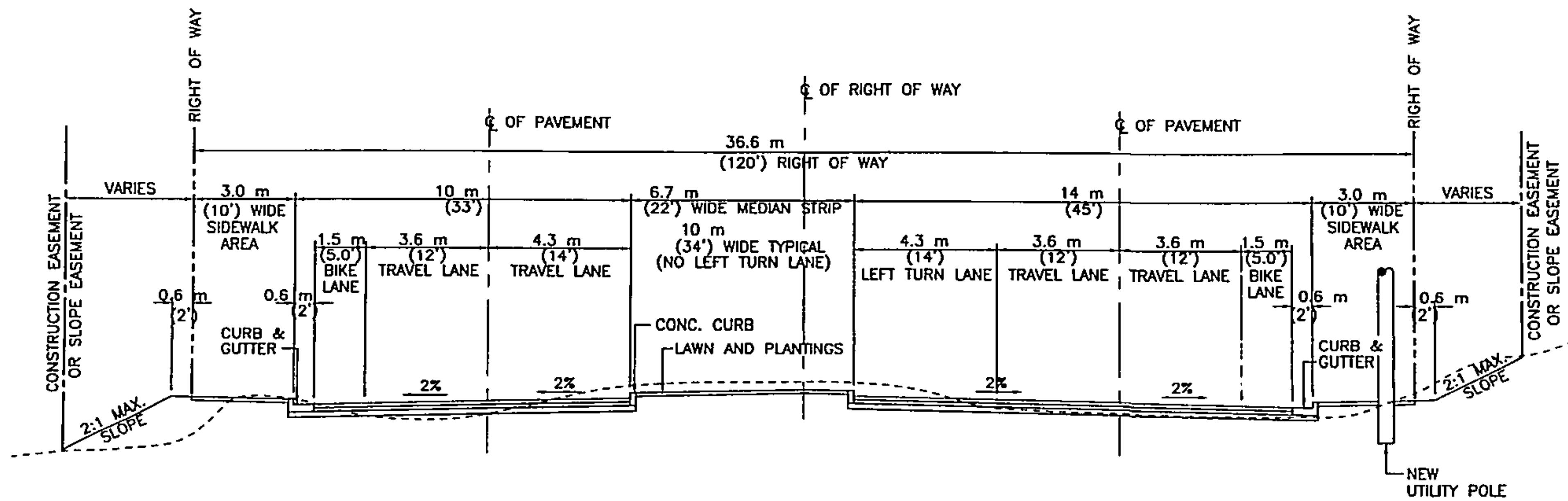
[1] *Although it is part of the State Highway System, the Saddle Road is currently owned and maintained by the County of Hawaii. The State has reached an agreement with the County to take over responsibility for the Saddle Road, subject to improvements of the roadway.*



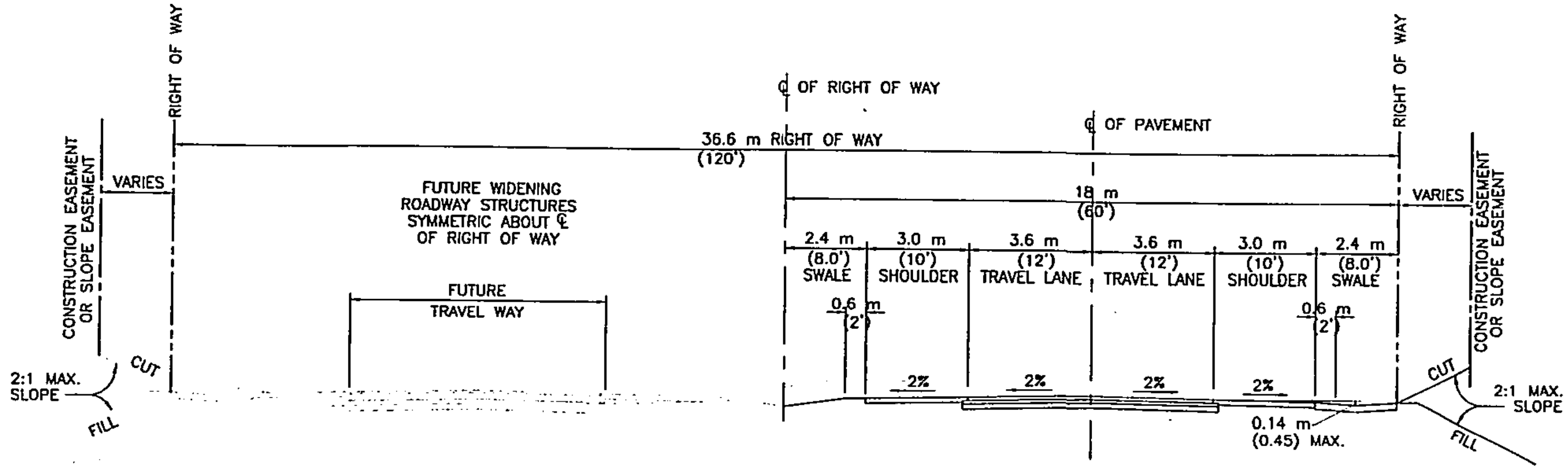
TITLE	FIGURE
STATE & COUNTY HIGHWAY SYSTEM	1-2
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000



NOTES:

1. MAXIMUM SIDESLOPE SHALL BE 2:1.
2. UTILITIES WITHIN ROADWAY NOT SHOWN.

TITLE	**TYPICAL SECTION LOWER PUAINAKO** KOMOHANA STREET TO KILAUEA AVENUE	FIGURE 1-3
PROJECT	PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000



NOTE:

1. MAXIMUM SIDESLOPE SHALL BE 2:1.

TITLE	TYPICAL SECTION UPPER PUAINAKO KAUMANA DRIVE TO KOMOHANA STREET	FIGURE 1-4
PROJECT	PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000

92014/W/..ES/ALT-10/F1-4.DWG/SCALE 1=1

The proposed transportation Project is intended to meet the existing and projected demand, based upon local land use plans.

1.4.2 Existing Roadway Deficiencies

Although Puainako Street is essentially straight, it has considerable deficiencies, including:

- o Limited sight distance due to poor vertical alignment;
- o High proportion of no-passing zones based on poor sight distances;
- o 3-meter (10-ft.) wide traffic lanes that decrease potential level of service as traffic increases;
- o Narrow shoulders;
- o Excessive access points from existing driveways and street intersections;
- o Limited pedestrian facilities; and
- o No signalized crossing at the Waiakea school complex.

These deficiencies increase congestion, decrease capacity, and worsen safety conditions. Without a substantial upgrade, Puainako Street cannot fulfill the function of a main link in the State Highway system.

1.4.3 Current Traffic Conditions

As the upland neighborhoods of Hilo have grown in population, Puainako Street has become a primary conduit routing traffic to and from the neighborhoods of Kaumana and Waiakea Uka. Puainako Street serves drivers destined for a number of locations within Hilo and in surrounding districts. Waiakea High School, Waiakea Intermediate School, Waiakea Elementary School, Hawaii Community College and the University of Hawaii at Hilo are all located on or near Puainako Street (see Fig. 1-1). Motorists on Puainako Street and Kaumana Drive currently experience congested traffic conditions at peak hours.

Both Waiakea Elementary and Waiakea Intermediate Schools are located on Puainako Street between Kinoole Street and Kawili Street. Traffic congestion associated with the start of school (7:00 to 8:00 AM) and the close of school (2:00 to 3:00 PM) occurs daily, as vehicles carrying students enter and exit the school complex. Because the start of the school day coincides with the morning work commute, particularly bad congestion occurs in the morning. Traffic circulation can also be poor between 4:00 and 6:00 PM because of returning commuters. Another source of traffic is students, faculty, staff and visitors of the University of Hawaii at Hilo and Hawaii Community College. Traffic to and from the colleges exhibits moderate peaks in the morning and late afternoon, but also contributes a steady flow throughout the day and into the evening.

Traffic engineers assess the quality of traffic flow by the Level of Service (LOS) (see Table 1-1). LOS is determined by comparing the amount of traffic using a roadway and the amount that the

Table 1-1
Definition of Traffic Level of Service

Level of Service	Operational Description	V/C Ratio for Arterial Roads
A	Free flow	0.00-0.60
B	Stable flow (slight delay)	0.61-0.70
C	Stable flow (acceptable delay)	0.71-0.80
D	Approaching unstable flow	0.81-0.90
E	Unstable flow	0.91-1.00
F	Forced flow	>1.00

Source: Based on Transportation Research Board. 1985. Highway Capacity Manual, Special Report 209. *Washington, D.C. Note: The V/C (Volume-to-Capacity) ratio indicates relative traffic demand relative to the road's traffic carrying ability.*

road is designed to carry (its capacity). LOS has values between "A" (Free Flow, when traffic flows with congestion) and "F" (Forced Flow, when traffic frequently comes 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. From an operational perspective, LOS "F" results in traffic queues backing up from downstream intersections, affecting traffic flow at the study intersection. From a planning perspective, LOS "F" indicates that the traffic demand far exceeds the roadway's carrying capacity. Roadway design is undertaken with the goal of producing LOS Level "C" or higher, which is the minimum goal of the proposed Project.

A field traffic study and data analysis for this Project is contained in Appendix G. The field investigation was conducted in May and June 1992, while school was in session. Manual traffic count surveys were conducted from 6:30 to 8:30 AM and from 4:00 to 6:00 PM at a number of affected intersections. Additional traffic data were obtained from the State DOT. Traffic volumes along Puainako Street and Kaumana Drive are illustrated in Table 1-2, below.

A capacity analysis was performed on the data, based upon procedures presented in the *Highway Capacity Manual* (Transportation Research Board 1985) and associated software from the Federal Highways Administration. The study concluded that the traffic Level of Service operates at undesirable levels at peak periods. Several descriptors of the traffic demand relative to the road's traffic carrying ability were generated for all intersections.

The current ratio of traffic volume to capacity along several segments of Puainako Street approaches or exceeds 1.0 during peak hours. Many intersections were found to be operating at poor condition (LOS "E" or "F") at either or both the AM and PM peak hours. Table 1-3 below presents the near or over-capacity intersections in the AM peak hour.

Table 1-2
Current Traffic Volumes

Roadway Section	24-Hour Volumes	AM Peak Hour Volumes	PM Peak Hour Volumes
Puainako St. W of Kanoelehua Ave.	20,164	1,057	1,600
Puainako St. E of Kilauea Ave.	17,527	1,065	1,402
Puainako St Between Kilauea St. and Kinoole St.	11,580	685	941
Puainako St. W of Kinoole St.	8,743	569	688
Puainako St. E of Iwalani/Kawili Sts.	7,460	484	632
Puainako St. W of Iwalani/Kawili Sts.	8,427	621	786
Puainako St. E of Komohana St.	6,622	527	519
Komohana St. N of Puainako St.	15,259	1476	1243
Saddle Road E of Country Club Dr.	1,630	130	146

Source: Appendix G.

Table 1-3
Near-Capacity or Over-Capacity Intersections

INTERSECTION	LEVEL OF SERVICE (LOS) A.M PEAK HOUR
Puainako St. at Komohana St.	F - Unacceptable LOS
Puainako St. at Iwalani/Kawili Sts.	E - Undesirable LOS
Puainako St. at Waiakea Schools	E - Undesirable LOS
Puainako St. at Lokahi St.	D - Desirable Minimum LOS

Source: Appendix G. Note: LOS listed pertains to one or more branches of the intersection. Figures 3-5 and p. 11 of Appendix G provide detailed data. (Refer to Table 1-1 for further definition of Level of Service codes.)

Conditions are worst at the intersection of Puainako and Komohana, where motorists turning onto Komohana in the AM peak hour are stuck in a long queue.

The left-turn movements from the exit driveways of Waiakea Elementary and Intermediate Schools both operate at LOS "E" ("undesirable"). Vehicles on the east- (makai-) bound lane of Puainako Street turning left at the school entrances must cross driveways from the through traffic lane. This results in queuing on Puainako Street, and occasional gridlock. Portions of Kaumana Drive are congested during the AM peak. The other intersections in the study area operate satisfactorily.

Poor levels of service at the PM peak hour (4:15–5:15 PM) are currently found only at the westbound approach of Puainako Street to Komohana Street and on Kaumana Drive.

1.4.4 Future Traffic Conditions

The State Department of Transportation in its *Island of Hawaii Long Range Highway Plan* forecasts an increase in traffic in the Hilo area of up to 68 percent between the years 1990 and 2010 (HDOT 1991; updated in 1998 and named *Hawaii Long Range Land Transportation Plan*). An assumption in this plan was the existence in 2010 of both the Puainako Street Extension and Widening Project and accelerated upgrade of the Saddle Road. This plan is currently under revision.

A separate modeling of traffic volumes under the assumption "No-Build" was performed for this EIS and is presented in Table 1-4. These volumes represent increases of 50 to 100 percent for the various points measured. The LOS at intersections will drop substantially, and most intersections along Puainako will operate at Level "D" or poorer with no improvements. It is clear that congestion will worsen to critical levels without remedial measures.

1.4.5 Current Safety

The Hawaii County Police Department (see HCPD letter of 15 August 1995 in App. A1) recorded the following accident totals for the five years preceding July 1995:

- 139 on Kaumana Drive between Country Club Drive and Komohana Street;
- 102 on Komohana Street between Waianuenue Avenue and Puainako Street; and
- 332 on Puainako Street between Komohana Street and Kilauea Avenue.

Currently, poor sight distance, deficient horizontal alignment and the lack of shoulders combine with regularly deficient Level of Service to cause high accident rates on Puainako Street and Kaumana Drive.

Table 1-4
2020 Projected Traffic Volumes Without Proposed Roadway Improvements

Roadway Section	24-Hour Volumes	AM Peak Hour Volumes	PM Peak Hour Volumes
Puainako St. W of Kanoelehua Ave.	36,300	1,983	2,798
Puainako St. E of Kilauea Ave.	30,600	1,935	2,376
Puainako St. Between Kilauea St. and Kinoole St.	22,500	1,346	1,812
Puainako St. W of Kinoole St.	20,100	1,485	1,407
Puainako St. E of Iwalani/Kawili Sts.	18,000	1,403	1,268
Puainako St. W of Iwalani/Kawili Sts.	15,200	1,180	1,347
Puainako St. E of Komohana St.	15,000	1,186	1,364
Komohana St. N of Puainako St.	24,000	2,222	2,058
Saddle Road E of Country Club Dr.	5,500	468	967

Source: Appendix G. Forecast assumes major improvements to Saddle Road.

To arrive at an accident rate that can accurately assess the safety of these roads requires data on the Average Daily Traffic (ADT) for these road segments. Table 1-5 compares the accident rate adjusted for level of traffic for each road segment, for the year 1993 (the latest date for which both accident and ADT data are available).

The average rate of accidents occurring on the above roadway segments is between 2.5 and 5.0 times the County average, indicating substantially more unsafe conditions than average. Residents of Kaumana have been vocal at public meetings and in letters to the editor in expressing the need to improve road safety conditions along Kaumana Drive, as well as providing alternative emergency access routes to and from Kaumana.

Table 1-5
Accident Rates Within Project Limits

Location	Accident Rate
Puainako Street: (Kilauea Ave. to Kinoole St.)	3.86
Puainako Street: (Kinoole St. to Iwalani/Kawili Sts.	3.09
Puainako Street: (Iwalani/Kawili Sts. to Komohana St.)	2.25
Kaumana Drive: (15 m west of Hapuu Rd. to Country Club Dr.)	7.89
HAWAII COUNTY AVERAGE	1.57

Source: Hawaii State Traffic Engineer (see Appendix A1); Hawaii County Police Department; Hawaii County Public Works Department, Highways Division. Note: Accident rate is normalized to accidents per 1.6 million vehicle kilometers (1.0 million miles).

1.4.6 Future Safety

Unless modification to existing roads or diversion of existing traffic occurs, traffic safety conditions can be expected to worsen in the future. The degree cannot be predicted with any certainty because the increase in traffic volumes may interact with deteriorating Levels of Service in complex ways.

The following types of actions – with or without the proposed Project – would be necessary to accomplish greater safety:

- Signalization of busy intersections;
- Signalized crossing where pedestrian traffic is heavy (e.g., at schools);
- Improvements to sight distance for turning and crossing from minor roads;
- Elimination of blind hills.

2 ALTERNATIVES

2.1 Introduction

The County of Hawaii developed for consideration a wide range of alternatives to address the Project objectives of developing a State Highway connection linking lower Puainako Street with Saddle Road, in Upper Kaumana. These included a Build Alternative with two alternative alignments in the Lower Portion and six alternative alignments in the Upper Portion. Other Project alternatives considered included widening of the existing Kaumana Drive and substitution of the Mohouli Street extension for a portion of the project area. Transportation Systems Management and Mass Transit were also considered. All alternatives were evaluated for environmental and engineering feasibility and fulfillment of Project objectives.

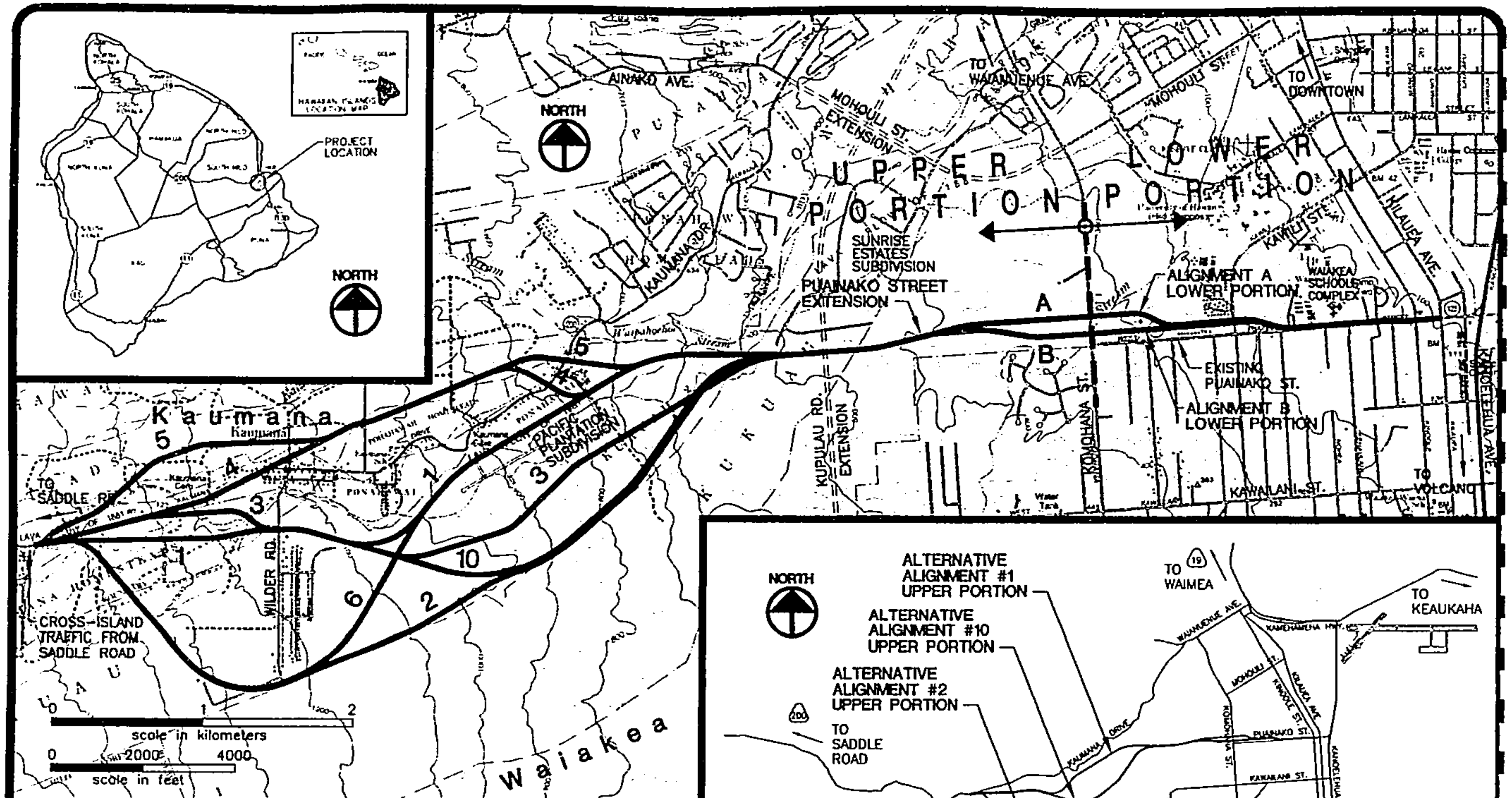
In accordance with a Memorandum of Understanding (MOU) to implement jointly the NEPA and Section 404 of the Clean Water Act, the signatory agencies, including FHWA, HDOT, U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, and the U.S. Army Corps of Engineers reviewed the alternatives. Based on this review, one No-Build Alternative and one Build Alternative with four alternative alignments were advanced for detailed engineering and environmental studies (illustrated previously in Figure 1-1). (See App. A1 and A5 for correspondence.)

This chapter first discusses the process by which alternatives were evaluated and briefly explains why some alternatives were withdrawn from further consideration. This is followed by a detailed description of the alternatives that were retained. In response to community concerns expressed during the review period for the Draft EIS, a hybrid of the two Alignments for the Upper Portion was developed. This alternative is explained in Section 2.3.2.2.3. The costs of all alternatives are compared in the next section. Next, ~~Finally,~~ a detailed discussion of the alternatives withdrawn from further consideration and the rationale for eliminating them from further study are presented in Section 2.5. Finally, Section 2.6 identifies the Preferred Alternative and explains why it was chosen.

2.2 Evaluation and Screening of Alternatives

The screening process consisted of first reducing the number of Build Alternative Alignments to those which met the Project need, conformed with State and County plans regarding land use and road networks, had the potential to satisfy the design standards, did not involve major disruption of existing or planned residential areas, and did not require extensive flood zone crossings. The alignments considered are illustrated in Figure 2-1.

Table 2-1 presents the criteria and scores of this initial screening process. Most of the potential build alignments failed to satisfy most of the screening criteria. Both alignments in the Lower Portion were acceptable. In the Upper Portion, only Alignments 1 and 2 (Alignment 10 had not yet been developed) reasonably satisfied the evaluation criteria (refer to Section 2.5 for detailed discussion of withdrawn alternatives).



TITLE

ALTERNATIVE ALIGNMENTS CONSIDERED DURING SCOPING

FIGURE 2-1

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 10/26/98

Table 2-1
Initial Alignments Comparison Matrix

FACTORS	BUILD HIGHWAY ALTERNATIVES								OTHER PROJECTS	
	LOWER PORTION		UPPER PORTION							
	A	B	1	2	3	4	5	6	MOHOULI	KAUMANA
Conformance with State and Regional Plan	●	●	●	_	_	O	O	_	O	O
Consistency with State Highway System	●	●	●	_	_	O	O	_	O	O
Potential Relocation Impacts	_	_	●	●	●	O	O	●	O	O
Impacts on Zoned/Entitled Lands	●	●	●	●	O	O	O	O	O	O
Potential to Meet Design Standards	●	●	●	●	_	_	●	●	O	O
Drainage Impacts	●	●	_	_	O	O	O	_	●	O
Overall Potential to Satisfy Project Need	●	●	●	●	_	O	O	_	O	O

Notes: ● Good _ *Fair* O *Poor*

The initial screening process reduced the alternatives under consideration to the No-Build Alternative, the Build Alternative (with two alternative alignments each in the Upper Portion and the Lower Portion), the Transportation Systems Management Alternative, and the Mass Transit Alternative.

Transportation Systems Management (TSM) involves restrictions to road use, such as work- and school-time staggering, car-pool incentives, and High Occupancy Vehicle Lanes (HOVLs), and minor changes to existing roads. Each of these techniques entails substantial problems that prevented their practical application to the Project need. Road restrictions, HOVLs and most cnanges to existing roads would require a system of roadways that has or can accommodate multiple lanes. This would not be practical in the project area, where most roadways have only two lanes and have considerable restrictions to expansion of right-of-way. A coordinated staggering system would probably prove counter-productive to the goal of reducing trips during peak hours to and from Upper Kaumana.

Mass transit is usually a practical alternative only in urban areas where a well-developed transit system already exists. Mass transit in Hilo consists of a bus system with a minimal service schedule not geared to the needs of commuters and students who compose the peak hour traffic. Given the needs of riders and the land use patterns present in the project area, expansion of the bus service system in this part of Hilo would not be cost-effective if it attempted to meet the practical needs of sufficient potential riders to reduce traffic by a substantial amount. In addition, it would not create the needed link in the State Highway System between Highway 11 (Volcano Highway) and Highway 200 (the Saddle Road).

Neither the Transportation System Management Alternative nor the Mass Transit Alternative provided a prospective solution to the Project needs. They were therefore eliminated from further consideration. Section 2.5 contains a more detailed discussion of withdrawn alternatives, including these.

2.3 Alternatives Retained for Further Consideration

2.3.1 The No-Build Alternative

Under this alternative, Puainako Street would not be widened substantially east (makai) of Kawili Street, or rerouted behind the existing Puainako Street west (mauka) of Kawili Street, nor extended west (mauka) from Komohana Street to Kaumana Drive. Intersection improvement might be undertaken east (makai) of Kawili Street. Improvements to the traffic signal at Kawili Street and the creation of a signal at Komohana Street might also take place.

The No-Build Alternative is the benchmark for comparing the other improvement alternatives. Traffic volumes for the design year 2020 were formulated in order to compare the demand placed upon the existing roadway network if Puainako Street is not widened or extended. Construction and right-of-way acquisition costs are also estimated. These measures along with the projected social and environmental impacts of each alternative are used as a basis of comparison of the costs and benefits of each alternative.

This Alternative does not address current and future deficiencies of capacity and safety on Puainako Street and Kaumana Drive. It does not provide for a State Highway connection between Highway 11 and the Saddle Road. Problems associated with congested traffic on a two-lane road with a narrow profile (e.g., noise, air quality and safety) are not addressed.

However, by definition, the No-Build Alternative also avoids environmental impacts associated with disturbance of natural and semi-natural vegetation, wetlands alteration, removal of historic sites, and construction-phase impacts to noise and air quality levels.

2.3.2 Build Alternatives

The Build-Alternative encompasses a set of alternative alignments that would widen, partially realign, and extend Puainako Street (see Fig. 1-1). Along the 2.4-km (1.5 mi.) long section between Kilauea Avenue and Komohana Street (Lower Portion), Puainako Street would be widened from two to four lanes and include dual sidewalks and bicycle lanes in the 37-meter (120-ft.) right-of-way. Improvements to vertical grade yielding satisfactory sight distances along road portions and at intersections and the addition of two new traffic signals would also occur.

Puainako Street would be extended approximately 7.3 km (4.5 mi.) between Komohana Street and the Saddle Road (State Highway 200, also designated as Kaumana Drive) as a two-lane road (Upper Portion). The eastern project terminus is at the intersection of Puainako Street and Kilauea Avenue and the western project terminus is at approximately the 10 km (6 mi.) marker on the Saddle Road, near the Country Club Drive intersection.

~~Each portion contains a set of two alternative alignments~~. The Lower Portion has two alternative alignments: Alignments A and B, and the Upper Portion has three: Alignments 1, ~~and~~ 2 and 10. A total of six ~~four distinct~~ combinations of these alignments is possible. All combinations share the following elements:

1. Lower Portion:
   a. Realignment of the existing Puainako Street right-of-way between Komohana Street and Kawili Street, parallel and to the north of the existing Puainako Street alignment. Acquisition of necessary land to provide a 37-meter (120-ft.) right-of-way, which is expanded to 40 meters (132 feet) for a distance of 275 m (900 ft.) west of the Waiakea School Complex.
   b. Design and construction of a four-lane roadway within the existing and realigned Puainako Street right-of-way between Komohana Street and Kilauea Avenue.
   c. Construction of dual sidewalks/bikeways, curbing and crossing facilities that conform to the Americans with Disabilities Act (P.L. 101-336).
   d. Modification and improvements to existing intersections including widening, signalization and restriction of turning movements.

(See Figure 1-3 for typical cross-section).

2. Upper Portion

   a. Design, acquisition, and construction of a new two-lane road within a 37-meter (120-ft.) right-of-way from Komohana Street to Kaumana Drive near Country Club Drive. A portion of the right-of-way would include an already existing right-of-way, which extends approximately 1,128 m (3,700 ft.) west (mauka) of Komohana Street.

(See Figure 1-4 for typical cross-section).

2.3.2.1 Lower Portion

The Project design calls for Puainako Street to be re-routed to the north of the existing Puainako Street above Kawili Street.

Widening of Puainako Street between Kawili and Komohana Streets is not feasible because of the narrow right-of-way and terrain. This option would require acquisition of over thirty (30) homes and substantial cut and fill, and it was therefore eliminated from further consideration.

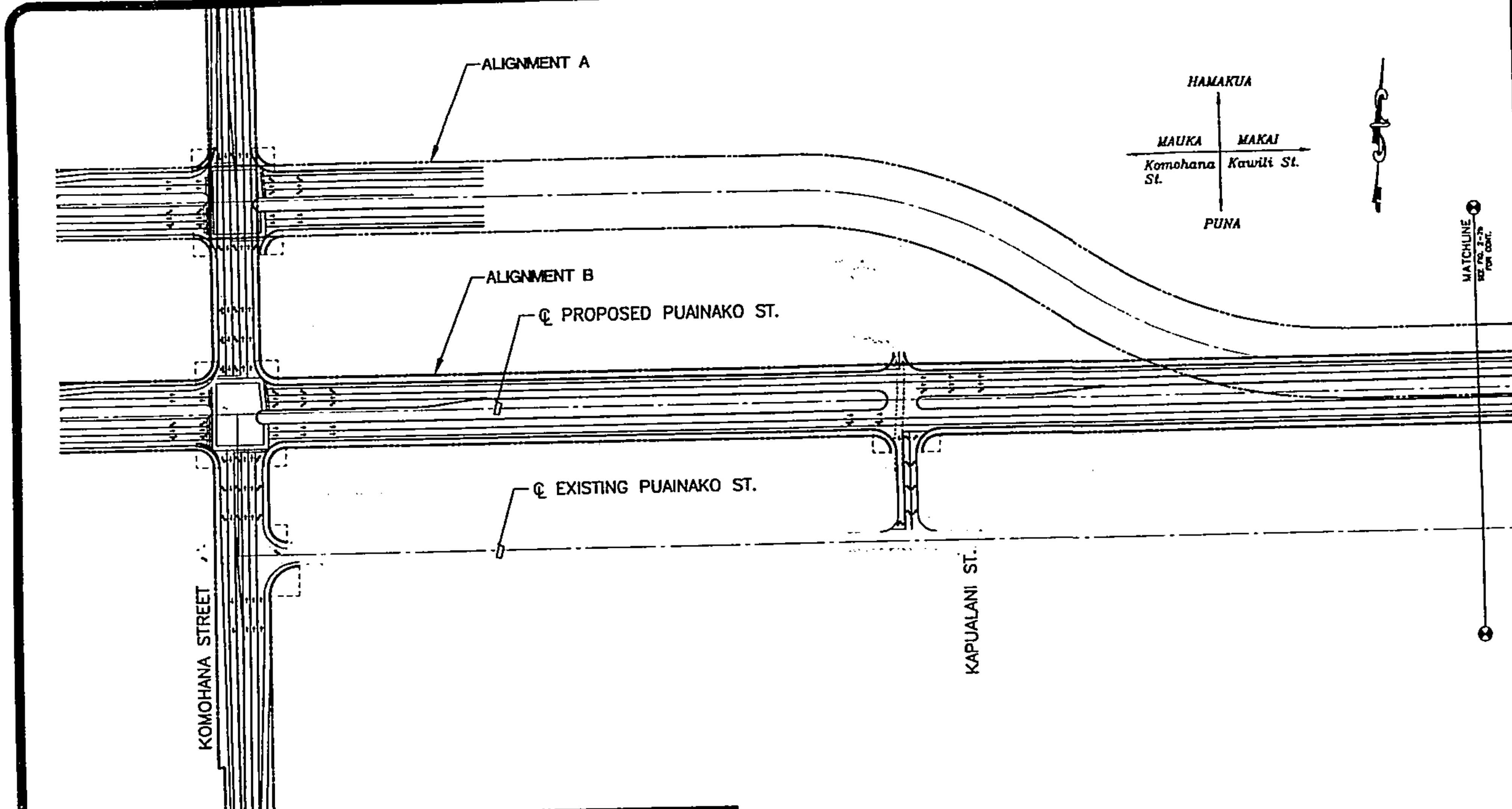
Both alignments entail redesign of existing intersections, including signalization and widening for additional through lanes and turning movement lanes. Figure 1-1 (above) illustrates the overall configuration of Alignments A and B. Figures 2-2(a) – 2.2(d) provide a detailed depiction of each alignment's relationship to individual intersections. Table 2-2 below summarizes the changes.

The cross streets at Kilauea Avenue and Komohana, Kawili and Kinoole Streets will be widened in order to provide multiple lanes for efficient traffic movement through the intersections. The widening will taper back gradually from the intersection. For some segments, the road/shoulder pavement will be widened back to the edge of the existing right-of-way. In other areas, the right-of-way must be widened to accommodate the broader road profile. Table 2-3 summarizes the changes.

In addition, the intersections serving the Waiakea Intermediate and Elementary Schools would be reconfigured. Currently, there are four unsignalized driveways entering the complex. Under the proposed design, these would be replaced by two central, fully signalized intersections and one subsidiary intersection with a right-turn-in only turning movement.

2.3.2.1.1 Alignment A

Alignment A was sited with several goals: to reduce the area of contact with the Waiakea flood control channel, to avoid a crossing of Komohana Street at the flood control channel, and to minimize disturbance to the existing residences on Puainako Street. This alternative overlaps

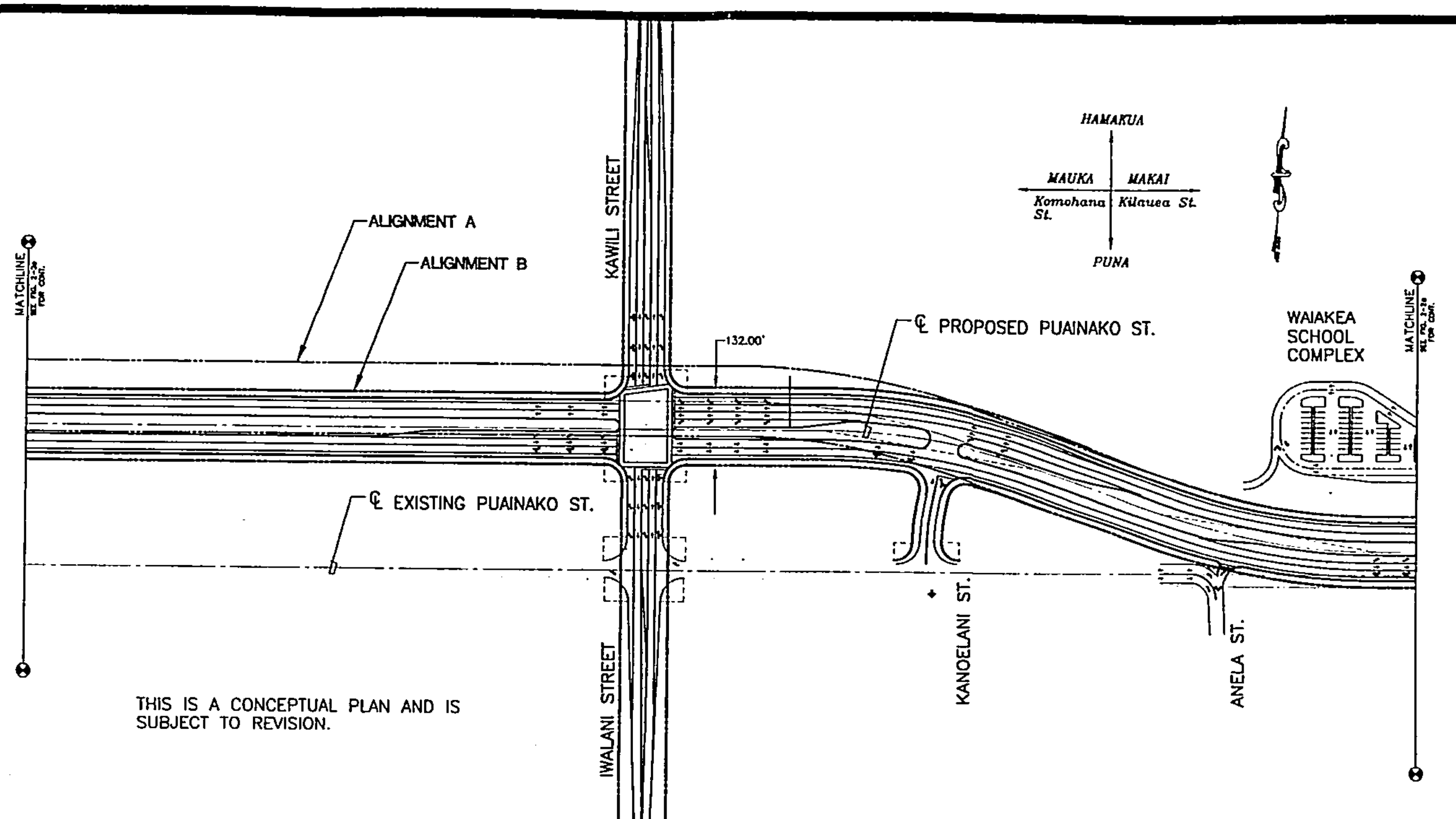


TITLE
LOWER PUAINAKO:
LANES, TURNING MOVEMENTS, & TRAFFIC PATTERNS

FIGURE 2-2a

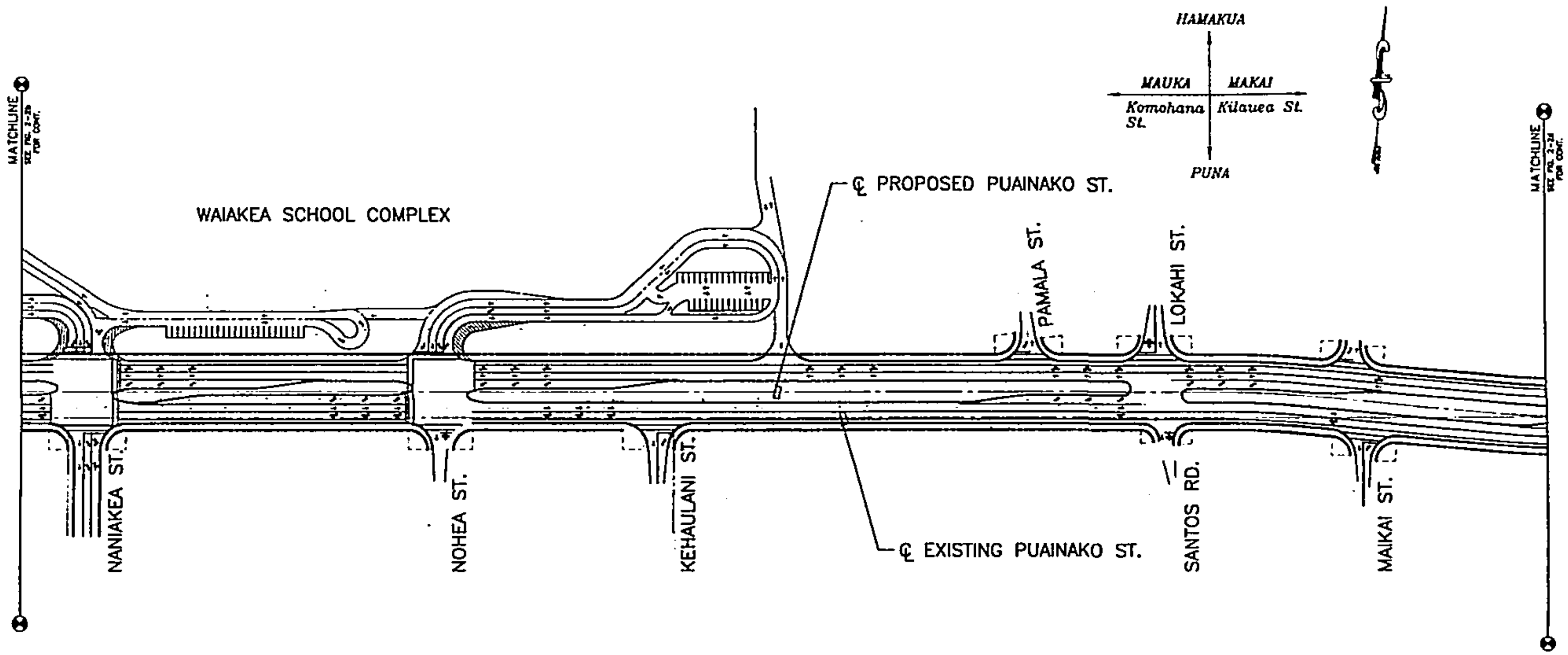
PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000



LANES, TURNING MOVEMENTS AND TRAFFIC PATTERNS FOR ALIGNMENTS A AND B ARE SIMILAR.

TITLE: **LOWER PUAINAKO:** (CONT.) LANES, TURNING MOVEMENTS, & TRAFFIC PATTERNS	FIGURE 2-2b
PROJECT: PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000



THIS IS A CONCEPTUAL PLAN AND IS SUBJECT TO REVISION.

LANES, TURNING MOVEMENTS AND TRAFFIC PATTERNS FOR ALIGNMENTS A AND B ARE SIMILAR.

TITLE **LOWER PUAINAKO:** (CONT.) LANES, TURNING MOVEMENTS, & TRAFFIC PATTERNS	FIGURE 2-2c
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000

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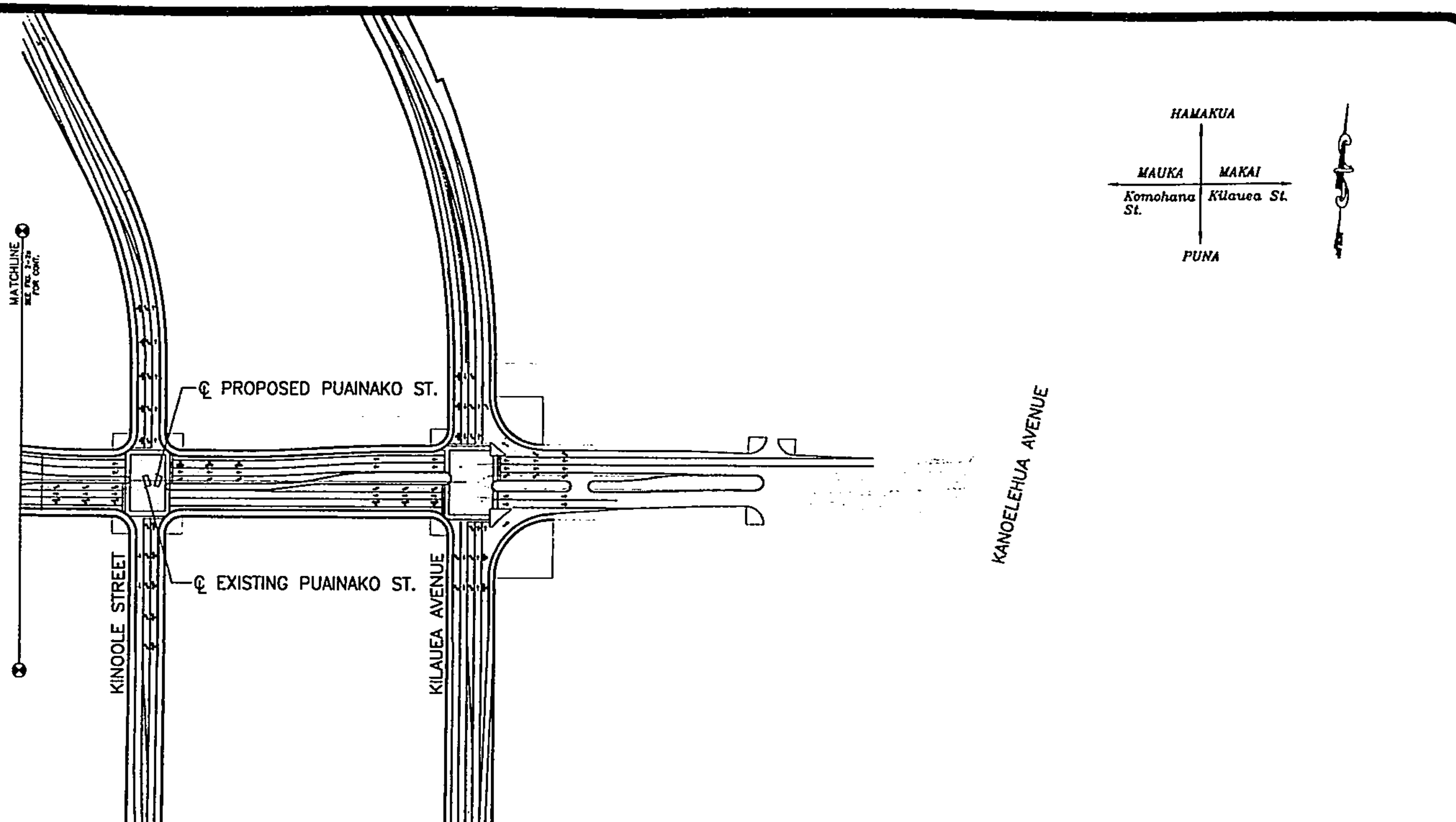


LANES, TURNING MOVEMENTS AND TRAFFIC PATTERNS FOR ALIGNMENTS A AND B ARE SIMILAR.

TITLE **LOWER PUAINAKO:** (CONT.) LANES, TURNING MOVEMENTS, & TRAFFIC PATTERNS	FIGURE 2-2d
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000

Table 2-2
Summary of Major Intersections and Changes to Intersection Controls, Lower Portion

Intersection	Intersection Control	
	Signal	Turning Movements Allowed
Puainako (Realigned) at Komohana	Yes	Full
Puainako (Existing) at Komohana	No	Right turn in/out*
Kapualani Street Offset Extension to Puainako (Realigned)	No	Full
Puainako (Realigned) at Kawili	Yes	Full
Puainako (Existing) onto Kawili/Iwalani	No	Right turn in/out*
Kanoelani Drive Extension to Puainako (Realigned)	No	Full
Puainako (Existing) to Anela	No	Right turn in/out
Puainako at Naniakea	Yes	Full
Puainako at Nohea	Yes	Full
Puainako at Kehaulani	No	Right turn in/out
Puainako at Pamala	No	Right turn in/out
Puainako at Santos/Lokahi	No	Full
Puainako at Maikai	No	Right turn in/out
Puainako at Kinoole	Yes	Full
Puainako at Kilauea	Yes	Full

**Note: Cul-de-sacs are also being considered for these intersections.*

Table 2-3
Cross-Street Widening

Cross-Street	North of Puainako Street		South of Puainako Street	
	Length of Road Widening	Maximum ROW Increase	Length of Road Widening	Maximum ROW Increase
Kilauea Ave.	280	6	310	6
Kinoole St.	250	4	250	4
Kawili St.	335	0	145	0
Komohana St.	430	0	290	16

Source: Project plans. Units are meters.

Alignment B for the first 122 m (400 ft.) extending uphill from Waiakea Intermediate School towards Komohana Street. It then deviates towards the north to avoid the existing County Department of Water Supply reservoir and extends straight towards Komohana Street, intersecting the flood control channel before the intersection (see Fig. 1-1).

2.3.2.1.2 Alignment B

Alignment B extends straight between Kawili Street and Komohana Street, directly behind a row of 32 houses. It occupies a corridor that has been identified for several decades as the ultimate location of Puainako Street.

2.3.2.2 Upper Portion

The objective of the Upper Portion of the Project is to connect with the Lower Portion of Puainako Street at Komohana Street and Kaumana Drive at Country Club Drive. After consideration of a number of alternative routes, two basic alignments (prior to the addition of Alignment 10) were subjected to engineering and environmental studies (see Fig. 1-1).

2.3.2.2.1 Alignment 1

Alignments 1 and 2 share the same corridor until the Extension passes west (mauka) of Sunrise Estates. At that point, Alignment 1 continues straight for approximately 610 m (2,000 ft.) and then curves to the southwest, intersecting Edita Street between Pacific Plantation Subdivision and Kaumana Drive. It continues southwest until Uhaloa Street, after which it curves west and intersects Wilder Road between Park Hokulani Subdivision and Kaumana Drive. It then continues due west until its intersection with Kaumana Drive.

2.3.2.2.2 Alignment 2

Alignment 2 curves to the southwest beyond Sunrise Estates and avoids lands identified for residential development. It has only one intersection with an existing street - the terminus of Wilder Road. After this intersection, it curves to the northwest in order to meet Kaumana Drive at the same location as Alignment 1.

2.3.2.2.3 Alignment 10

Alignment 10 (numbered nonsequentially to avoid confusion with alignments that were eliminated during early stages of the project) was developed subsequent to the Draft EIS, in response to environmental concerns (see Appendix A3 for discussion on public and agency involvement in formulation of this alignment). This hybrid of Alignments 1 and 2 (and a short section of new alignment) reduces noise and wetland impacts and avoids impacting the mapped and visited portions of Kaumana Cave. Similar to Alignment 2, it does not involve a connection to Kaumana Drive except at Wilder Road, which, however, it crosses at the same point as Alignment 1, nearer the junction with Kaumana Drive.

2.4 Costs

2.4.1 No-Build

Although no major construction costs are associated with the No-Build Alternative, the cost of this alternative is by no means zero. As traffic volumes increase over time, a higher level of maintenance and improvements will be necessary both to alleviate traffic congestion and for safety considerations. The actual costs associated with such improvements will largely depend on specific improvements to be made; e.g., traffic lights and/or widening of roadways. At the present time there is no specific funding source identified for the improvement of Puainako Street apart from the proposed Project.

2.4.2 Build Alternatives

2.4.2.1 Lower Portion

As shown in Table 2-4, the total Project cost for Alignments A and B are $30.475 and $28.176 million ~~$33.727 and $31.556 million~~, respectively. As indicated in the tables, the total cost includes the cost of purchasing right-of-way plus five existing residential structures along the right-of-way. One structure would likely be relocated instead of purchased. The right-of-way costs are estimated using the current market value of land and structures. The cost of Alignment A is about eight percent greater, at $2.299 million, ~~$2.171 million higher~~ than Alignment B.

2.4.2.2 Upper Portion

As noted in Table 2-4, the Project costs include planning and design, acquisition and relocation costs, construction costs, contingencies, and right-of-way costs. The construction costs also include mitigation costs for noise barriers. Alignments 1 and 10 are approximately equal in cost, at $28.475 and $28.852 million respectively. Alignment 2 costs are about 15 percent greater, at $33.293 million. ~~There is a $2.413 million total Project cost difference between Alignments 1 and 2, at $31.094 million and $33.507 million in 1998 dollars, respectively~~.

2.4.3 Comparative Cost for Alternative Alignments

There are six ~~four~~ possible combinations of alternative alignments for the Build Alternative. Projected costs are shown below.

TABLE 2-4
Summary of Project Costs, by Alternative

ALTERNATIVE ACTIVITY	LOWER PORTION ALIGNMENT A	LOWER PORTION ALIGNMENT B	UPPER PORTION ALIGNMENT 1	UPPER PORTION ALIGNMENT10	UPPER PORTION ALIGNMENT 2
Planning & Design	**$1,400,000**	**$1,400,000**	**$1,400,000**	**$1,400,000**	**$1,400,000**
Planning & Design	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Specification / Building	150,000	150,000	150,000	150,000	150,000
Acquisition & Relocation	**5,050,000**	**5,050,000**	**950,000**	**950,000**	**1,070,000**
Consultant	300,000	300,000	200,000	200,000	200,000
Implementation	4,750,000	4,750,000	750,000	750,000	870,000
Construction	**24,025,000**	**21,726,000**	**26,125,000**	**26,502,000**	**30,823,000**
Road Construction	20,875,000	18,576,000	22,975,000	23,352,000	27,673,000
Management/ Inspection	3,150,000	3,150,000	3,150,000	3,150,000	3,150,000
Total Project Costs	**$30,475,000**	**$28,176,000**	**$28,475,000**	**$28,852,000**	**$33,293,000**

Notes: Acquisition and relocation includes right-of-way acquisition of the following: 18.5 ha (45.9 ac.) in Alignment 1; 23.0 ha (56.9 ac.) in Alignment 2, 20.1 ha (49.7 ac.) in Alignment 10; 1.4 ha (3.5 ac.) in Alignments A and B. Note: Costs were recalculated between Draft and Final EIS with updated design data. In general, the final cost totals for each alignment are about $3 M less than the draft cost totals, except Alignment 2, which remains similar.

1. Upper Puainako Alignment 1 connecting to Lower Puainako A: $56,653,000*
2. Upper Puainako Alignment 1 connecting to Lower Puainako B: $56,651,000
3. Upper Puainako Alignment 2 connecting to Lower Puainako A: $61,471,000*
4. Upper Puainako Alignment 2 connecting to Lower Puainako B: $61,469,000
5. Upper Puainako Alignment 10 connecting to Lower Puainako A: $57,030,000*
6. Upper Puainako Alignment 10 connecting to Lower Puainako B: $57,028,000

*$2.297 million has been deducted from these sums to avoid double counting the cost of drainage improvements at Waiakea Stream channel

2.5 Alternatives Considered and Withdrawn From Further Study

2.5.1 Transportation Systems Management (TSM)/ Travel Demand Management (TDM) Alternative

Considered under this heading are restrictions and/or programs involving road use, such as work- and school-time staggering, car-pool incentives, High Occupancy Vehicle Lanes, and minor changes to existing roads.

These techniques often have great merit in relieving road congestion and in improving the general urban environment in certain situations. The Hawaii State Functional Plan for Transportation calls for increased use of such measures wherever possible. Nevertheless, for the particular case under consideration, each of these techniques also entails substantial problems. A discussion of the merits and shortcomings of these alternative solutions follows.

The morning one-way traffic pattern involving Waianuenue Avenue and adjacent streets has for many years been the solution for handling the joint influx of students and commuters from Kaumana. Despite the elaborate and labor-intensive transformation of the traffic patterns on weekday mornings, considerable congestion remains.

At present there is no coordinated policy of work- or school-time staggering for traffic congestion alleviation. Classes at all schools begin at approximately 8:00 AM. Most state and county workers report to their jobs between 7:30 and 8:00 AM. A County of Hawaii policy allows "flex-time" and "staggered-time" work scheduling for county employees. Some businesses have also adopted such policies.

There is thus – at least theoretically – a potential to alleviate congestion by staggering work times across a four-hour period. The problems inherent in such a policy, however, are wide-ranging. Locally, it appears that most existing car-pooling consists of shared rides between couples and their children on their way to school and work. Staggering work and school times might actually prevent family members from sharing rides, forcing multiple, separate trips. Any staggering policy would have to be sensitive to such situations and, from the standpoint of employees and students, would need to be implemented on a voluntary basis to promote common sense solutions designed by individual families. The problem with such individualistic applications is that schools and businesses may not function well without organization-coordinated start-times. It is probably the case that only when a well-developed mass transit system is in place would work- and school-time staggering be practical.

Car-pooling is practiced on a limited basis in East Hawaii, particularly among Puna residents and those who work at the Kohala Coast hotels (on special buses, for the most part). However, the short commuting distance from Kaumana to Hilo makes inter-household car-pooling more trouble than it is worth for most commuters. It is doubtful that any measures short of mandatory car-pooling or incentives such as High Occupancy Vehicle Lanes would be successful in inducing this behavior in commuters.

High Occupancy Vehicle Lanes (HOVL), on which travel is permitted only by vehicles carrying over a specified number of occupants (typically 2 or 3), are often successful in encouraging car-pooling in large cities. To install HOVLs along Kaumana Drive would require far greater community disruption and substantial costs associated with right-of-way expansion and shoulder cut-and-fill than the Puainako Extension.

Other, "minor" changes to roads include use of existing shoulders for through or travel lanes and better signalization to optimize queuing.

The traffic congestion problem is most intense during rush hours along Puainako Street and Kaumana Drive. Unfortunately, neither of these roadways has sufficient unused right-of-way space to support an additional lane. Komohana Street, by contrast, is designated as a future four-lane road and could be expanded in parts to relieve congestion. However, Komohana already has left turn lanes where they are most necessary. Furthermore, Komohana Street between Punahele Street and Puainako Street is the least congested portion of the route from Kaumana to Kanoelehua Avenue. Therefore, the only road that could actually support expanded lanes would probably not benefit from them.

At present, there are demand-type traffic signals at the following intersections: Kaumana Drive and Ainako Street, Lele Street and Kaumana Drive, Waianuenue Avenue and Komohana Street, Mohouli Street and Komohana Street, Kawili/Iwalani Street and Puainako Street, Kinoole Street and Puainako Street, and Kilauea Avenue and Puainako Street. Many drivers bound from Kaumana to the Puainako area avoid the stop light at Waianuenue Avenue and Komohana Street by turning right off Kaumana Drive at Punahele Street. A traffic signal might alleviate congestion problems, although this idea would require further study. Signalization is also possible at the Waiakea school complex, but with the current lack of space for turning lanes, a situation not much better than the present congestion might develop. Therefore, although added signals might alleviate congestion on feeder roads leading into the main route under discussion, overall traffic flow would probably not proceed any more smoothly without considerable widening.

In summary, the TSM/TDM Alternative was withdrawn from further study because it does not solve the problem of the present and future traffic demand in the project area.

2.5.2 Mass Transit Alternative

As of mid-1998, the public transportation system in Hilo consists of a county bus system and a limited rideshare taxi system. A fleet of 17 buses serves eight routes that involve at least some service in Hilo. Three buses link the Kaumana area with downtown and the shopping centers on Kanoelehua Avenue. The first bus departs Kaumana at 7:30 AM, the second at 11:30 AM and the third at 2:30 PM. A program of replacing the entire fleet of county buses, each of which had over 1.6 million km (1.0 million mi.) of service, was begun in 1992. So far, eight have been replaced, with six new buses planned for the next two years, and as many as six more in the three years following. Future service expansion is planned to focus on West Hawaii. There are no plans in the immediate future for major expansion of service in the Hilo area, which would probably require funding from the county budget and increased rider fees. No substantial change in Hilo's public transportation system has occurred between 1998 and 2000.

The history of public transportation in Hilo is one of low ridership, with very few working commuters. This is often explained as a function of the city's small population, which prevents the frequent scheduling needed to satisfy the complex demands of commuters. The small scale of Hilo also offers very short automobile commutes in terms of mileage and minutes. When commuters balance the cost and effort of busing versus the convenience and mobility a car affords, they nearly always opt to drive. This would probably be true even if a better bus schedule were available. For many reasons, a gradual improvement in the public transportation system is warranted, but such a scheme offers little in the way of solutions for the congestion seen in the project area. This alternative was therefore withdrawn from further consideration.

2.5.3 Alternative Roadway Alignments

During initial Project conceptualization, six alternative alignments for the Upper Portion of the project area were examined. Assessment of the engineering, physical and social conditions associated with each reduced the number of sensible alternative alignments for the Lower Portion to the two currently under consideration.

Figure 2-1 (above) depicts the individual alignments, including Alignments 1 and 2, which were retained, each with slight modifications. The other alternatives were withdrawn from further consideration for the reasons below:

Alignment 3: This route had the advantage of avoiding most of the existing residential subdivisions on the south side of Kaumana Drive, as with Alignment 2, but with a shorter overall length than Alignment 2. However, the use of this route would have intersected several planned subdivisions for which appropriate zoning has already been approved and the subdivision process has already begun. This would have entailed high right-of-way acquisition costs and excessive disturbance to residential lots.

Alignment 4: This route followed Alignment 1 until just west of Edita Street, after which it crossed Kaumana Drive in order to avoid much of the existing development in Kaumana. Like Alignment 3, it would have entailed far greater levels of disturbance and right-of-way acquisition cost than either Alignment 1 or 2. In addition, another large intersection at Kaumana Drive would have been necessary and would have impacted existing residences.

Alignment 5: This alignment is very similar to Alignment 4 except that it crossed Kaumana Drive east of Edita Street. Although feasible, it had essentially the same disadvantages as Alignment 4.

Alignment 6: Alignment 6 followed the path of Alignment 1 until it approached Wilder Road, after which it veered to the southwest to link up with Alignment 2. It is essentially the same length as Alignment 2 but, similar to Alignment 3, crossed over areas that already contain planned uses.

In addition to these four alignments, the use of all or a portion of Kaumana Drive itself was considered as a possible segment of the project area. Several factors weighed against selecting this option. Kaumana Drive is circuitous, has a narrow right-of-way that is infeasible and/or expensive to widen in many locations, and has unfavorable vertical and horizontal alignment. Furthermore, it would have entailed the acquisition of a large number of existing residences.

Alignments 1 and 2 were selected for further engineering and environmental study because they best meet Project purposes and needs, efficiently link the termini of the project area and entail the least impact in terms of cost and disturbance to existing and planned uses. In response to community concerns expressed during the review period for the Draft EIS, a hybrid of the two Alignments for the Upper Portion was developed, which was named Alignment 10.

2.5.4 Related Roadway Projects

The Saddle Road Improvement Project (Final EIS completed in September 1999) covers the entire 78 km (48 mi.) of Saddle Road, from the terminus of the Puainako Extension in Kaumana to State Highway 190 near Waikoloa. The Project would widen, provide shoulders and improve vertical and horizontal alignment. It would be the primary cause of the threefold increase in traffic expected at the western end of Puainako by 2020. Although the Puainako and Saddle projects are independent, each would more effectively serve the traffic provided by the other.

The Mohouli Street Extension (scheduled for construction in ~~1999~~ 2000) would fulfill a portion of the goals of the Project by bypassing a 2.8 km (1.7 mi.) segment of Kaumana Drive between Ainako Street and Komohana Street, and a section of Komohana Street between Waianuenue Avenue and Mohouli Street.

The Mohouli Extension does not diminish the need for the Project, because the former project would ameliorate traffic flow and safety along less than 20 percent of the 8 km (5 mi.) length of Kaumana Drive. Conditions along this entire length would be improved by the Puainako Extension. Also, the Mohouli Extension does not fulfill the Project's goals of providing a continuous State Highway System link between the Saddle Road and State Highway 11. Therefore, this project is not considered a true "alternative" to the proposed project. However, the Mohouli project would complement the Puainako project and would improve Hilo's traffic circulation system.

2.6 Preferred Alternative

Following the issuance of the Puainako Street Extension and Widening Draft EIS (DEIS), the public hearing, the close of the public comment period, and the consideration of new information related to Alignment 10, the project team agencies evaluated the alternatives to determine which could best satisfy the project's purpose and need with minimum environmental impact.

The No-Build Alternative avoids many physical and biological impacts, and also avoids disturbance to sugar cane-related historic sites. However, it fails to address the need for improved safety and traffic circulation in the project area. It may thus be argued that the impact to the social environment is perhaps greater under this alternative. Therefore, the No-Build Alternative was not advanced as the Preferred Alternative.

The Build Alternative would entail environmental impacts in many categories, although most are mitigable to negligible levels. Traffic circulation and air quality would improve under this alternative. The Build Alternative has been determined to be the *Only Practicable Alternative* in the context of Executive Order 11988, *Floodplain Management*. The FHWA, HDOT and DPW, the lead agencies, have adopted the Build Alternative, specifically the combination of **Alignment B and Alignment 10**, as the *Preferred Alternative* for the project. The following sections summarize the primary reasons for the choice of these two alignments.

2.6.1 Preferred Alternative Lower Portion

Alignments A and B serve the project's purpose and need equally and are approximately equivalent in terms of environmental impacts. Alignment A involves more impact to archaeological sites determined to be significant for preservation in place, while Alignment B causes more numerous and severe noise impacts to adjacent residences. Alignment A would cost about $30 million, about eight percent more than Alignment B. Alignment B is a component of the preferred alternative because it, unlike Alignment A, avoids the use of resources protected by Section 4(f) of the Department of Transportation Act (see Chapter 5 for discussion).

2.6.2 Preferred Alternative Upper Portion

Alignments 1, 2 and 10 were all judged to be capable of serving the project's purpose and need. Alignment 1, and to a lesser degree Alignment 10, provides good connection points for traffic on Kaumana Drive, which is the principal collector road for this part of Hilo and which connects to the Saddle Road.

In terms of environmental impacts, each alignment has advantages and disadvantages. Alignments 2 and 10 avoid close approaches to the utilized and most important segments of Kaumana Cave. Alignment 2 minimizes noise impacts, although Alignment 10's impacts are only slightly more severe. Alignment 10 minimizes impact to native vegetation. Alignment 10 was also identified as the *Least Environmentally Damaging Practicable Alternative* (LEDPA) in terms of Section 404 of the Clean Water Act (see Section 4.2.2.3 for discussion). Alignments 1 and 10 have nearly identical projected costs, at about $28 million; Alignment 2 would cost an additional $5 million.

In sum, Alignment 10 was chosen because it minimizes costs, minimizes adverse effects to the environmental resources identified by the public and agencies during the comment period as most critical (noise and Kaumana Cave), and represents the LEDPA in terms of the Clean Water Act.

3 ENVIRONMENTAL SETTING

This chapter describes the existing social, economic, cultural, and environmental conditions surrounding the proposed Project. Chapter 4 discusses the probable impacts of the proposed action and mitigation measures designed to reduce or eliminate adverse environmental impacts.

The Island of Hawaii, which had 120,317 residents according to the 1990 U.S. Census of Population, 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.

Hilo Bay has been an important site of settlement, agriculture and trade since well before European contact in 1778. Fishponds and taro fields occupied the low areas between the Wailoa and Wailuku Rivers. Several villages were present within the makai portions of what is now Hilo, and farming took place on the upper slopes. During the century following contact, Hilo's harbor destined it for a central position in the sandalwood, missionary, whaling and sugar plantation phases in Hawaii's history. A thriving Western town developed east of the Wailuku River, and sugar plantations spread across the uplands, occupying virtually all areas with reasonably suitable soil. In the meantime, native Hawaiians were decimated by disease and their far-flung settlements were slowly abandoned. Planters brought in laborers from Asia, the Americas and Europe, leading to the cosmopolitan population for which Hawaii is famous. In 1881, a lava flow was poised to divide Hilo in half but finally stopped after penetrating what were then the outskirts of the city. Hilo's population grew slowly but steadily during the early 20th century as sugar cane became the dominant industry of the island and Hilo came to serve as the commercial and administrative center. Plantation "camps" were built in various areas to house workers who serviced the canefields and mills. The second half of the 20th century saw a diversification of the agricultural base and an expansion of economic activities in Hilo, notably servicing the growing tourism industry in West Hawaii and the University of Hawaii at Hilo. Suburbs radiated out along the major roads leading south and northwest, and also clustered in the mauka areas of the city. The sugar industry collapsed in the 1990's, exacerbating a statewide economic slump.

The project area contains roughly 13 sq. km (5 sq. mi.) within Hawaii County, from the eastern limit of the Puainako Street/Kilauea Avenue intersection to the western limit of the Kaumana Drive/Country Club Drive intersection. The project area is illustrated in Figures 1-1 and 1-2. This area was used in places for scattered traditional farming and was later largely converted to sugar cane farming. A long section of the project also traverses the 1881 lava flow.

3.1 Physical Environment

3.1.1 Geology and Geological Hazards

The project area surface is mainly `a`a (clinkery) and pahoehoe (smooth or ropy) lava from Pleistocene and Holocene eruptions of the Northeast Rift Zone of Mauna Loa. The western (mauka) end of the Upper Portion passes over inclusions of pyroclastic material known as Pahala Ash.

This project area (as all development in Hilo) would be subject to volcanic hazard, particularly lava inundation. The United States Geological Survey classifies the area as 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).

The Northeast Rift Zone of Mauna Loa has produced eruptions many times in the last century, sending flows towards Hilo in the years 1881, 1899, 1935, and 1942 (Macdonald et al 1986:64). 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 City of Hilo. Much of the proposed roadway would lie on the 1881 Mauna Loa flow.

Lava flow hazard is a fact of life for all who reside on the slopes of Kilauea, Mauna Loa, and Hualalai volcanoes, including the residents of Kaumana. Presently, the only practical escape routes from Kaumana are down Kaumana Drive, or via Akolea Road and Waianuenue Avenue.

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, none of the several earthquakes of Richter magnitude 6.0 or greater that have occurred in the Hilo area since 1950 has caused substantial damage to well-engineered roads or bridges.

Lava tubes, which are the long cavities left behind by underground channels of lava, are common on pahoehoe lava flows. Road planners often seek to ascertain the location of lava tubes in order to avoid damage to personnel and equipment during construction. In some cases, lava tubes may also represent valuable geological, recreational or biological resources. Pahoehoe flows along the project corridor are known to contain lava tube systems. Although several lava tubes were encountered during reconnaissance of the corridor, the only commonly accessible lava tube in the project area is Kaumana Cave, which was a principal feeder of the 1881 pahoehoe lava flow from Mauna Loa and has been partially mapped. The location of an entrance to Kaumana Cave in a County Park on Kaumana Drive makes it one of the most visited and studied lava tubes in Hawaii.

One of the objectives that guided Project design was avoidance of the accessible portions of Kaumana Cave. An accurate survey of the cave was conducted in order to meet this objective. Figure 3-1 shows a plan view of the relationship between Alignment 1 of the Upper Portion and the course of the cave, showing that the roadway as designed approaches no closer than 5 m (16 ft.) and generally maintains a much greater distance from the cave. The inset in the upper left of Figure 3-1 illustrates a profile section of the area of closest approach. The roof of the cave in this area varies from 5 to 6 m (16 to 20 ft.) beneath the surface.

During field investigations near the time of publication of the Draft EIS, a bulldozer grading private property in Sunrise Estates inadvertently created an opening to a cave ("Sunrise Estates Cave") that passes under the shared section of the Upper Portion (see Fig. 1-1). The cave appears to belong to an approximately 1,000 year-old lava flow that covers a large area in mauka Hilo. The portion of the cave accessible from the entry (which is located on private property) is a segment about 100 m (330 ft.) long blocked by a collapse upslope. The collapse was likely caused by construction of the drainage canal that runs parallel and directly adjacent to the proposed alignment. The downslope end of this segment also appears to be blocked. This portion of the Sunrise Estates Cave does not appear to have ever been accessible and contains no cultural material, burials or bones of any type. The area overlying the cave is occupied by streets, residential lots, and a drainage canal.

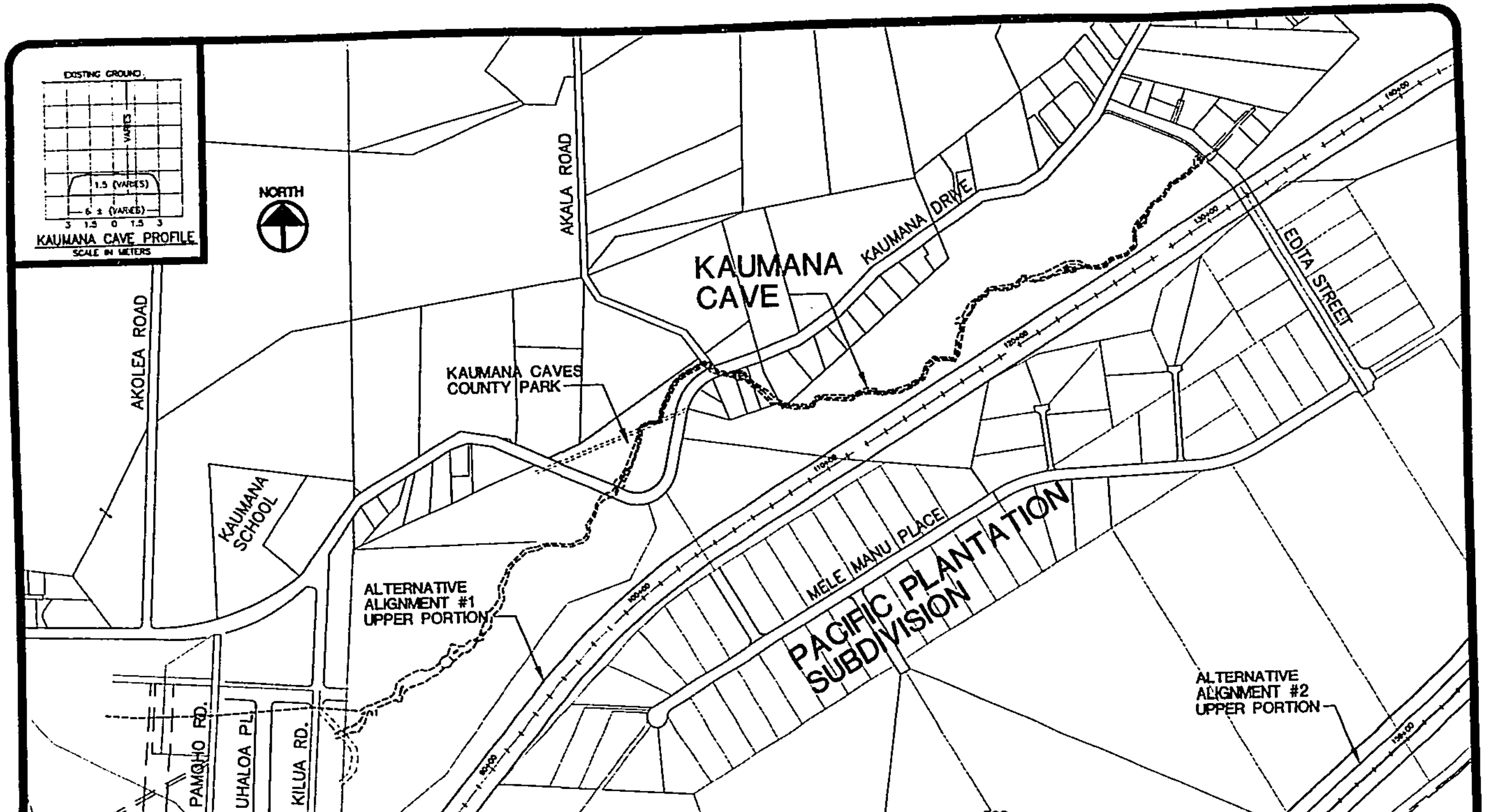
The County of Hawaii and its consultants have investigated the resources offered by Sunrise Estates Cave based on a field visit, a description of the cave provided by the U.S. Geological Survey (USGS), and additional information from the (private) Hawaii Speleological Survey. Further investigation of the cave has been prevented by the owner's refusal to allow further entry. However, sufficient data exist to conclude that the cave does not offer any significant and unique value for geology, recreation, drainage/hydrology, historic sites, or biology. This conclusion has been supported by discussions with the USGS, and the U.S. Fish and Wildlife Service (see App. A5).:

3.1.2 Physiography and Soils

The terrain of the project area is composed principally of the downslope segments of major basalt lava flows from Mauna Loa's northeast rift zone. Slopes range from 1 to 7 degrees and are not anticipated to pose major highway construction problems in themselves. Local relief across this generally uniform slope is minor. A few incipient drainage channels exhibit sharp elevational changes of up to 6 m (20 ft.), and thus would require limited terrain modification, such as grading, filling, and construction of culverts and bridges.

Soil is an important consideration in roadway engineering, biological resources and the agricultural value of the land. The soils along most of the alternative alignments overlie recent lava flows and are thus acidic, poorly developed, shallow, and stony. Permeability and runoff are variable and erodibility minor to moderate. There are several pockets of better-developed, agriculturally useful soils along the upper (mauka) section of both Alignments 1 and 2. These soils, derived from Pahala Ash, possess moderate flood and erodibility potential, particularly where slopes are steeper (U.S. Soil Conservation Service 1973).

The engineering properties (e.g., shrink-swell, bearing strength, and thixotropic characteristics) of the soils present are reasonably adaptable to road construction, and specific solutions are most appropriately addressed in road design and engineering work. The agricultural value of the soil is discussed in Section 3.3.7.



TITLE
KAUMANA CAVE

FIGURE
3-1

DATE
2/03/2000

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

For biological considerations, there are three general soil types with the following characteristics:

1. Lava Lands

The Lava Lands are found on the 1881 lava flow, vegetated with 'Ohi'a/Uluhe (*Metrosideros polymorpha* and *Dicranopteris linearis*) Forest or Closed 'Ohi'a Forest. The soil is a very thin, discontinuous layer of organic matter. The surface may be 50 percent or more pahoehoe lava outcrop.

2. Tropofolists

These are shallow, organic soils formed over prehistoric pahoehoe lava flows from Mauna Loa, generally covered with native 'Ohi'a/Uluhe Forest, variably undisturbed or disturbed. These soils are not in their entirety hydric, but have a tendency to become waterlogged when microtopography or compaction impede drainage.

3. Hydrandepts

The Hydrandepts are relatively deep soils of Mauna Kea ash that have been cleared and cultivated, mostly for sugar cane. Now abandoned, these areas primarily support alien-dominated vegetation. These soils are moderately to well drained, and contain well-developed gullies and intermittent streams.

3.1.3 Weather and Climate

The climate of Hilo can be described as humid and tropical. Since the Project is aligned essentially parallel to the topographic gradient and encompasses 424 m (1,390 ft.) vertical elevation change, considerable climatic variation occurs.

Average high temperatures in Hilo vary from approximately 26° Centigrade (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 to 21° C (70° F) in the summer. Temperatures are approximately 2° C (4° F) lower at the highest elevation of the project area. Freezing temperatures or frost do not occur in the project area.

Rainfall and fog are the elements of weather and climate most relevant to the design of a safe roadway for the proposed Project. Mean annual rainfall near the lower end of the project area is estimated at 330 mm (130 in.), while the mean annual rainfall at the Project terminus on Kaumana Drive is close to 508 mm (200 in.) (UH-Hilo 1998).

Fog is essentially absent at sea level in Hawaii because of the radiative properties of the ocean and the abundant wind mixing, which combine to prevent surface temperature inversions. (Fog should not be confused with driving rain, which can obscure vision.) The natural cooling that takes place as air is forced to higher elevations does permit fog development, and most locations over 244 m (800 ft.) in Hawaii experience some fog. Driving conditions at high elevations on the

Saddle Road are notoriously dangerous due to frequent fog. The Lower Portion of the project area is below the minimum elevation for fog. The upper elevations of the Upper Project are subject to occasional fog, but data indicate that foggy conditions are rare even at the highest elevation in the project area and thus merit negligible consideration (personal communication with Dr. James O. Juvik, Sept. 1992).

Wind is important for its effect on dispersion or concentration of pollutants. Trade winds with an east to northeast direction are present 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, from a southerly direction, most often in winter.

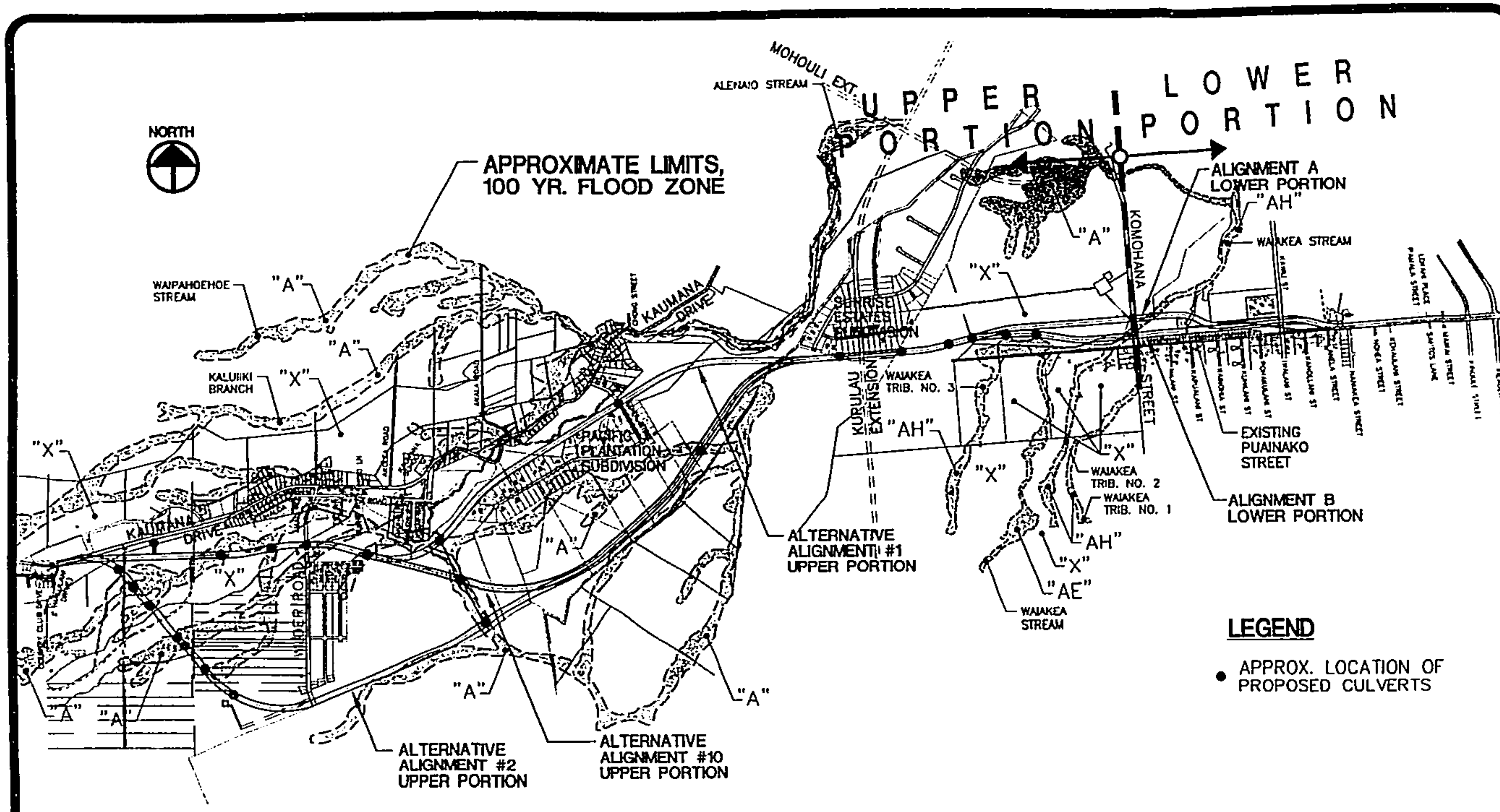
3.1.4 Hydrology and Floodplains

All drainage channels within the area potentially affected by the roadway eventually connect to the Wailoa River, an estuary of ponds and streams located in the middle of urban Hilo. Two major branches of perennial or intermittent stream systems are present: Alenaio (including Waipahoehoe/Kaluiiki) Stream and Waiakea Stream/Flood Channel (Fig. 3-2).

The main portion of Alenaio Stream and associated tributary floodways are outside the project area. Alignments A and B of the realigned Lower Portion both cross the Waiakea Flood Control Channel, but otherwise avoid the system of floodways associated with Waiakea Stream. However, the project area in the Upper Portion includes a number of floodways associated with unnamed drainage ways that are poorly organized and may not connect directly to intermittent or perennial streams. The poor drainage development is a result of the highly permeable lava and shallow soil of lava flows younger than two thousand years, which leads to rapid percolation of surface flows. Water is transported laterally in subsurface flow and emerges downslope, in this case in streams or basal springs that feed the Wailoa River. Substantial amounts of surface flow occur only during heavy and sustained rainfall.

Floodplain status for the planning area 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) (Fig. 3-2). Applicable Special Flood Hazard Area (SFHA) designations are as follows:

1. Zone A: SFHAs subject to inundation by the 100-year flood. Because detailed hydraulic analyses have not been performed, no base flood elevation or depths are shown.
2. Zone AE: SFHAs subject to inundation by the 100-year flood determined in a Flood Insurance Study by detailed methods. Base flood elevations are shown within these zones. In this area, there is a base flood elevation of 95 m (312 ft.) above mean sea level.



LEGEND

- APPROX. LOCATION OF PROPOSED CULVERTS

NOTE:
LETTERS REFER TO FLOOD ZONE TYPE

TITLE
APPROXIMATE LIMITS, 100 YEAR FLOOD ZONE AND CULVERT LOCATIONS

FIGURE 3-2

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

0 1 2 scale in kilometers
0 2000 4000 scale in feet

3. Zone AH: SFHAs subject to inundation by 100-year shallow flooding (usually areas of ponding where average depths are between 31 and 92 cm (1 and 3 ft.). Base flood elevations derived from detailed hydraulic analyses are shown in this zone. In this area, there is a base flood elevation of 106 to113 m (348 to 372 ft.) above mean sea level.

4. Zone X: Areas identified in the community flood insurance study as areas of moderate or minimal hazard from the principal source of flood in the area. However, buildings in these zones could be flooded by severe, concentrated rainfall coupled with inadequate local drainage systems. In this area, such a zone may be inundated by the 500 year flood.

Most of the areas upslope of Komohana Street in all projected alignments are classified as Flood Zone X or A. The areas on the eastern (makai) side of Komohana Zone are classified X, AH, or AE.

Several spots within the project area are known as problem areas for minor local flooding. Residents of Wilder Road and Uhaloa Road in Kaumana have reported repeated overtopping at street culverts and subsequent flooding laterally along the road. Minor flooding associated with paved areas with inadequate drainage capacity has occurred on or near Puainako Street near Santos Lane and Kuhilani Street. Flooding in the Lower Portion is not associated with a mapped Flood Zone.

The entire State of Hawaii is part of the Coastal Zone as defined in Coastal Zone Management Act (CZMA) of 1972 (U.S.C. 1451-1464). Section 6.9 contains a discussion of the relationship of the Project to the Hawaii Coastal Zone Management Program objectives.

3.1.5 Water Quality

Precipitation, runoff and groundwater entering the project area exit in one of three ways: into the atmosphere via evapotranspiration, through runoff into streams and flood control channels to Hilo Bay, or via groundwater transport into Hilo Bay. The water transports along with it a proportion of the pollutants derived from many sources, including highway runoff.

Groundwater

The aquifers underlying the project area consist of basal water floating on salt water, as well as water perched on ash, soil, or alluvium and underlain by basal water (Hawaii Water Resources Regional Study 1979). No aquifers designated as Principal or Sole-Source aquifers are located in or near the project area. There are no State Wellhead Protection Plans in force in or near the project area.

Streams

This discussion concerns water quality, particularly as related to recreation and habitat issues. The floodplain characteristics of project area streams are discussed in Section 3.1.4 above.

Drainage systems in the project area are not well developed because of the relatively recent age and high permeability of the lava. The drainages here are either intermittent or very flashy in discharge, and many disappear underground before reaching the sea. The major stream is the Wailoa River, which forms a broad estuarine pond. Its tributaries include Waiakea and Alenaio Streams, both of which are channelized or modified along much of their lower reaches.

The *Hawaii Stream Assessment* (Hawaii State CWRM 1990) inventoried State streams for their resources, habitat, cultural and recreational value. The Wailoa River is largely channelized or artificially modified. Pollution associated with urban runoff and former industrial use is present. Although it is not assessed as an outstanding or substantial riparian habitat, it contains several native aquatic species and is considered part of the essential habitat for the recovery of endangered species and native ecosystems. Stabilization and improvement of water quality in the Wailoa River are vital for the preservation of native species habitat. Recreational fishing, gathering and boating also occur in the estuarine ponds at Wailoa River State Park.

Coastal Waters

Hilo Bay, where groundwater, stream flow and other runoff ultimately collect, supports fishing, gathering, boating, swimming and other water activities. The oceanic waters of Hawaii support a number of endangered and threatened mammal and reptile species. Several of these, including the green sea turtle *(Chelonia mydas)*, the hawksbill sea turtle *(Eretomochelys imbricata)*, and the Hawaiian monk seal *(Monachus schauinslandi)* have been recorded within Hilo Bay.

Pollution in Hilo Bay is an ongoing problem. The primary source of damaging pollution is sewage (Dudley et al 1991). The sewage problem is principally derived from groundwater seepage from unsewered residences and businesses. The situation is undergoing gradual improvement through installation of sewage mains and mandatory property hook-ups. According to the Hawaii County Department of Public Works, the number of total accounts in Hilo has increased from 2,968 in 1987 to 3,338 in 1999. In the same period, the quantity of treated water has increased from 14.80 million liters per day (mld) (3.91 million gallons per day[mgd])to 23.54 mld (6.22 mgd) (Hawaii County DPW 1989: II-1, II-4; Hawaii County DPW Wastewater Division service records 1999). The great majority of the service expansion is attributable to the implementation of the master plan for the Hilo Wastewater Treatment Facility (Ibid.), which has provided sewer mains to existing neighborhoods such as Keaukaha Hawaiian Homes, Waiakea House Lots, Old Waiakea Mill, and Ainako, which long lacked sewer service. Sewer facilities for a number of other neighborhoods in Hilo are in progress or planning.

In addition to sewage, chemical and soil pollution also affect Hilo Bay. According to the U.S. Natural Resources Conservation Service (USNRCS), the vast majority of sediment pollution in Hilo Bay was a result of sugar cane cultivation, which ceased during the mid-1990s. Until 1992, about 12,000 acres of land in the Hilo area were planted to cane (Hawaii County Research and Development Department: 1993). Each winter storms would pile up thousands of cubic yards of bagasse (cane debris) and sediment on the beach at Hilo Bay. Sugar cane cultivation ceased entirely in the mid-1990s. Despite the substitution of other crops over some of the sugar land and a modest but continual expansion of construction in the Hilo area, all authorities agree that sediment pollution has substantially decreased since that time.[1]

1 Based on telephone conversations in April 1999 between Ron Terry and Steve Skipper, U.S. Natural Resources Conservation Service, Dr. Leon Hallacher, professor of Marine Science and co-author of Hilo sewage study, and James O. Juvik, professor of Geography and co-editor of Atlas of Hawaii.

3.1.6 Air Quality

The report discussing air quality impacts in the project area is included as Appendix L and is summarized below and in section 4.1.5.

Regional and local climate along with the type and amount of human activity generally dictate air quality of a given location. The climate of Hilo is discussed in Section 3.1.3, but it bears reiteration that the wind regime is dominated by light but persistent east to northeast trade winds, especially in summer. A shallow, low-velocity drainage wind from the opposite direction occurs at night.

Humans impact air quality in many ways. Industrial activity outputs pollutants in smokestacks, and farming and construction activity may produce fugitive dust. Most important in Hawaii are the pollutants produced by motor vehicle engines. Harmful substances include particulate matter, sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3) and lead. 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.

Federal and state air quality standards limit ambient concentrations of particulate matter, SO_2, NO_2, CO, O_3, and lead. In addition, there are state standards for hydrogen sulfide (H_2S). 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.

Table 3-1 summarizes state and federal air quality standards. National AAQS are stated in terms of primary and secondary standards. National primary standards are designed to protect the public health with an "adequate margin of safety." National secondary standards 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 human environment. In contrast to the national standards, state AAQS are given in terms of a single standard that is designed "to protect public health or welfare and to prevent the significant deterioration of air quality." State of Hawaii AAQS are in some cases considerably more stringent than comparable national AAQS, in particular, for 1-hour carbon monoxide and ozone levels.

The State and federal governments periodically monitor air quality to determine whether it meets the AAQ standards. Areas that do not meet these 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 application of Conformity Rules.

Table 3-1
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[a]	µg/m³	Annual	50	50	50
		24 Hours	150[b]	150[b]	150[b]
Sulfur Dioxide	µg/m³	Annual	80		80
		24 Hours	365[b]		365[b]
		3 Hours	–	1300[b]	1300[b]
Nitrogen Dioxide	µg/m³	Annual	100	100	70
Carbon Monoxide	mg/m³	8 Hours	10[b]	–	5[b]
		1 Hour	40[b]	–	10[b]
Ozone	µg/m³	1 Hour	235[b]	235[b]	100[b]
Lead	µg/m³	Calendar Quarter	1.5	1.5	1.5
Hydrogen Sulfide	µg/m³	1 Hour	–	–	35[b]

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

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, and particulate matter. Motor vehicles emit CO, nitrogen oxides and hydrocarbons (an ozone precursor), and 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.

3.1.7 Noise Levels

The report discussing the acoustic environment of the project area is included as Appendix K and is summarized below and in section 4.1.6.[1]

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 – $L_{eq}(h)$ – in decibels (dBA), which considers the combined effects of all noises near and far and includes background noise and noise fluctuation. In this document, all noise levels have been measured in terms of A-weighted decibels using the hourly energy equivalent sound level, i.e., dBA $L_{eq}(h)$, which is abbreviated as "dBA" or "L_{eq}".

Table 3-2 relates A-weighted sound levels at various decibel levels to representative sources and typical individual or community responses. Levels over 70 dBA are considered unpleasant by most individuals; levels under 50 dBA are generally perceived as acceptably quiet.

State and Federal governments have cooperated to provide procedures for noise studies and noise abatement measures to help protect the public health and welfare. They have supplied noise abatement criteria (measured in decibels) for various categories of land use (23 CFR 772), as shown in Table 3-3 below. These criteria help to determine whether there is a noise impact, and therefore, whether noise abatement must be considered.

Existing traffic and background ambient noise levels were measured at ten locations (five in the Lower Portion, five in the Upper Portion) along the project corridor in May 1995 (Fig. 3-3a, 3-3b). 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 incorporated parameters for terrain, ground cover, and local shielding conditions. The agreement between measured and predicted traffic noise levels was sufficiently accurate to formulate the Base Year (i.e., existing) and future traffic noise levels.

Tables 3-4 and 3-5 provide the results of noise measurements for traffic and existing background noise, respectively, at sites depicted in Figures 3-3a and 3-3b. Ambient noise over the Lower Portion of the project area is influenced by the presence of a busy two-lane road with a moderate grade and several traffic signals. As detailed in Appendix K, existing traffic noise levels approach or exceed the 67 L_{eq} FHWA noise abatement criteria at approximately ten homes mostly west (mauka) of Kawili Street. This level is not approached or exceeded at any of the

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[1]Appendix K consists of the original noise report finished in 1995, as well as 1997 and 1998 supplements that address the acoustic environment and potential impacts of alignment shifts and cross-street widening, which had been added to the project in the interval. The supplement also reassessed noise impacts on Lower Puainako in light of the adoption by HDOT in October 1996 of a noise policy defining "approach" as within 1.0 decibels of the applicable criteria.

churches or schools along the route. Also, due to the large setback from Puainako Street, traffic noise levels within the classrooms or churches do not currently approach or exceed the 52 L_{eq} interior criterion. Although noise levels are below these levels, many people who work at or attend these sensitive sites perceive a noise problem.

At areas removed from Puainako Street, such as the vacant lands west of Komohana Street, and the backyards of residences along Kaumana Drive and its side streets, existing traffic noise levels are very low, typically less than 57 L_{eq}. In these areas, local or distant highway traffic, birds, dogs, and wind-rustled foliage tend to be the dominant noise sources.

Table 3-2
A-Weighted Sound Level, in Decibels

Noise Source or Response	dBA
Jet Takeoff - Threshold of Physical Discomfort	120
Rock Music Band	108
Ambulance Siren (100')	94
Diesel Bus (10') Hearing Damage Criteria for 8-hour workday	90
Most Residents Highly Annoyed	80
Freight Train (100')	69
Car Passby (50'); Acceptable Limit for Residential Area	64
Inside Department Store; Goal for Urban Areas	55
Inside Home	40
Quite Rural Area; No Community Annoyance	30
Threshold of Hearing	0

Source: U.S. Department of Transportation Policy and Procedure Memorandum 90-2.

Table 3-3
Federal Highway Administration Noise Abatement Criteria

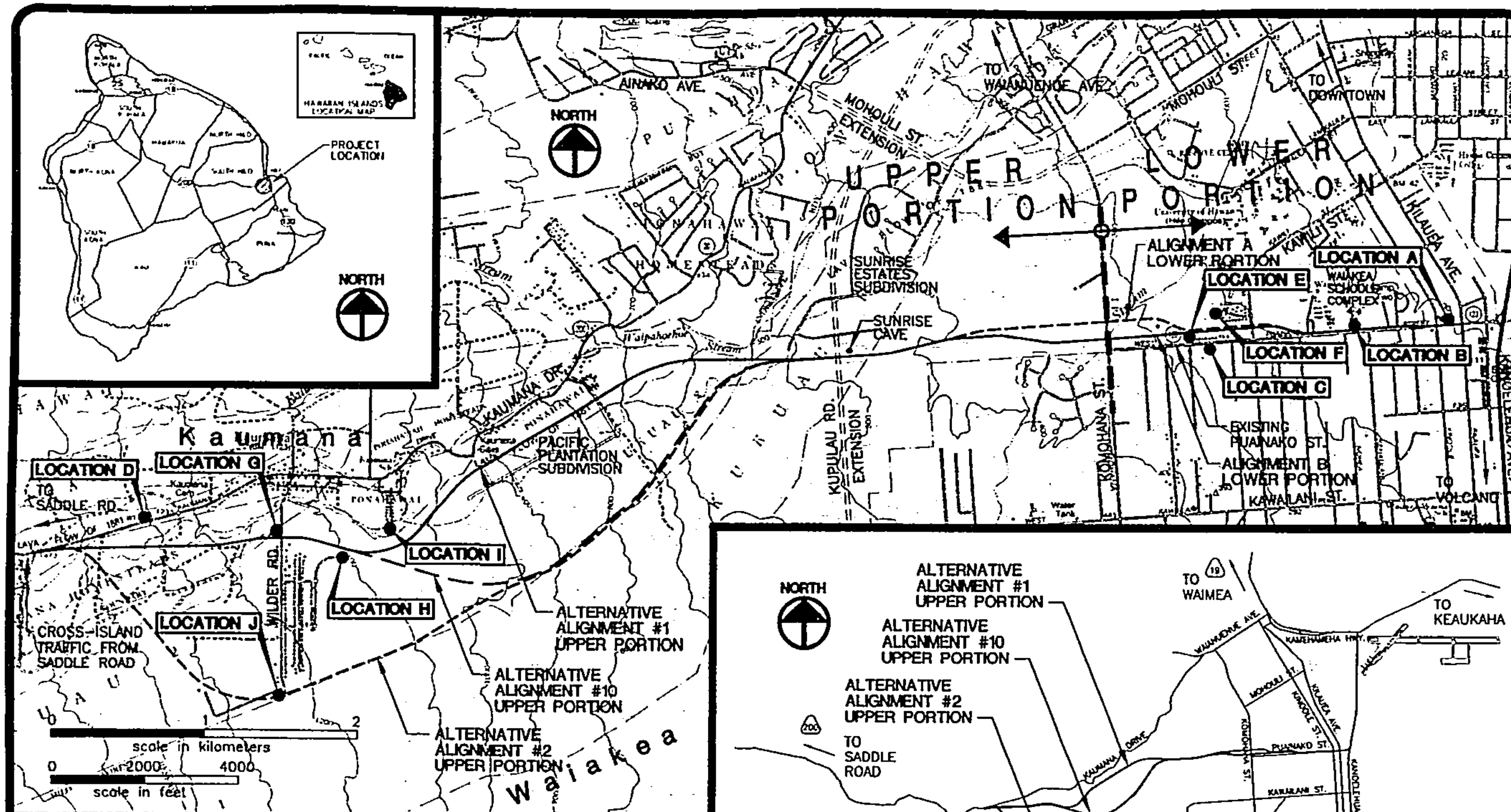
Activity Category	Design Noise Level L_{eq}	Description of Activity Category
A	57 (Exterior)	Tracts of land in which serenity and quiet are of extraordinary significance and serve an important need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, or open spaces which are dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B	67[1] (Exterior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, recreation areas, playgrounds, active sports areas, and parks.
C	72 (Exterior)	Developed lands, properties or activities not included in categories A and B.
D	—	Undeveloped Lands
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

Source: U.S. Department of Transportation Policy and Procedure Memorandum 90-2, developed per requirements of 23 CFR 771, which regulates Environmental Impact procedures of the Federal Highways Administration (FHWA).

Notes:

L_{eq} is the one-hour energy equivalent sound level measured in decibels on the A-weighted scale (see main text for definitions).

[1] Noise impacts occur when noise "approaches or exceeds" the Noise Abatement Criteria. The Hawaii State Department of Transportation defines "approach" as within 1.0 decibel of the applicable criteria.



TITLE

LOCATION OF NOISE MEASUREMENT SITES

FIGURE

3-3

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE
10/26/98

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Table 3-4
Traffic Noise Measurement Results

Location		Time of Day (HRS)	Ave. Speed (MPH)	Hourly Traffic Volume AUTO	MEDIUM TRUCK	HEAVY TRUCK	Predicted Leq (h) (dBA)	Measured Leq (h) (dBA)
A	50 ft. from the center-line of Puainako St. (5/02/95)	1615 TO 1715	35	1,042	7	2	61.1	61.1
A	50 ft. from the centerline of Puainako St. (5/04/95)	1055 TO 1125	35	832	7	4	61.1	60.7
B	50 ft. from the centerline of Puainako St. (5/03/95)	0645 TO 0715	38	713	18	11	63.3	63.2
B	50 ft. from the centerline of Puainako St. (5/03/95)	0820 TO 0920	38	385	12	9	61.2	61.4
B	50 ft. from the centerline of Puainako St. (5/04/95)	0645 TO 0745	35	1,008	10	13	62.0	62.7
C	50 ft. from the centerline of Puainako St. (5/02/95)	0830 TO 0930	38	433	10	7	61.1	61.1
D	50 ft. from centerline of Kaumana Dr. (5/02/95)	1030 TO 1130	45	109	3	2	57.6	57.8

Source: Appendix K

Table 3-5
Background Ambient Noise Measurement Results

	Location	Time of Day HRS	Measured Lmax (dBA)	Measured Leq(dBA)	Measured Lmin (dBA)
E	100 ft. From back of house at 334 Puainako St. (5/04/95)	0930 TO 1000	58.9	47.0	38.0
F	Behind UH Hilo dormitories (5/03/95)	1515 TO 1545	63.0	47.9	35.7
G	0.22 mi. south of Kaumana Dr./Wilder Rd. intersection (5/03/95)	1100 TO 1130	60.6	41.1	28.5
H	At end of Puhili St. (5/03/95)	1155 TO 1225	58.4	38.6	26.8
I	150 ft. behind house at end of Uhaloa Pl. (5/03/95)	1000 TO 1030	58.5	39.1	26.9
J	At end of Wilder Rd. (5/02/95)	1145 TO 1215	57.2	35.4	24.1

Source: Appendix K

3.2 Biological Environment

3.2.1 Flora and Plant Communities

The U.S. Fish and Wildlife Service (USFWS) was consulted to determine whether rare, threatened or endangered animal or plant species are present within the project area, or might be affected by the development of the Project. [See Appendix A1 for the coordination letter with USFWS]. A report describing the botanical survey of all alternative road segments and areas of cross-street widening is contained in Appendix B. The purpose of this study was to describe and evaluate the vegetation of the alternative alignments and to identify ecologically sensitive communities or valuable plants within the right-of-ways. Special attention was given to the search for rare or endangered species and for ecosystems that might be unique to the project area. If found, resources such as these might require mitigative planning.

The study began with a literature search to determine which, if any, plant species listed or proposed for listing as endangered or threatened by the U. S. Fish and Wildlife Service might occur within the project area. Such listed plants are legally protected by federal and State law.

The lists of threatened and endangered plants were reviewed (Federal Register 1990a, 1990b; U.S. Fish and Wildlife Service 1996, 1997; and updated lists provided by U.S. Fish and Wildlife Service, Pacific Islands Office, Honolulu). The ranges of these listed and proposed plants were determined from the *Manual of Flowering Plants of Hawaii* (Wagner et al. 1990). Project botanists walked the entire length of all alignments, following the staked center-line, with excursions to either side to identify plants or vegetation within a 92-meter (300-foot) corridor surrounding the proposed 37-meter (120-foot) right-of-ways.

Vegetation descriptions were recorded in all plant communities encountered along the alignments, and all plant species found were recorded. A list of plant species was prepared (Appendix B: Tables 1-4).

3.2.1.1 Original Vegetation

Originally, the natural vegetation of most of the project area was `Ohi`a/Uluhe (*Metrosideros/Dicranopteris*) Forest, which is a subtype of the Lowland Wet Forest (Gagne and Cuddihy 1990). This `Ohi`a/Uluhe Forest community is associated with young lava flows and shallow soils on the lower windward slope of Mauna Loa. This community is dominated by a deep mat of uluhe and more or less scattered `ohi`a trees, and contains relatively few other plant species. At a few sites within the project area with deeper soil, the vegetation has further developed into the `Ohi`a (*Metrosideros*) Lowland Wet Forest or the Koa/`Ohi`a (*Acacia/Metrosideros*) Lowland Forest communities (Gagne and Cuddihy 1990). These communities have a closed tree canopy, less uluhe ground cover, and a somewhat richer assortment of associated species.

3.2.1.2 Present Vegetation of Lower Portion

The original vegetation of all the Lower Portion has been destroyed by intense human activity. Most of this area was formerly cultivated in sugar cane. The present vegetation is a secondary forest dominated by gunpowder trees (*Trema orientalis*) up to 18 m (60 ft.) tall. Other common trees, mostly alien, are octopus tree (*Schefflera actinophylla*), melochia (*Melochia umbellata*), Chinese banyan (*Ficus microcarpa*), neneleau (a native, *Rhus sandwicensis*) and bingabing (*Macaranaga mappa*). The ground cover is also made up of alien plants, including oak fern (*Cyclosorus dentatus*), palm grass (*Setaria palmifolia*), thimble-berry (*Rubus rosifolius*), and sensitive plant (*Mimosa pudica*). In openings, the vegetation is chiefly sugar cane (*Saccharum officinarum*), California grass (*Brachiaria mutica*), and wedelia (*Wedelia trilobata*). The vegetation in areas where cross-streets would be widened is either semi-natural alien assemblages similar to those described above or ornamental plantings in yards.

3.2.1.3 Present Vegetation of Upper Portion

The vegetation over much of the Upper Portion still strongly reflects the original vegetation. However, human activity, especially agriculture, has substantially modified the vegetation in many areas. The botanical survey identified two communities that are dominated by native plants, one community that is predominantly alien, and one that is a variable mix of native and alien plants.

About 10 percent of all alignments are within developed subdivisions and contain no natural or semi-natural vegetation.

1. 'Ohi'a/Uluhe Forest

The most extensive native community in the project area is an open 'ohi'a forest with the ground completely covered by a dense mat of uluhe. The 'ohi'a trees have narrow, columnar crowns up to 12 m (40 ft.) high. Three variants of this type were identified.

Where the 'Ohi'a/Uluhe Forest occurs on the 1881 lava flow, the community is very simple with few species. The substrate is a very thin layer of organic matter over pahoehoe lava.

'Ohi'a/Uluhe Forest also occurs on older lava flows where the soil is a shallow organic layer mapped as Ke'ei or Keaukaha "extremely rocky muck." On this slightly more developed soil, the open forest contains a few more species of native trees and ferns, widely scattered within the uluhe mat. These soils are classified as Tropofolists.

The least common variant has scattered mature koa (*Acacia koa*) trees mixed with the 'ohi'a. Otherwise, the community is very simple and similar to the 'Ohi'a/Uluhe Forest on older lava flows as described above.

'Ohi'a/Uluhe Forest covers 35 percent or 2,593 linear meters (8,500 feet) of Alignment 1 ~~between Kaumana Drive and Sunrise Estates~~, ~~and 26~~ 29 percent or ~~1,220~~ 2,340 linear meters (~~4,000~~ 7,600 feet) of Alignment 2, and 22 percent or 1,720 linear meters (5,600 feet) on Alignment 10 ~~between these same two points~~. This community does not occur ~~along the alignment~~ in the common portion of Upper Portion Alignments from Sunrise Estates to Komohana Street. The koa variant covers 4 percent of Alignment 2 but was not found along Alignments 1 and 10 (Appendix B, Table 1).

2. Closed Canopy 'Ohi'a Forest

The canopy here is about 15 m (50 ft.) high. This community has several more native species than the forest community described above. The most abundant of these additional trees is kopiko (*Psychotria hawaiiense*), with occasional pilo (*Coprosma* sp.). Hapu'u are fairly common. Some uluhe does grow in sunnier spots, but the ground cover is generally dominated by alien swordferns (*Nephrolepis* spp.). The epiphytic flora is well-developed, including 'ie'ie (*Freycinetia arborea*) and 'ekaha (*Elaphoglossum* spp.). Alien trees are also common in this community, such as strawberry guava or waiawi (*Psidium cattleianum*), which forms dense understory thickets in many places, common guava (*Psidium guajava*), African tulip tree (*Spathodea campanulata*), and Alexander palm (*Archontophoenix alexandrae*).

Closed Canopy 'Ohi'a Forest was found only on the 1881 lava flow in the vicinity of Edita Street, covering ~~8~~ 10 percent or ~~554~~ 770 linear meters (~~1,800~~ 2,500 feet) of Alignment 1, ~~and~~ 5 percent or 244 linear meters (800 feet) of Alignment 2 between Edita Street extension and Sunrise Estates, and 10 percent or 770 linear meters (2,500 feet) of Alignment 10 (Appendix B, Tables 1 and 2).

3. Savanna Dominated by Alien Plants

This community now occurs on sites with deeper soil where the original vegetation has been removed for agricultural or other purposes in the recent past. The soils of these abandoned fields are mapped as Kaiwiki silty clay loam, Olaa extremely stony silty clay, Olaa silty clay loam, or Panaewa rocky silty clay loam. All are classified as Hydrandepts, and are well-drained to moderately well-drained. Presumably, the vegetation of the savanna would develop into a secondary forest given time. The savanna vegetation is highly variable and includes many species of alien plants and a smaller number of native plants as well. Generally, the ground-cover is tall, dense grass with widely scattered trees of many species. Common grasses include two mat-forming grasses: Wainaku grass (*Panicum repens*) and California grass (*Brachiaria mutica*), and two tall, bunch grasses: little bluestem *(Schizachyrium condensatum)* and broomsedge (*Andropogon virginicus*). Trees occur singly or in groves or thickets, including albizia (*Albizia falcataria*), common guava, waiawi, melochia (*Melochia umbellata*), gunpowder tree (*Trema orientalis*), and the native koa.

In many areas, the native `Ohi`a/Uluhe community still persists or is re-invading. `Ohi`a, hapu'u and uluhe are commonly seen in gullies where they may have survived land clearing. In other places, it is clear that `ohi`a saplings are becoming reestablished and uluhe mats are spreading into the grasslands of the savanna.

The Savanna community covers ~~11~~ 12 percent or ~~793~~ 920 linear meters (~~2,600~~ 3,000 feet) of Alignment 1, ~~and~~ 13 percent or 610 linear meters (2,000 feet) of Alignment 2, and 12 percent or 710 linear meters (3,000 feet) of Alignment 10. ~~between the Edita Street extension` and Sunrise Estates.~~

4. Mixed `Ohi`a/Waiawi

Many areas are a mix of dense waiawi thickets intermingled with `ohi`a and uluhe. The presence of other native and alien plants is also variable. Some of these areas appear to be native vegetation that was not completely cleared but has been degraded and invaded by waiawi and other alien species. Other areas appear to have been cleared but then partially reinvaded by `ohi`a and uluhe. In either case, these communities may contain any of the species of the savanna and of the `ohi`a/uluhe communities described above, and occur on both the Tropofolist and Hydrandept soils described above.

The Mixed `Ohi`a/Waiawi community covers ~~29~~ 33 percent or ~~2,044~~ 2,490 linear meters (~~6,700~~ 8,100 feet) of Alignment 1, ~~and~~ ~~56~~ 52 percent or ~~2,654~~ 4,150 linear meters (~~8,700~~ 13,500 feet) of Alignment 2, and 47 percent or 3,600 linear meters (11,700 feet) of Alignment 10. The vegetation of the entire ~~alignment~~ common segment (1,555 linear meters [5,100 linear feet]) between Sunrise Estates and Komohana Street is Mixed `Ohi`a/Waiawi.

A more detailed discussion of vegetation along the alignments can be found in Appendix B.

3.2.1.4 Biological Resource Values of the Vegetation

For the purposes of this assessment, alien plants and communities dominated by alien plants are considered to have only negligible biological resource value. Vegetation attributes that are valued are (1) rare or endangered native plants; (2) plant communities dominated by native plants, especially if the community is a combination of plant species found only in that area; and (3) plant communities dominated by aliens but offering habitat to native fauna. However, even alien-dominated vegetation without such attributes may have general resource value for other purposes, such as controlling erosion, aesthetics/open space, and microclimatic cooling effects.

No legally protected threatened or endangered plant species were found, nor is it considered likely that any such plants occur in or near any of the alignments.

The natural vegetation of the entire Lower Portion has been replaced with alien secondary forest. This vegetation has almost no biological resource value. Much of the natural vegetation within the Upper Portion has been heavily disturbed by land-clearing and is dominated by communities of alien plants. In some other areas, alien plants, especially waiawi and melastoma, have heavily invaded the natural vegetation and compromised its native character. There are, however, stretches on each alignment where the vegetation is near its natural state, but no area is outstanding in terms of the diversity of plant species nor particularly unique to the project area. Similar communities occur elsewhere in the South Hilo and Puna districts on relatively young lava flows.

3.2.2 Wetlands

Regulatory Overview

It was determined during the preparation of the Draft EIS that the scale and nature of effects to wetlands potentially disturbed by project activities might be sufficient to require a Section 404 Individual Permit. Accordingly, the EIS was subsequently developed in conformance with the requirements of the *Memorandum of Understanding, National Environmental Policy Act and Clean Water Act, Section 404, Integration Process for Surface Transportation Projects in the State of Hawaii* (NEPA-404 MOU). The purpose of this process is to ensure the earliest possible consideration of environmental concerns pertaining to waters of the U.S., including wetlands. Specifically, the process has involved consultation with U.S. Army Corps of Engineers (US-COE), the U.S. Environmental Protection Agency (EPA) and the U.S. Fish and Wildlife Service (USFWS). Jointly with the project sponsor highway agencies, these resource agencies have been consulted on and concurred with decisions related to purpose and need, alternatives, wetlands delineation, analysis of function and values, impact analysis, and mitigation. Documentation of this consultation is contained in Appendices A1 (pre-Draft EIS), A3 (during the Draft EIS comment period), and A5 (post-comment period).[1]

1 As a result of completing coordination under the NEPA-404 MOU, the methodology for evaluating and describing wetlands in the area were updated. As a consequence, this section of the EIS has been extensively revised for the Final EIS. Only the revised version is presented in the Final EIS – see end of Appendix B2 for superseded section.

3.2.2.1 Wetland Determination and Delineation Methodology

Analysis of wetland habitats was guided by the *Corps of Engineers Wetlands Delineation Manual* (US-COE 1987) and the *National List of Plant Species That Occur in Wetlands: Hawaii (Region H)* (U.S. Fish and Wildlife Service 1988). The vegetation, soil and hydrological criteria defined in the Delineation Manual were used to determine the parts of the project area that have one or more strong indicators of wetland habitat.

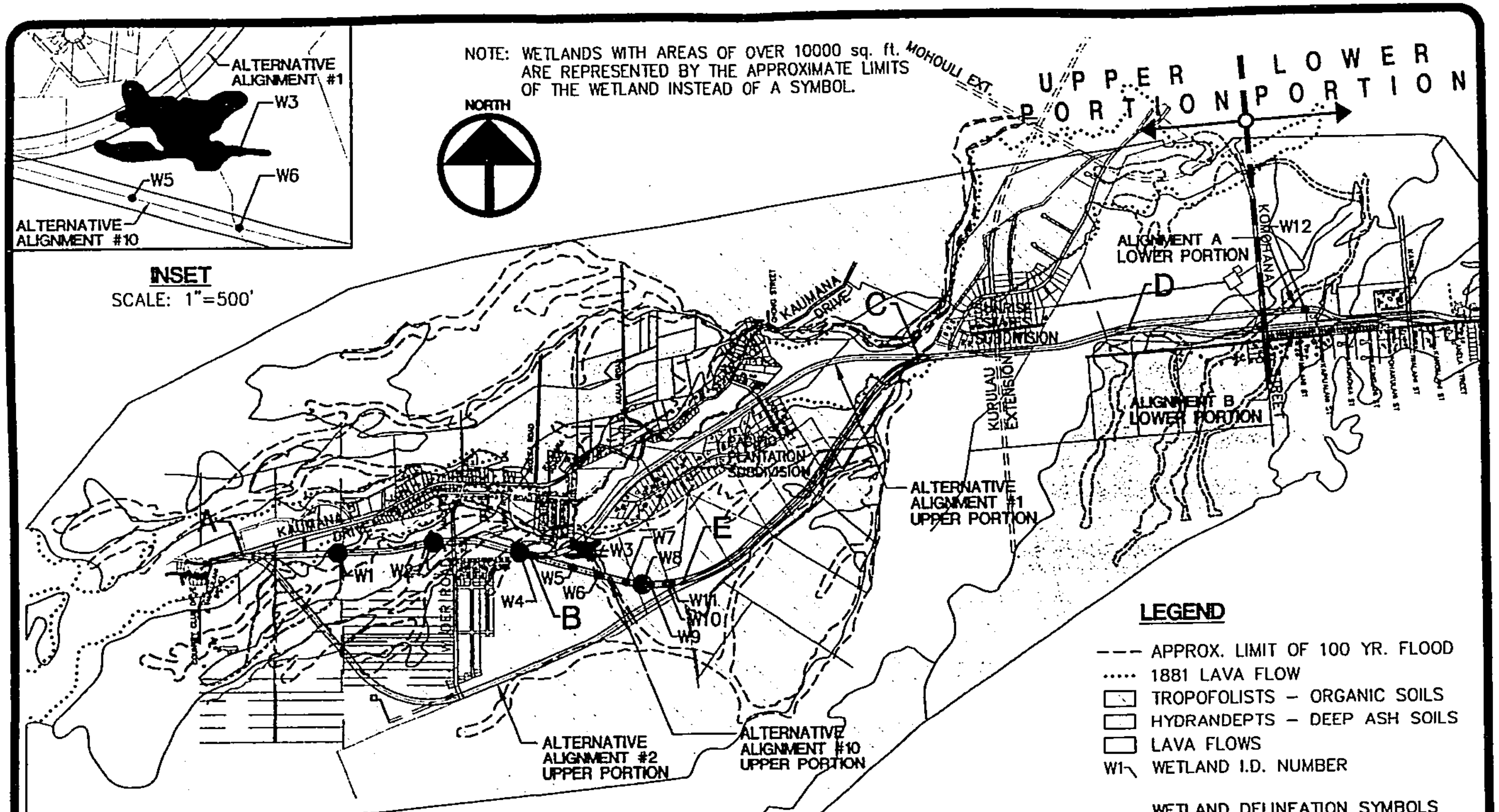
Precise delineation of the extent of wetland habitat in Hawaii on moderate to high slopes in areas of rainforest climate is highly problematic. Quite often, areas with basically upland characteristics contain scattered pockets of tiny "wetlands," often with borderline wetlands indicator characteristics. This is the case for much of the project area.

Therefore, in consultation with the US-COE, Honolulu District, the analysis of wetland habitat was done in two steps. First, in order to generate an estimate of the maximum area that might be wetlands under the jurisdiction of the US-COE (the "worst-case" area of disturbance), all areas that field surveys and map data determined to possess one strong indicator of the presence of at least one of the three required criteria were determined to be jurisdictional wetlands. This determination was made for all alternative alignment segments, and it provided a basis for determining where it would be feasible to conduct a formal delineation to measure the actual wetland areas. Then, delineations were done for Alignments A, 1, 10, and a portion of 2 (Alignment B contained no wetlands). The mauka portions of Alignment 2 contains hundreds of small, poorly drained pockets, mostly less than 5.0 sq. m (55 sq. ft.) in a dominantly upland matrix. This situation precluded actual delineation of individual wetlands. Therefore, the "worst-case" figure was used as the estimate of wetlands for most of Alignment 2. Details of the wetlands determination/delineation process are contained in Appendix B2.

In accordance with 40 CFR 230 Subpart E, the project area was inventoried for special aquatic sites, such as sanctuaries and refuges, mud flats, vegetated shallows, coral reefs, and riffle and pool complexes. No such sites are present or would be affected by the Project.

3.2.2.2 General Distribution of Wetlands

Figure 3-4 illustrates the wetlands and Tropofolist soils of the project area. Table 3-6 summarizes the locations and areal extent of all wetlands on an alignment by alignment basis. The calculated area of wetlands assumes a 60 m (200 ft.) corridor width, which provides a generous estimate of wetlands, as no more than 45 m (160 ft.) would likely be disturbed under any circumstances.



TITLE	DELINEATED WETLANDS	FIGURE 3-4
PROJECT	PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000

Table 3-6
Distribution of Wetlands

Alignment	Number of Wetlands	Total Wetland Area
1	4	3,442 m^2 (36,366 $ft.^2$)
2	*	32,568 m^2 (344,000 $ft.^2$)
10	10	1,669 m^2 (17,630 $ft.^2$)
A	1	2 m^2 (20 $ft.^2$)
Alternative Combinations		
1-A	5	3,444 m^2 (36,386 $ft.^2$)
1-B	4	3,442 m^2 (36,366 $ft.^2$)
2-A	*	32,570 m^2 (344,020 $ft.^2$)
2-B	*	32,568 m^2 (344,000 $ft.^2$)
10-A	11	1,671 m^2 (17,650 $ft.^2$)
10-B	10	1,669 m^2 (17,630 $ft.^2$)

**Note: Estimate for Alignment 2 is based on determination (worst-case) method (See Sec 3.2.2.1).*

In general, wetlands distribution is correlated with the three different soil types and landforms found in the project area. The *Lava Flows* are the 1881 lava flow, with a very thin, discontinuous layer of organic soil and no developed gullies or drainageways. No wetlands occur on this soil type. *Tropofolists* are shallow organic soils formed over prehistoric pahoehoe lava flows from Mauna Loa. These areas also have poorly developed drainage systems and infiltration is limited by the underlying lava. Small depressional wetlands are frequently found in areas of low slope. The *Hydrandepts* are relatively deep ash soils that have been cultivated. These soils are generally well-drained and the surface is dissected by well-defined gullies. Wetlands were found on Hydrandept soils only where human actions have blocked or altered the natural patterns.

3.2.2.3 Description of Wetlands Character, Function and Value

In this section, the individual wetlands within each alignment are briefly described (Appendix B2 contains full descriptions). The biological functions of the wetlands are then evaluated, on a wetland by wetland basis if substantial difference exists among wetlands. The biological functions and values considered are conservation of native plants, animals or ecosystems. Conservation of alien organisms or habitat for such is not considered a biological function, as most alien organisms adversely impact native ecosystems, which are under severe stress in Hawaii. Hydrological functions include flood-storage capacity, erosion control and the capacity of wetlands to filter sediment, nutrients, and other pollutants and protect surface waters and groundwater. Other functions that wetlands can supply (regardless of whether they are dominated by native or alien components) are open-space, scenery, and recreation.

Alignment A

Alignment A crosses some Tropofolist soils, but these do not contain scattered wetland patches. This Alignment traverses a small wetland seep of 2 m^2 (20 $ft.^2$). This pocket of undrained soil is dominated by alien plants, and is contained in a surrounding upland community of a secondary forest of alien trees and plants with little conservation value. No biological, hydrological or other function of this wetland has been identified.

Alignment B

Alignment B contains no wetlands area.

Alignment 1

On Alignment 1, a total of four wetlands were delineated with a combined area of 3,442 m^2 (36,366 $ft.^{2)}$. The largest of the wetlands is 2,474 m^2 (26,136 $ft.^2$). These are keyed W-1, W-2, W-3 and W-4 on Figure 3-4. They are described below:

> **W-1** is a surface water depression of human origin within an abandoned cane field, 500 m^2 (5,280 $ft.^2$) in size. The wetland is an impoundment of a broad swale created many years in the past by a farm road blocking surface water drainage. No outlet or high water mark is apparent. The soil is saturated and structureless, with a very strong sulfidic smell. Vegetation of this wetland is entirely Wainaku grass (*Panicum repens*), distinct from surrounding vegetation of mixed grasses and shrubs. No aquatic animals were observed in the wetland. **Hydrological Functions:** The estimated maximum watershed for this wetland is 3,790 m^2 (40,000 $ft.^2$). The wetland appears to store precipitation and overland flow from a small local watershed formed by the impoundment of the swale and allows sedimentation. No outlet is visible, implying that impoundment rarely overflows and that catchment area is small relative to capacity. This wetland prevents impounded water from entering an intermittent drainage 30 m (100 ft.) down-slope except in periods of high rainfall. **Biological Functions:** Vegetation is a common alien grass within a surrounding upland successional community in an abandoned cane field. This wetland is not habitat for native plants. The wetland is isolated from other bodies of water and is not likely to be habitat for native aquatic animals. **Other Functions:** Wetland may provide habitat for introduced invertebrates, amphibians or fish, although none have been observed. It provides no other functions distinct from adjacent upland areas.

> **W-2** is located within a man-made drainage channel that originates nearby and empties into an intermittent drainage. The channel is 10 m (33 ft.) wide with steep banks 5 m (16 ft.) high. The channel bottom is almost completely vegetated. The wetland is on the relatively level floor of the channel which often has a small amount of water flowing beneath a dense growth of grass. Small areas of open water are sometimes visible. The soil is saturated and structureless, measuring 7 inches deep over pahoehoe lava. A portion of this channel is on the north side of the study corridor, and 300 m^2 (3150 $ft^{2)}$ of the wetland lies within the corridor. The vegetation is dominated by Wainaku grass with a few scattered kamole (*Ludwigia octovalis*). All plants within the wetland are introduced species. Alien aquatic fauna, including prawns (*Macrobrachium lar*), tadpoles and minnows have been observed in the open water. **Hydrological Functions:** The channel was apparently dug in the past to improve drainage within this locale with very little slope. The channel carries water to an intermittent drainage system. Wetland vegetation within the channel may slow water movement and enhance sedimentation. **Biological Functions:** This wetland provides negligible biological function or values, similar to W-1. The plants and animals observed are all introduced species that are commonly found elsewhere in this locale and throughout the region. **Other Functions:** The wetland provides habitat for introduced aquatic fauna. It provides no other functions distinct from adjacent upland areas.

W-3. This large grassy opening contains a total of about 21,000 m^2 (221,850 ft.^{2}), of which 2,474 m^2 (26,136 ft.^{2}) is within the study corridor and might be affected by the proposed action. The site is within a mixed landscape of agricultural fields and grazed woodlands, and is crossed by an electrical transmission line. The site appears to have been influenced by these land uses. The wetland is a broad, shallow depression, apparently fed by precipitation and overland flow. No distinct inlet or outlet has been found, but deep grass mats limit observations of topography. One end of the wetland abuts an intermittent drainage, to which it may connect. The vegetation at most of the site is a deep mat of Wainaku grass and California grass (*Brachiaria mutica*). No aquatic animals have been observed at this site. **Biological Function:** As native organisms are not present, his wetland provides negligible biological function or values, similar to W-1 and W-2. **Hydrological Functions:** The major hydrological functions of this wetland are temporary water storage and sedimentation. This depressional wetland receives precipitation and overland water moving through a surface drainageway indicated by the flood zone map. The wetland may also function as part of floodplain and water storage when the discharge of the intermittent drainage exceeds capacity during high rainfall, although any connection of this wetland to the drainage is not confirmed. The water storage capacity of the entire wetland has been estimated as 30,500 m^3 (1,089,000 ft.^{3}). Assuming a connection between the drainage and the wetland, this capacity would delay peak flooding of the 100 year flood by only 213 seconds, and would contain the full discharge of the 10 year flood for 307 seconds. The drainage disappears from the surface a short distance below this wetland. Apparently, the drainage flow goes underground through lava tubes or similar voids; it is not known if this water reappears as surface water before reaching the ocean. Given this disappearance, any influence of this wetland on flooding or surface water quality is short-lived. **Other Functions:** The wetland may provide habitat for introduced invertebrates, amphibians and fish, although none have been observed. The large grassy patch provides variation and interest in the landscape. It provides no other functions distinct from adjacent upland areas.

W-4 is a small surface-water depression (170 m^2 [1,800 ft.^{2}]) in an area with low slope, and lacks an inlet or outlet. It contains standing water or water marks, depending on season. The source of water is precipitation and collection of overland flow from very limited nearby areas. Its vegetation is similar to upland areas in the tree layers but shows an alteration of species of the herb layer. (*Cyperus halpan*), a sedge, is the dominant species. Other obligate or facultative wetlands plants are also present. The soil has a sulfidic odor and low chroma. It is located in the100 year floodplain. **Biological Functions:** This wetland provides habitat for common facultative and a few obligate wetland plants of the region. However, few of these species are indigenous. Due to its small size and fluctuating water level, it does not provide important habitat for any known native (or alien) aquatic animals. **Hydrological Functions:** This wetland retains a small amount of water, reducing overland flow to surface waters. However, drainages are poorly developed on this soil type and precipitation is normally dissipated by infiltration in areas not underlain by impervious bedrock. Retained water may maintain soil moisture during periods of drought or low rainfall, water that can be utilized by surrounding plant-life. These functions are restricted to the immediate site of the wetland, which in this case is very small. **Other Functions:** It provides no other functions distinct from adjacent upland areas.

Alignment 2

On Alignment 2, no wetlands were found in the sections that were delineated. However, the field studies found numerous small wetlands in the portion that was not delineated, as discussed in Section 3.2.2.1 above. An estimate based on a field sample and soil type model was made that Alignment 2 may contain up to 32,568 m^2 (344,000 ft.^{2}) of jurisdictional wetlands. All of these wetlands would be small, depressional impoundments of rainfall. A general description of this type of wetlands and their functions and values follows:

> On Alignment 2, wetlands are dispersed in an irregular mosaic within mostly upland vegetation. Much of the surrounding vegetation is predominantly native in character. Some areas are intact `Ohi'a/Uluhe fern forest with few alien plants present. Most, however, is degraded Mixed O'hi'a/Waiawi thickets. Generally

the wetland areas are dominated by alien ground cover species. Some small pockets (diameter 1–2 m, [(3–6 ft.]), of submerged soil occur where the ground cover is dominated by spikerush (*Eleocharis obtusa*), an indigenous sedge and obligate wetland plant. No endemic wetland plants characterize these pockets. The tree layer above does not appear to be affected by these small wetland pockets. Larger undrained areas, 30 m (100 ft) in diameter also occur. These resemble "bog-formation dieback" areas that naturally occur in some 'ohi'a forests at higher elevations (Stone and Scott 1985:405–406). The 'ohi'a trees are scattered and stunted in appearance. The ground cover tends to be dominated by alien grasses rather than native plants, leading to a generalization that within the project area, the wetlands are often more alien than native in plant composition. It is difficult to determine if these various types of wetlands are natural inclusions in these forests, or if they are the result of soil compaction and drainage impedance by pig activity or human-induced disturbance. There are no permanent streams, and the intermittent drainages contain no native aquatic fauna, and little native flora, none of which is valuable from a conservation perspective. **Biological Functions:** Although the flora of the poorly drained sites is generally made up of widespread, non-endemic, wetland species, some small wetland habitat pockets are dominated by one or two indigenous obligate wetland plants, and much of the potentially wetland area occurs within native or partially native communities. Due to their small size and fluctuating water level, these pocket wetlands do not provide important habitat for any known native aquatic animals. **Hydrological Functions:** The wetlands of the project area have similar function. These small, depressional wetlands, isolated from other surface water bodies, retain a small amount of rainfall, may slow overland runoff and may allow some sedimentation. Water infiltration through the shallow organic (Tropofolist) soil is slowed by underlying pahoehoe lava bedrock. The wetlands are generally too shallow to store appreciable volumes of water, but probably do permit some sedimentation from surface flowing water. Even these small effects are likely to have little influence on surface water quality because drainageways in this watershed are poorly developed and no surface water bodies flow out of the project area. **Other functions:** These wetland pockets may provide habitat for introduced invertebrates and amphibians (including edible species). The variation in vegetation form at the micro-scale provides interest in the landscape, which is otherwise forested. These wetland pockets provide no other functions distinct from adjacent upland areas.

Alignment 10

On Alignment 10, a total of ten wetlands were delineated with a combined area of 1,669 m^2 (17,630 ft.^{2}). The largest wetland here was 568 m^2 (6,000 ft.^{2}). The wetlands in Alignment 10 are keyed W-1, W-2, W-4, W-5, W-6, W-7, W-8, W-9, W-10, W-11 on Figure 3-4. With the exception of W-1, W-2 and W-4, which are shared with Alignment 1 and are described above in that context, they are described below:

W-5, W-6, W-7, W-8, W-9, W-10, W-11: These seven wetlands are all small surface-water depressions or topographic lows in areas with little slope. None have inlets or outlets. Most contained some standing water on the delineation date. Only one (W-6) is located in the 100-year floodplain. Most have no effect on the species composition of the tree layer but can be recognized by standing water or water marks and an alteration of species of the herb layer. All but one of the wetlands has umbrella sedge (*Cyperus halpan*) as a dominant species. Some have the alien obligate wetland plant kamole (*Ludwigia octovalis*) or the indigenous obligate wetland spikerush as a dominant or subdominant species. The soils have sulfidic odor and usually have low chroma. They vary in size from 9 m^2 (100 ft.^{2}) to 568 m^2 (6,000 ft.^{2}), and total 855 m^2 (9,050 ft^2) in area. **Biological Functions:** These wetlands provide habitat for common facultative and a few obligate wetland plants of the region. However, few of these species are indigenous. Due to their small size and fluctuating water level, they do not provide important habitat for any known native (or alien) aquatic animals. **Hydrological Functions:** These wetlands retain a small amount of water, reducing overland flow to surface waters. However, streams are poorly developed on this soil type and precipitation is normally dissipated by infiltration in areas not underlain by impervious bedrock. Retained water may maintain soil moisture during periods of drought or low rainfall, water that can be utilized by surrounding plant-life. These functions are restricted to the immediate site of the wetlands, which are small. **Other Functions:** They provide no other functions distinct from adjacent upland areas.

3.2.3 Fauna

The U.S. Fish and Wildlife Service (USFWS) and the Hawaii State Department of Land and Natural Resources (DLNR) were consulted to determine whether rare, threatened or endangered animal or plant species are present within the project area, or might be affected by the development of the Project. See Appendices A1 and A5 for coordination letters with USFWS. In addition, field studies and scientific literature reviews of the flora, avifauna, terrestrial vertebrate, and cave invertebrate species found within the project area were commissioned specifically for the EIS.

3.2.3.1 Mammals

Hawaii's sole extant endemic terrestrial mammalian species, the Hawaiian Hoary Bat (*Lasiurus cinereus semotus*), or *ope'ape'a*, is listed as endangered by both the USFWS and the DLNR. It is locally abundant in the lowlands of the Hilo area and has been recorded within the project area. All other mammal species found on the island are alien species (introduced to Hawaii by man).

3.2.3.2 Birds

A reconnaissance survey of the avifauna present within the project area was performed. A review of the ornithological literature pertinent to the project area is a component of the faunal report attached as Appendix C.

The avifauna currently found within the project area is dominated by introduced species, as are the avifauna found in most of the ecological disturbed lowland areas in East Hawaii. No rare, threatened or endangered avian species were encountered during the faunal survey. However, it is likely that the Hawaiian Hawk *(Buteo solitarius)*, known locally as the 'io, occurs within the project area. The 'io is listed as an endangered species by both the USFWS and the DLNR. Additionally it is probable that the site is overflown by the threatened Newell's Shearwater (*Puffinus newelli*), or *a'o*, as well as the endangered Dark-rumped Petrel (*Pterodroma phaeopygia sandwichensis*), or *ua'u*.

There is no suitable nesting habitat within the project area for either the Newell's Shearwater or the Dark-rumped Petrel. The project area is within the normal breeding range of the Hawaiian Hawk. There is no documented record of this species nesting within the project corridor; however, Hawaiian Hawks may nest within the project area.

3.2.3.3 Invertebrates

The invertebrate fauna of the project area, or for that matter of most of the Island of Hawaii, has not been studied scientifically or completely described. In general, native invertebrate species are associated with native vegetation. Areas dominated by native plant cover, such as the 1881 lava flow, may provide corridors connecting pockets of lowland vegetation with larger areas of native vegetation upslope. These corridors may have major survival value for some species. No invertebrate species listed as endangered, threatened, or proposed by the USFWS is likely to occur in the project area.

The endemic invertebrate fauna of Kaumana Cave has been studied and partially described. Native species of crustaceans, spiders, and insects have been found, and some populations or species may be unique to this cave (Hoch and Howarth 1993). This ecosystem is important for evolutionary studies because related surface-dwelling species still live in the native forest above the cave. The native vegetation above the cave is also essential for the well-being of the cave species since roots of `ohi`a trees are the food source for herbivorous species (See Appendix D: Kaumana Cave Report).

3.3 Socioeconomic Environment

The proposed Project would most directly affect the neighborhoods of Waiakea and Kaumana, and would have lesser but still substantial effects on much of Hilo. To the extent that the Project effectively connects the State Highway system, effects would be felt island-wide. The level of information in Section 3.3 is geared to reflect this hierarchy of effects.

3.3.1 Existing Land Use and Planning

Planning responsibility for the entire Island of Hawaii area rests with the Hawaii County Planning Department and the State Land Use Commission (LUC).

County Planning Designations

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 plan was adopted by ordinance in 1989. The Land Use Pattern Allocation Guide (LUPAG) map component of the General Plan is a graphic representation of the Plan's goals and policies. The Facilities map of the General Plan identifies existing and proposed roads and existing government facilities. These maps 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 Puainako Project would link areas identified as High- and Medium-Density Urban in the eastern (makai) portion to areas identified as Medium- and Low-Density Urban, as well as land slated for Urban Expansion. The proposed Project is thus an appropriate corridor for traffic between areas designated for urban uses. The Facilities Map (effective date 14 November 1989) explicitly identifies the Lower Portion of Puainako Street as a primary arterial to be improved. The Upper Portion of the proposed Project is designated as a planned primary arterial.

State Land Designations

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 Lower Portion of the project area is entirely Urban. In the Upper Portion, the designation is Agricultural.

The proposed Project is a permitted use in both of these classifications, and no Petition to Amend State Land Use District Boundaries is anticipated or necessary for the Project.

Existing Land Use

Existing land use in the project area consists primarily of residential and open space. The Lower Portion of the proposed project area passes through Waiakea, a primarily residential neighborhood.

The segment between Kilauea Avenue and Kawili Street passes through a heterogeneous mixture of homes from various dates. Non-residential land uses include the Waiakea School Complex (which contains the Waiakea Elementary and Intermediate Schools); three churches; one family-owned general store and one barber shop.

The segment between Kawili Street and Komohana Street would pass between a State Housing Project built in the 1970s and an apartment complex that serves as a component of the student housing for the University of Hawaii at Hilo. The lands in this area are currently vacant but have been reserved for expansion of the University of Hawaii at Hilo by the State of Hawaii. All other land use in this area is residential.

The Upper Portion passes primarily through undeveloped forest land or unutilized agricultural land. The area immediately west (mauka) of Komohana Street is currently vacant and has also been reserved for university expansion. There is a number of existing residential and small lot agricultural subdivisions adjacent to the alternative alignments, including Sunrise Estates, Pacific Plantations, and Park Hokulani (see Fig. 2-1.) Depending on the alignment chosen, a varying number of residents of Kaumana Drive and side-streets that branch off towards the southeast would be within 92 m (300 ft.) of the proposed roadway. The sections of Kaumana Drive affected by the proposed Project are entirely residential in land use.

3.3.2 Demography

County Patterns

The population of the island has grown in tandem with visitor industry growth, increasing by 45.0 percent, from 63,468 in 1970 to 92,053 in 1980, and by 30.7 percent (to 120,137) between 1980 and 1990. These growth rates exceed the state-wide growth rate of 14.9 percent in the 1980s. According to a State population projection, Hawaii County will grow at an annual average of 3.56 percent into year 2010, reaching 206,000 by 2010. Much of this growth is concentrated in West Hawaii, particularly the North Kona and South Kohala Districts. Many new residents are relatively well-off in-migrants from the U.S. mainland.[1]

[1]Source: 1990 U.S. Census of Population; Hawaii State Department of Business, Economic Development and Tourism (DBEDT), M-K Population projection series. A 1996 study by DBEDT (Hawaii 2020 Revised Long Range Projections) predicts a population of 205,400 in Hawaii County by the year 2020, assuming a slightly lower rate of annual growth. No district-by-district projections were developed.

Waiakea, Kaumana and Hilo

The population of East Hawaii has also experienced growth, particularly in the Puna District. Population in the city of Hilo has increased somewhat more slowly, from 26,353 in 1970 to 35,269 in 1980, to 37,808 in 1990. Forecasts call for East Hawaii's population (including Hilo, Hamakua and Puna) to grow at an estimated annual rate of 2.24 percent, reaching 95,385 by the year 2010. East Hawaii retains a socioeconomic and ethnic structure more similar to pre-1960 patterns than does West Hawaii, the demography of which has been transformed by in-migration of job-seekers and retirees from the U.S. mainland.

Issues of Environmental Justice

Environmental justice is a term that refers to social inequity in bearing the burdens of adverse environmental impacts. Certain socioeconomic groups in the United States, including ethnic minorities and low-income residents, have historically experienced a disproportionate share of undesirable side-effects from locally undesirable land uses such as toxic waste dumps, landfills, and freeway projects (Cutter 1995).

The policy of the Federal Highway Administration (FHWA) with regard to environmental justice is to ensure that an EIS shall address whether any low-income or minority population is disproportionately impacted by a proposed project and to identify possible mitigation measures to avoid or minimize any adverse social impacts.

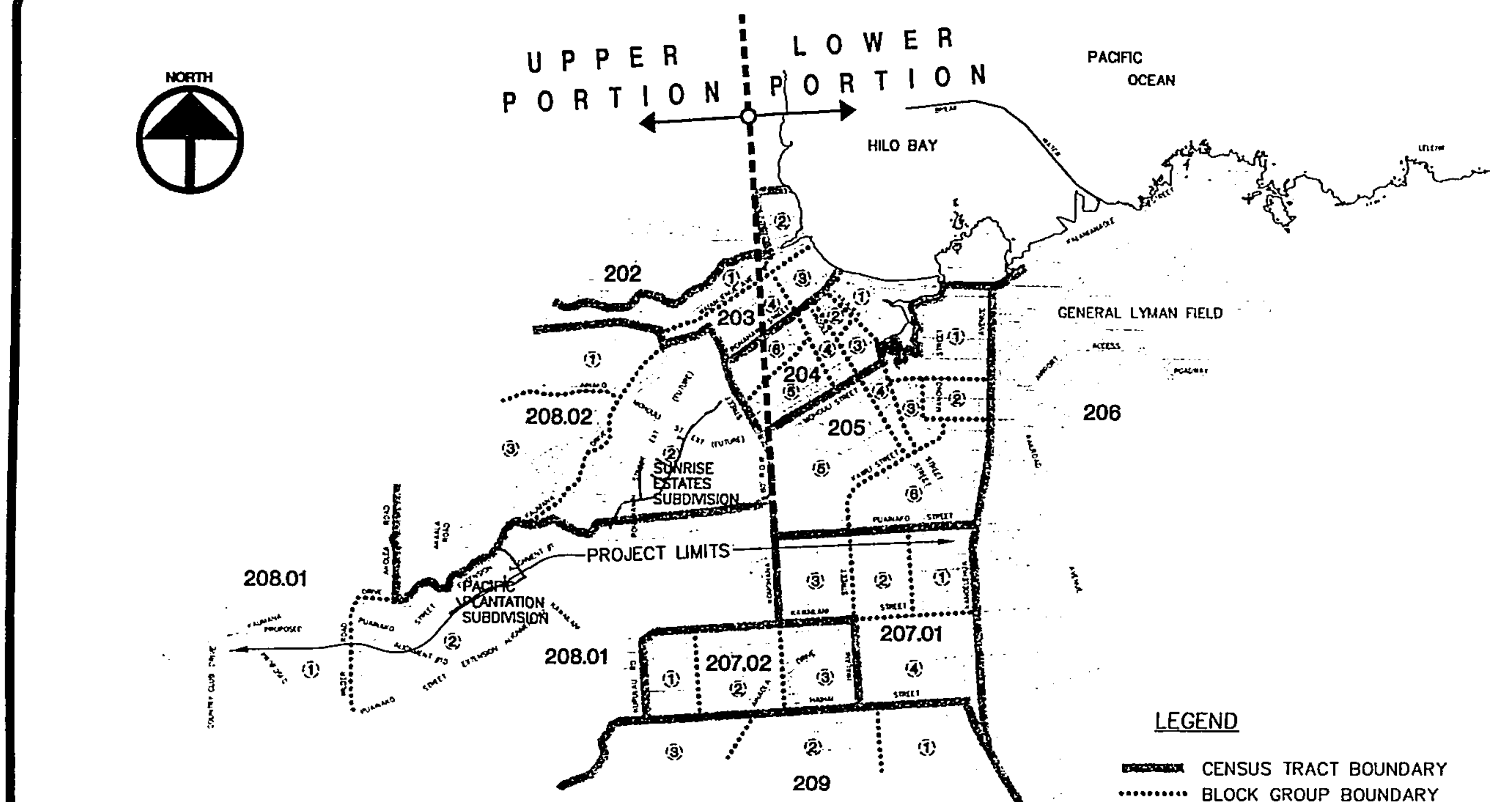
The most recent and comprehensive data set with information on these variables is the U.S. Census of Population in 1990. The U.S. Census Bureau's poverty thresholds are used in this EIS to define low income. Census information, which is based upon self-identification of census respondents, is also used to determine membership in a minority group. Minority is defined as black, Hispanic, Asian, Pacific Islander (including Native Hawaiian), American Indian, or Alaskan Native. Minorities make up 63.1 percent of Hawaii County residents and 75.8 percent of Hilo residents. It should be recognized that more than half of all births in Hawaii since 1970 involve parents of different and/or mixed ethnic backgrounds.

The following discussion, which compares neighborhoods in the vicinity of the project area with the rest of Hilo, includes information on the presence of low-income and minority groups.

Census Tract and Block Group Data

Figure 3-5 illustrates the census tracts that comprise the city of Hilo. Block groups, which are smaller census units, are also illustrated for the portion of Hilo directly affected by the proposed Project. Socioeconomic data for Hilo and the census tracts containing the project area are presented in Table 3-7. Block group data is presented in Table 3-8.

Data from these tables reveal characteristics of the neighborhoods most affected by the Project. These would simultaneously benefit most, through better traffic flow and traffic safety, and would also would experience most of the adverse impacts, such as loss of property for rights-of-way and noise increases. The following comparisons can be made:



TITLE: PROJECT AREA CENSUS TRACTS AND BLOCK GROUPS	FIGURE: 3-5
PROJECT: PUAINAKO STREET WIDENING/EXTENSION, HILO, HAWAII	DATE: 2/03/2000

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

Trait/Unit	205 Lower Waiakea: Mohouli - Puainako	207.01 Lower Waiakea: Puainako to Haihai	208.01 Upper Kaumana	208.02 Lower Kaumana	Hilo
PERSONS	5,576	4,399	3,062	5,081	37,808
FAMILIES	1,295	1,256	7,355	1,428	9,715
HOUSEHOLDS	2,096	1,559	868	1,746	13,234
%Female	51.5	51.0	51.6	50.7	51.2
%Low Income	***22.5***	***6.2***	***7.6***	***10.9***	***14.5***
ETHNIC					
%Cauc	25.8	16.8	28.1	30.0	26.6
%Fili	9.3	9.2	8.9	8.0	9.5
%Hawa	19.7	15.6	14.0	12.9	20.0
%Japa	33.0	51.8	41.3	39.6	35.2
%Minority	***76.4***	***84.4***	***74.7***	***72.5***	***75.8***
AGE					
%<18	27.5	22.5	31.0	27.0	27.3
%18-29	20.5	12.7	11.1	12.3	15.0
%30-59	30.5	36.9	39.9	39.3	37.8
%>59	21.5	27.9	18.0	21.4	19.9
HOUSEUNITS	2,223	1,586	892	1,802	14,134
%Owner-Occu.	33.6	74.6	81.0	74.0	56.7
%Vacant	5.7	1.7	2.7	3.1	5.7
MEDIAN $HOME VALUE	111,700	114,900	114,500	108,800	84,700
Q1 $RENT	251	316	373	363	270
MEDIAN $RENT	367	412	516	477	371
Q4 $RENT	466	537	610	579	491

Source: U.S. Census of Population, 1990 STF1-A. Note: Refer to Figure 3-4 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: Q1=Average of rents in 1st quartile: Q4=Average of rents in 4th quartile. Low income is defined as below Census Bureau poverty threshold.

Table 3-8
1990 U.S. Census Data, Census Block Groups

Trait/Unit	205		207.01			208.01		208.02	
	BG5	BG6	BG1	BG2	BG3	BG1	BG2	BG1	BG2
PERSONS	1745	1226	990	896	1294	935	2127	920	1740
FAMILIES	345	311	270	282	359	237	498	270	488
HOUSEHOLDS	630	399	361	338	418	294	574	337	597
%Female	51.4	52.4	50.1	50.0	48.1	49.9	52.3	48.4	52.6
%Low Income	***44.0***	***18.4***	***16.2***	***0.0***	***4.1***	***5.6***	***8.6***	***10.9***	***12.1***
ETHNIC									
%Cauc	25.6	25.9	19.1	11.9	15.8	34.9	25.0	39.7	26.6
%Fili	10.2	8.5	13.1	6.7	9.9	9.3	8.8	6.1	11.1
%Hawa	17.1	19.7	14.6	11.0	15.4	17.6	12.4	9.7	11.1
%Japa	33.0	33.5	44.8	66.4	51.9	31.9	45.4	35.1	42.5
%MINORITY	***77.5***	***76.0***	***81.9***	***89.1***	***84.9***	***79.1***	***77.0***	***61.3***	***76.7***
AGE									
%<18	24.1	28.6	22.4	18.3	26.3	34.0	29.7	24.1	26.8
%18-29	32.4	18.7	12.9	12.3	12.3	12.5	10.4	10.4	11.8
%30-59	25.6	32.9	34.6	37.2	40.4	41.9	39.0	40.4	36.3
%>59	17.9	19.8	30.1	32.2	21.2	11.6	20.9	25.1	25.1
HOUSEUNITS	641	419	372	343	418	305	587	342	623
%Own-Occu	31.0	37.2	58.8	82.8	85.6	75.1	84.2	79.5	71.9
%Vacant	1.7	4.8	3.0	1.8	0.0	3.6	2.2	1.5	4.2
MEDIAN HOME VALUE ($000,000)	1.24	1.09	1.09	1.23	1.17	0.94	1.31	1.23	0.97
Q1 $RENT	146	258	302	296	368	310	398	365	340
MEDIAN $RENT	279	387	380	465	488	514	517	446	477
Q4 $RENT	472	518	488	635	625	625	598	536	589

Source: U.S. Census of Population, 1990 STF1-A. Note: Refer to Figure 3-4 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: Q1=Average of rents in 1st quartile; MED=Median rent: Q4=Average of rents in 4th quartile Low income is defined as below Census Bureau poverty threshold.

1. Census Tract 207.01

Puainako Street forms the northern boundary of an area known as Waiakea Homesteads, which was formerly part of the Waiakea Sugar Plantation. Beginning in the late 1940s, homes and residential subdivisions were constructed and settlement moved up the slopes to Komohana Street, an infilling process that is still continuing. The neighborhood contains almost exclusively single-family homes. This area is largely coincident with Census Tract 207.01. The older, more eastern (makai) section is in Block Group 1, the central section in Block Group 2, and the most western (mauka) section is in Block Group 3. The tract as a whole has relatively high home values and rent prices, which reach their peak in Block Group 2. This is the Census Tract that would be most affected by the construction activity and right-of-way takes associated with widening of Puainako Street.

The proportion of the population classified as minority is 84.4 percent (somewhat greater than the average for Hilo, 75.8%), and low-income residents make up 6.2 percent (much lower than the 14.5% for Hilo as a whole). The Tract contains the highest proportion of the Japanese-American ethnic group of any Tract in Hilo, but in other ways has an ethnic distribution similar to that of Hilo in general. A relatively large percentage of the population is over age 59. Native Hawaiians make up 15.6 percent of the population here, somewhat less than the 20.0 percent for Hilo as a whole.

2. Census Tract 205

Socioeconomic measures for Tract 205 closely match the characteristics of Hilo as a whole, revealing that the area is a microcosm of Hilo. However, since the area contains the University of Hawaii at Hilo and much of the associated off-campus housing, some categories are skewed. This is particularly evident by examining the data for Block Group 5, which contains the campus area. There, the proportion of the population between 18 and 29 is the highest of all groups and tracts in Hilo, and rents and incomes are the lowest. This Census Tract contains most of the relocations associated with the Project.

The proportion of the population classified as minority is 76.4 percent, almost identical to that of Hilo as a whole, and low-income residents make up 22.5 percent, greater than average for Hilo. Native Hawaiians are 19.7 percent of the population in this tract, with similar proportions in Block Groups 5 (17.1 percent) and 6 (19.7 percent) that would be directly affected by the proposed Project.

3. Census Tracts 208.01 and 208.02

Kaumana, which borders the north side of the Upper Portion, was one of the original suburbs of Hilo. It has a mixture of high-value older homes, newer homes that span the market range, and a remnant of original plantation cottages from the era when sugar was grown in Kaumana. The area is divided into Tracts 208.01 and 208.02 above and below Akolea Road, respectively. These areas are very similar to each other demographically. They are relatively affluent, similar to Waiakea. Ethnically they are not markedly different from Hilo as a whole, although the

Caucasian population is approximately 20 percent above its average value for Hilo and the Hawaiian population is about 30 percent lower than the average for Hilo. In Tract 208.01, the proportion of the population classified as minority is 74.7, and low-income residents make up 7.6 percent. For Tract 208.02, these figures are 72.5 and 10.9 percent, respectively.

Although the percentage of low-income residents ~~minorities~~ varies slightly among census tracts in the project area and between these tracts and Hilo in general, such variation is not enough to represent a disproportionate impact to low-income residents ~~minorities~~. The project generally is beneficial to local residents, the same population that also experiences some adverse impacts through construction-phase impacts, right-of-way taking, long-term noise and air quality effects, and similar direct impacts. The characteristics of the residents who must be relocated as a result of this Project are discussed in Section 4.3.2.

3.3.3 Public Services

Police Protection

The Hawaii County Police Department, headquartered in Hilo, provides police services to the project area.

Fire Protection

The Hawaii County Fire Department serves the project area. Four stations are located in Hilo, at Lower Kaumana, Waiakea, Downtown Hilo and near Hilo Airport.

Emergency Services

The emergency center for Hilo is the Hilo Medical Center, located near Lower Kaumana on Waianuenue Avenue.

Schools

The project area is served by a number of public schools. Upper Portion students attend Ernest B. De Silva and Hilo Union Elementary Schools, Hilo Intermediate School, and then Hilo High School. Lower Portion students attend Waiakea Elementary and Waiakea Intermediate Schools, both located directly on Puainako Street, and then Waiakea High School, located on Kawili Street approximately 0.6 km (0.3 mi.) from Puainako Street.

Utilities

Adjacent to or underneath Puainako Street are a number of utility structures. Water mains varying in size from 15 cm (6 in) to 46 cm (18 in) line both sides of Puainako. One gas main extends from Kilauea Avenue to Kawili Street. Electricity/telephone transmission lines and poles are located along the entire length of Puainako Street. No sewer lines are currently present, although sewer service is planned to extend eventually along Puainako Street and adjacent areas.

Gas and water mains along with electricity/telephone transmission lines extend along the areas that would be affected by intersection expansion both north and south along Kilauea Avenue and Kinoole Street. The corridors associated with Alignments A and B do not cross utilities except at Komohana Street, where transmission lines and two water mains are present. Alignment 1 crosses transmission lines and a water main at Wilder Road. Alignment 2 crosses an electrical transmission line in the vicinity of Pacific Plantations Subdivision.

3.3.4 Parks and Recreation

There are no county, state, federal or private parks within or adjacent to the 37-meter (120-foot) wide corridors associated with any of the proposed Project's alternative alignments. Lokahi Park, part of the County Neighborhood Park system, is located approximately 150 m (500 ft.) from the proposed right-of-way edge north of Puainako Street near the eastern terminus of the project area. Also located within approximately 150 m (500 ft.) of the edge of the Kaumana Drive right-of-way is Kaumana Caves County Park. This park consists of minimal parking facilities and steps that descend into the cave entrance. Kaumana Cave (as distinct from the County Park which provides one access to the cave) is discussed in Section 3.1.1, above. The Project completely avoids both parks, and neither would be indirectly affected by the proposed Project.

3.3.5 Visual Resources

The primary viewsheds that can currently be observed from areas adjacent to the proposed corridor in the Upper Portion of the project area are the following:

- Seaward (makai) background views of the Hilo/Puna seacoast;
- Upslope (mauka) background views of Mauna Loa and particularly Mauna Kea; and
- Foreground views of forests and grasslands alongside the roadway.

The relatively gentle slope and lack of local relief features in the project area leads to subtle viewsheds in which the more dramatic background elements are often not visible. The makai (seaward) view contains both natural landscape elements, such as the seacoast, open ocean and swaths of lowland forest, and manmade elements, such as housing tracts, commercial areas, the airport, and parks. Upslope (mauka) views are primarily of wilderness, including the upper forested and bare slopes of the mountains.

In the Lower Portion, views from the road are of urban housing tracts. The view of the road from adjacent properties is currently not shielded by landscaping except where homeowners have provided their own vegetation screens.

No viewplanes mentioned as sensitive or important for preservation in the Hawaii County General Plan or any other County or State plan are present in the area.

3.3.6 Historic Sites/Archaeological and Cultural Resources

The cultural resources in the project area consist of archaeological sites, some of which have been researched and identified as historic sites and are described below in Section 3.3.6.1. Other cultural sites, such as traditional cultural properties or gathering areas, have been determined not to be present based on consultation with appropriate individuals and cultural groups. The process of consultation and research that led to this conclusion are described below in Section 3.3.6.2.

3.3.6.1 Archaeological Sites

Section 106 of the National Historic Preservation Act is meant to provide protection of historic sites that are on or eligible for the National Register of Historic Places. This law designates the State Historic Preservation Officer (SHPO) in each state as the entity responsible for coordination and consultation on historic sites. The Hawaii State Historic Preservation Division (SHPD) has been consulted continuously during Project planning and has reviewed and approved the findings of the archaeological research discussed in this section (See Apps. E1, E2, and E4 for reports; App. E3, and extensively summarized in Appendix E3; see Apps. A-1& A-3 for early coordination; App. A-5 contains final coordination letter).

Prior to historic site investigations for this Project, no sites were listed on the State or National Registers of Historic Places in or near the project area. In order to determine if eligible historic sites would be affected, four ~~two~~ archaeological investigations of the project area have been conducted. The first was performed in 1993 and is included as Appendix E1. A subsequent study to investigate features that were included in the widened Project and study corridors was performed in 1995. The report of that study is included as Appendix E2. Additional studies were necessitated by the addition of Alignment 10 and other design changes, and these are documented in Appendix E4. The information below is based on synthesis of these studies along with previous archaeological work, historical literature and documents search, and interviews with informants.

Prehistoric and post-contact land uses of the project area are classified as "upland agricultural" and "lower forest." The upland agricultural zone extended above (mauka) to the lower edge of the forest and was characterized by scattered habitations and garden plots. Archaeological resources are sometimes abundant in this zone. The lower forest zone probably lacked permanent habitation, but was used for cultivation and gathering forest products. Temporary huts and small religious shrines may have been utilized by family units. By the late 1800s, large tracts of land in the Hilo area were converted to sugar cane cultivation, followed by settlement and urbanization.

All Project alignments cross through this traditional Hawaiian land use zone once utilized for extensive agriculture and habitation. The overlay of 19th and 20th century sugar cane cultivation and ranching on the remnants of traditional (i.e. pre-Western contact) land use that probably existed on these lands have destroyed most evidence of earlier use.

The original Project archaeological study corridors done in 1993 measured 37 m (120 ft.) wide. A total of 13 sites were identified in these corridors. This survey work and resulting report were accepted by the Department of Land and Natural Resources/State Historic Preservation (DLNR/SHPD letter to D. Kiyosaki, dated July 20, 1994, see Appendix A1).

The subsequent archaeological survey expanded the width of the corridors to 92 m (300 ft.) along a slightly realigned course. In general, the latter survey area extended roughly 27 m (90 ft.) beyond the outer course of the first survey.

The second survey identified and evaluated a number of additional features, most of which were interpreted as elements of the 13 originally identified sites (designated Site Nos. 50-10-35-18911 through 18923; See Table 3-9, Figure 3-6). One additional site was designated. The majority of the 14 total sites (85 percent) are located in Alignments A and B.

Various features of one site (Site 18921) ~~is~~ are located in Alignment 1 and Alignment 10, and one site (Site 18920) is located in Alignment 2. The remaining 12 sites occur between approximately the 61 m (200 ft.) contour and 104 m (340 ft.) contour. Four of the sites are located makai (east) of where Alignment A and B diverge; five sites (sites 18913, 18914, 18915, 18917, and 18918) are located in Alignment A; and three sites (sites 18916, 18919 and 20681) are in Alignment B.

These 14 sites comprise 136 component features. The individual site features include a range of architectural types: platforms, mounds, terraces, modified outcrops, and walls. The sites range from single-feature sites (e.g., sites 18922 and 18933) to a complex of 58 structures (Site 18919) that covered roughly 16,722 m^2 (180,000 sq. ft.) of Alignment B.

A model was generated based on previous archaeological studies that interpreted the 14 sites as associated primarily with the commercial cultivation of sugar cane. The model consists of the following site qualifications: (1) sites are located within or adjacent to designated historic cane fields; (2) site structures match cane-related structures anticipated in the historic research and are comparable to other known sugar plantation sites; (3) site structures have architecture atypical of traditional Hawaiian structures; and (4) sites are associated with historic-era artifacts or contain elements of historic constructions that are specific to sugar plantation or ranching activities. Archaeological analysis indicates that the 90 component features functioned either as cane field or pasture clearing piles, cane hauling ramps, water tank foundations, a railroad bed, and sometimes a combination of these uses.

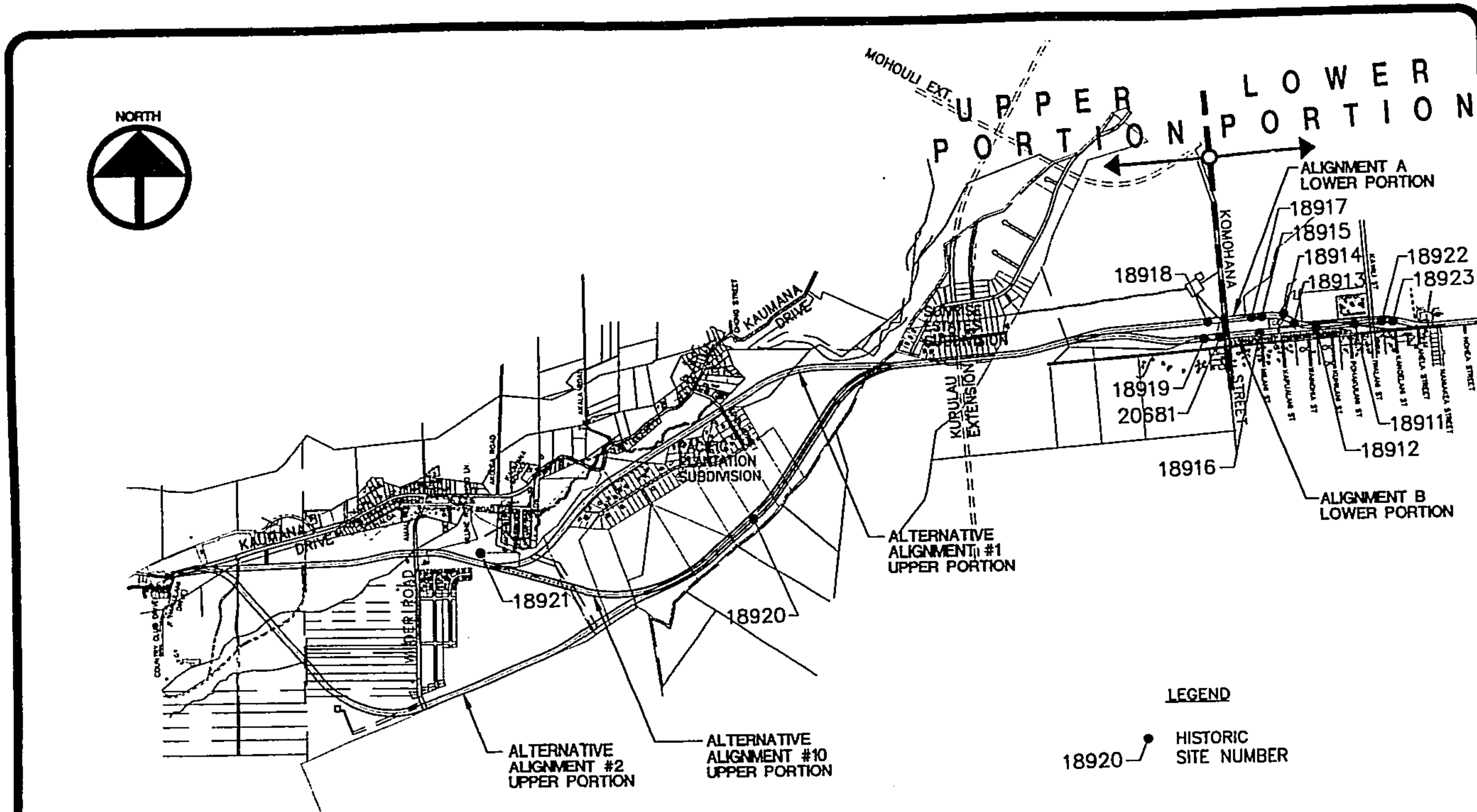
Seven of the sites (sites 18911, 18913, 18917, 18920, 18921, 18922, and 18923) are composed primarily of field-clearing structures ranging in size from 6.5 sq. m to 96.0 sq. ms (78 sq. ft. and 1,152 sq. ft.). The larger of the field-clearing structures consisted of terraces and linear mounds identified at sites 18911 and 18921. The smallest of the clearing structures, measuring between 6.5 and 8.5 sq. m (78 sq. ft. and 102 sq. ft.), were represented by circular mounds at Site 18920. Five of the sites (sites 18911, 18912, 18914, 18915, and 18919) contain a combination of field-clearing features and foundations for ramps or water tanks.

The foundation structures range between 7.5 sq. m and 60.0 sq. m. (90 sq. ft. and 720 sq. ft.) Water tank foundations are typically circular, while ramps are rectangular in shape with at least one vertically-faced side. Historic sources reveal that most of the sites are located in cane fields once under cultivation by the sugar plantation of Waiakea Mill Company. The sites were probably constructed and continually modified while the Waiakea Mill Company was in operation between 1897 and 1947. Only two sites identified in the project corridors are located outside of the historically designated cane fields: Site 18918 is located within pasture land, and Site 18919 is on the boundary between the cane lands and historic pasture. Site 18918 is

Table 3-9
Archaeological Site Summary and Significance

Site No. (50-10-35)	Alignment	No. of Features	Site Type	Interpreted Function	Significance Eligibility Criteria
18911	Shared Lower	11	Complex	Historic agriculture	D
18912	Shared Lower	5	Complex	Historic agriculture	D
18913	A	1	Mound	Historic agriculture	NLS
18914	A	12	Complex	Historic agriculture	C, D
18915	A	9	Complex	Historic agriculture	C, D
18916	B	2	Complex	Historic agriculture	D
18917	A	3	Complex	Historic agriculture	C, D
18918	A	4	Complex	Historic agriculture/pasture	D
18919	B	58	Complex	Historic agriculture/pasture	D
18920	2	8	Complex	Historic agriculture	NLS
18921	1/10	5	Complex	Historic agriculture	D
18922	Shared Lower	1	Modified outcrop	Clearing	D
18923	Shared Lower	1	Modified outcrop	Clearing	D
20681	B	16	complex	Historic agriculture	D

Notes: National Register of Historic Places/Hawaii Register of Historic Places eligibility criteria. From 36 CFR 60
A Site reflects major trends or events in the history of the state or nation
B Site is associated with the lives of persons significant in the past
C Site is an excellent example of a site type
D Site is likely to yield information important to prehistory and history
E Site has cultural or religious significance
Recommended treatments are discussed in Section 4.3.7.
NLS means no longer significant (sufficient data recovery has been accomplished)



TITLE

ARCHAEOLOGICAL SITES

FIGURE 3-6

DATE 2/03/2000

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

0 1 2
scale in kilometers

0 2000 4000
scale in feet

associated with historic ranching activities specifically related to land clearing. Site 18919 contains structures (clearing mounds, field walls, ramps and foundations) that are comparable in construction and function with the other 13 sites in the project corridors. Site 18919 illustrates that peripheral lands of the historic cane fields were also utilized by the sugar plantation for less extensive cultivation of sugar and as a location for plantation infrastructure, such as water tank foundations and ramps for hauling the harvested cane from the fields.

Similar structure types are found among the 14 sites, especially substantially constructed mounds and platforms, many of which are vertically faced or leveled on the surface. This structure type has been identified in historic cane lands in other regions of the Hawaiian islands and are commonly considered to be field-clearing mounds that were built up and subsequently utilized as foundations or ramps by the various historic sugar plantations. Sites 18914, 18915 and 18917 contain the best examples of this particular structure type.

The most obvious sugar plantation structures present at the sites consist of foundations composed of stone-mason or concrete surfaces (Sites 18912-Feat. 1 and 18915-Feat. A) and a railroad bed with *in situ* railroad ties (Site 18915-Feat. B). The foundations are considered to have been used for water tanks.

In contrast to traditional Hawaiian sites, a type more stable in construction, the site structures in the project corridors were indiscriminately assembled. Subsurface testing at 11 structures (of 3 sites) revealed that they were constructed with a loose, internal fill that was typically retained by a sturdy facing; thus, evidencing that these structures were originally assembled as clearing piles.

The presence of associated historic material with the 14 sites attests to the sites' historic plantation era origin and use. The absence of prehistoric construction components (e.g., pavements and fire hearths) and associated cultural materials provides evidence that the 14 sites are not traditional Hawaiian sites. The recovery of three volcanic glass flakes from a subsurface context predating the construction of Site 18915 Feature H corroborates that the area was utilized by traditional Hawaiians; however, the degree of plantation-era land alterations, as well as evidence that the site area was continuously flooded by an adjacent stream, suggests that the volcanic flakes had been displaced from their original context.

The presence of historic material incorporated into the construction of some of the features of the 14 sites supports the interpretation that they are historic in construction and use. This historic material includes barbed wire fencing within a wall (Site 18919 Feat. E) and *in situ* railroad ties on a railroad bed (Site 18915, Feat. B). Various other historic artifacts, metal strapping, and railroad ties, were found on or nearby some of the 14 sites.

Determination of Significance

Among the purposes of Section 106 of the National Historic Preservation Act is the protection of sites important in archaeology. The goals are to determine the significance of subject sites, identify the effects of actions upon these sites, and avoid or mitigate damage to significant sites to the greatest extent possible. Criteria by which historic sites are considered to be "significant" are contained in 36 CFR Part 60 and consist of the following:

- Site reflects major trends in the history of the state or nation;
- Site is associated with the lives of persons significant in our past;
- Site is an excellent example of a site type;
- Site may be likely to yield information important in history or prehistory;
- Site has cultural significance to particular ethnic groups.

Sites considered significant are recommended for various treatments. Data recovery may be recommended, after which a site may be considered "no longer significant." Other sites may be recommended for preservation. Of the 14 sites identified in the project corridors, 12 are considered significant for information content (criterion D), and three ~~two~~ of these 12 sites (sites 18914, 18915 and 18917) are also considered excellent site types (criterion C). The remaining site is considered no longer significant. These significance assessments were established by the SHPO upon review of the original 1993 inventory survey report and were confirmed and modified (by adding Site 18917) after review of the 1995 report. Impacts and mitigation for these sites are discussed in Section 4.3.7.

3.3.6.2. Traditional Cultural Places and Cultural Resources

36 CFR Part 800, Subpart A of the National Historic Preservation Act discusses the purposes and participants for Section 106 regulations. Subpart B includes discussion of the initiation of the Section 106 process, the identification of historic properties, an assessment of adverse effects, and a resolution of adverse effects. Additionally, Section 800.2.3 states that Section 101 (d)(6)(B) of the act will allow Native Hawaiian organizations a reasonable opportunity to identify their concerns about historic properties, advise on the identification and evaluation of historic properties, articulate their views on the undertaking's effects on such properties, and participate in the resolution of adverse effects. Section 106 rules (800.2.1.C) have expanded the role of consultation in regard to the Section 106 process that includes the identification and involvement of many additional interested parties. Important to consultation process is identifying and assessing impacts to Traditional Cultural Properties. These are defined as any natural or cultural feature that "is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Source: Bulletin 38, National Park Service).

Pursuant to these regulations and guidelines, the project sponsors have since 1994 directed consultation and research through archival research, oral historic interviews, archaeological research, public hearings, and further direct consultations with the Office of Hawaiian Affairs (OHA) and other Native Hawaiian organizations. Briefly, archaeological and archival work was accomplished by Hunt and McDermott (1994); oral historic interviews were conducted by Maly (1996); archival and archaeological work was further accomplished by Robins and Spear (1996); Eblé *et al.* (1997) conducted archaeological investigations and consulted with a group identified by the Office of Hawaiian Affairs as a native group, the Ho'okaika Hawaiian Club; Spear (1998), McGerty and Spear (1999), and Dega and Benson (1999) all performed additional archaeological work within the project area; finally, Dega (2000) conducted further archaeological work, interviews and consultation with Native Hawaiian Groups and individuals. Following the work of Dega (2000), SCS formalized the process of consultation with OHA (see Appendix A5, letter of Dega to Lee, 24 January 2000).

Based on research and consultation, the FHWA has concluded that no Traditional Cultural Properties (TCPs) or other important cultural sites (e.g., gathering areas) are present within the project area or would in some other way be affected by project activities. This is based on the fact that: a) during all consultations, archaeological field work, and interviews, no groups or individuals have made specific claims or offered specific knowledge regarding the presence of such resources; b) none of the archaeological sites identified within the project area have been identified or suggested as traditional cultural places; and c) historic research and oral historic interviews and consultations have failed to reveal the presence of any traditional sites occurring within the project area. All archaeological sites have been securely identified as temporally and culturally associated with historic sugar cane cultivation in the area.

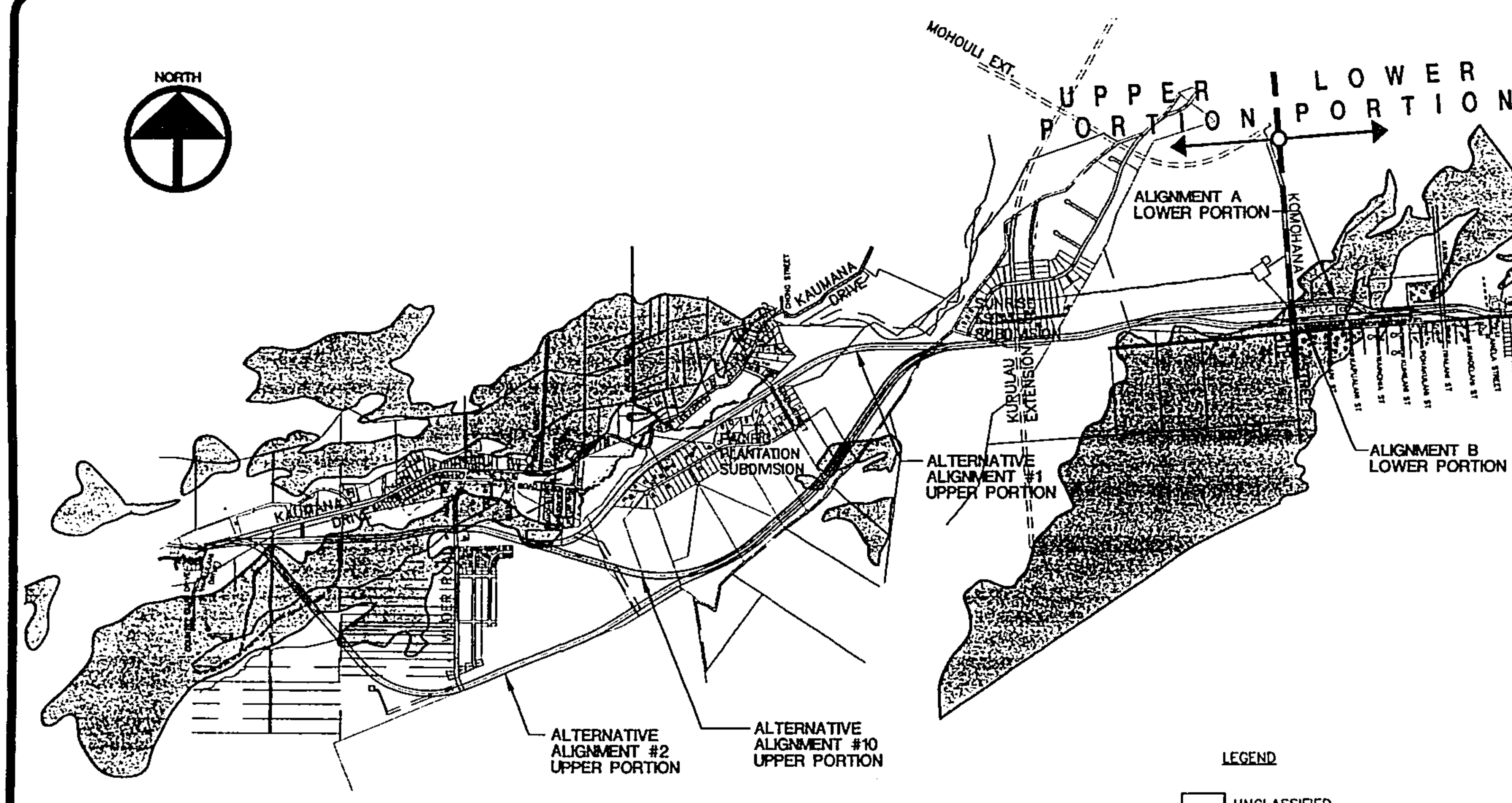
3.3.7 Agricultural Land

The U.S. Natural Resources Conservation Service (USNRCS – formerly U.S. Soil Conservation Service) was consulted to determine the soil and agricultural resources present in the project area. This consultation included formal assessment of the Farmland Conversion Impact Rating evaluation process (see Appendix J for documentation).

The agricultural utility of the land was assessed in the 1970s by the U.S. Soil Conservation Service and mapped as part of the *Agricultural Lands of Importance to the State of Hawaii* (ALISH) map series. Three categories of valuable agricultural land are identified: Prime, Unique, and Other (Baker 1976:4). Prime Land "has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed . . . according to modern farming methods" (Ibid:2). Island-wide, Prime Lands constitute about 4 percent of the surface, Unique Lands less than 1 percent, Other Lands about 18 percent, and Unclassified the remaining 78 percent.

Only the western (mauka) section of the Upper Portion in the Project contains agricultural lands identified as Prime, Unique or Other Important Agricultural land (i.e., especially important for preservation) (Fig. 3-7). Alignments 1 and Alignment 2 both cross approximately 915 m (3,000 ft.) of better-developed soil that was once used for sugar cane cultivation but is now fallow. Calculations show that each alignment displaces approximately 3.2 ha (7.9 ac.) of Prime Agricultural Land. Alignment 10 involves about 10 percent more Prime Agricultural Land than Alignments 1 or 2. No Unique or Other Important Agricultural Land is present or affected.

One farm, located in upper Kaumana west of Kaumana Drive, would be affected by the proposed Project if Alignment 1 or 10 were chosen. The farm occupies somewhat less than half of a 2.10 ha (5.25 ac.) leased area on which a variety of vegetables are grown for both home consumption and market. About 35 percent of the leased area would be converted to right-of-way with Alignment 1, including 25 percent of the area currently farmed; about 15 percent of the leased area would be converted under Alignment 10, converting none of the area currently farmed.



TITLE
AGRICULTURAL LANDS OF IMPORTANCE TO THE STATE OF HAWAII (ALISH)

FIGURE 3-7

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

3.3.8 Transportation Patterns

A detailed description of traffic volumes and safety characteristics specific to the immediate project area is contained in Section 1.4. This section discusses regional traffic patterns and the existing use of the project area by pedestrians and bicycles.

3.3.8.1 Regional Transportation Network

The transportation network of the Project region consists of three major state highways which converge in Hilo, secondary arterials which connect these highways, and minor feeder roads. Figure 3-8 depicts the roadway system and the 1994 average daily traffic associated with each link, if measured. The function of individual roads is described below:

State Highway 11 (Volcano Highway/Kanoelehua Avenue), a four-to-six-lane divided highway, is the primary arterial in the vicinity of the project area and is a segment of the round-the-island "Belt Highway" carrying traffic into Hilo from all parts of the island to the south, terminating in Kailua-Kona. Within Hilo, Highway 11 carries traffic from the port and hotel areas of Hilo and the Hilo Bayfront Highway (State Highway 19) through Hilo's industrial district. Highway 11 provides the only public access to Hilo International Airport. The eastern terminus of Puainako Street is at Railroad Avenue to the east of Highway 11.

State Highway 19 (Kamehameha Avenue/Bayfront Highway) is a two-to-four lane, partially divided highway within urban Hilo and then a two-lane highway from Hilo northwest to Honokaa, Waimea and beyond. It meets Highway 11 in Kailua-Kona.

State Highway 200 (Saddle Road) begins at the western (mauka) end of Kaumana Drive and crosses the island, intersecting with Mamalahoa Highway south of Waimea, South Kohala, and connecting the Kona and Kohala districts with East Hawaii.

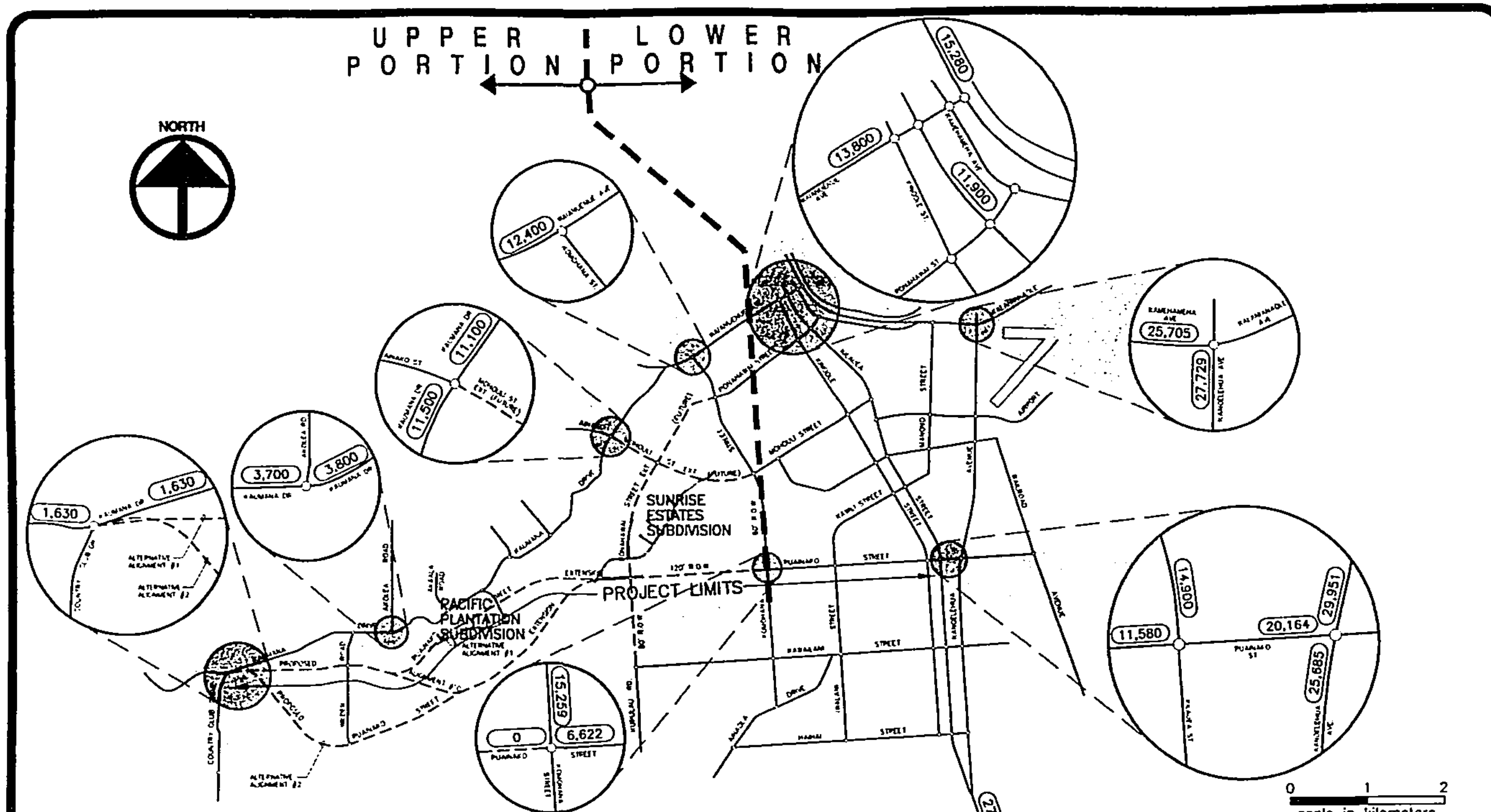
Improvements of Saddle Road that are underway or planned would increase traffic on the roadways connecting it to arterial roads of Hilo and East Hawaii. Puainako Street now carries traffic destined for Kaumana Drive/Waianuenue Avenue and Saddle Road via Komohana Street.

Kilauea Avenue runs along the long axis of the older sections of Hilo, connecting the southern part of the city and the Puna District with downtown. Kilauea Avenue intersects Puainako Street near its eastern terminus at Highway 11.

Komohana Street directly connects the two major upland (mauka) Hilo neighborhoods, Waiakea Uka and Kaumana, and provides the most direct cross-town route for the residents of those two districts. Currently, the western terminus of Puainako Street is at Komohana Street.

Kaumana Drive/Waianuenue Avenue connects downtown Hilo with Kaumana and Saddle Road. Kaumana Drive is a two-lane roadway with a curvilinear horizontal alignment and rolling vertical alignment. At the eastern (makai) end, Kaumana Drive connects to Waianuenue Avenue, which passes Hilo High School and terminates at the Hilo Bayfront Highway.

Trucks represent 3.0 to 6.0 percent of Average Daily Traffic (ADT) at various locations within the network. Neither ADT nor peak hour traffic volumes are markedly seasonal.



TITLE
1994 AVERAGE DAILY TRAFFIC VOLUMES MAJOR PROJECT AREA ROADWAYS

FIGURE 3-8

PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII

DATE 2/03/2000

3.3.8.2 Pedestrian and Bicycle Traffic

Survey counts of pedestrian and non-motorized traffic were not undertaken as part of research for this EIS. However, observations of general patterns reveal that in the Lower Portion, the principal pedestrian traffic consists of school children who live in the vicinity of the Waiakea school complex. The existing Puainako Street has dual asphalt sidewalk/bikeways separated from the roadway by intermittent raised asphalt curbing. Most of the local cross-streets have pedestrian crosswalks. Meetings between the EIS team and administrators from the Waiakea Intermediate and Elementary Schools have identified pedestrian safety as a major concern in planning for roadway improvements. Although bicycles are not a major component of traffic on Puainako Street, there is some use.

Kaumana Drive sees little use by pedestrians and only limited bicycle use. The lack of sidewalks, bike lanes or wide shoulders coupled with relatively high traffic volumes discourage such use.

The *Bike Plan Hawaii: A State of Hawaii Master Plan* (Hawaii DOT 1994), lists bicycle paths, lanes and routes that exist, are in design, or are proposed for the future. The Bike Plan recommends bike lanes for Puainako Street between Kilauea Avenue and Komohana Street. In the general project area, an existing route is present on Kawili Street. Routes are proposed for portions of Kaumana Drive and Komohana Street.

3.3.9 Hazardous Waste

The Hawaii State Department of Health, Office of Hazard Evaluation and Emergency Response (HERR), maintains several databases that compile the following information:

- Hazardous material releases reported to HERR since 1988;
- List of facilities that have submitted Tier II and Form Rs as a reporting requirement of the Hawaii Emergency Planning and Community Right-to-Know program;
- A list of the potential hazardous waste sites which are undergoing evaluation or have been evaluated as part of the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS).

Consultation with HERR determined that according to information in these databases, no known hazardous waste sites are present, no active or former generators of hazardous waste are or were present, and no releases of hazardous materials have been reported along the project corridor. Although this information cannot be regarded as definitive (hazardous waste or releases are not necessarily discovered or reported for all locations), it is consistent with the lack of potential hazardous waste generators in the land use history and ongoing use of the area.

4 ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION AND PROPOSED MITIGATION

This chapter discusses the potential beneficial and adverse impacts of the proposed action and the mitigation measures proposed to reduce adverse impacts, and then compares the relative impacts of the No-Build Alternative and the various Build Alternative alignments.

4.1 Physical Environment

4.1.1 Geology and Geological Hazards

4.1.1.1 Impacts

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.

Lava tubes are associated with pahoehoe lava flows. Some of the lava tubes are large enough and have openings for human entry, and may thus be classified as caves. Lava tube caves in Hawaii may have value as historic sites, recreation areas, as ~~or~~ unique geological features, or for other reasons. Because of the multiple resources afforded by such caves, they are discussed in several sections of this EIS. Section 4.2.3 discusses the biology of Kaumana Cave, and Section 4.3.7 discusses impacts to historic sites or burials that may be found in caves.

The 1881 lava flow is known to contain many such lava tubes, including Kaumana Cave. While the mapped segments of Kaumana Cave will be avoided by all alignments, other lava tubes (some of which may be unmapped segments of Kaumana Cave) may be disturbed directly or indirectly by the road project. Because of the recent date, caves on the 1881 lava flow are unlikely to contain burials or other historic sites. Initial reconnaissance of several caves revealed no cultural material. There is no information indicating that the caves in this area (other than Kaumana Cave) are used for recreation. In that these caves have probably never been systematically explored, their value as geological features is unknown, but as lava tube caves are common in pahoehoe flows in lowland East Hawaii, they are unlikely to have important, unique geological value.

No matter which Alignment is selected under the Build Alternative, the Sunrise Estates Cave would be affected. Detailed geological investigations must be conducted before it is determined whether the overburden, as-is, provides a safe structure for the road, or whether structural modifications (such as collapsing and filling, structural modifications, bridging, or by some combination of these methods) would be required. As discussed, the FHWA has concluded, in consultation with the United States Geological Survey and the U.S. Fish and Wildlife Service, that this cave does not offer any significant and unique value for geology, recreation, drainage/hydrology, or biology.

4.1.1.2 Comparison Among Alternatives

No-Build Alternative

This alternative would avoid construction in a geologically hazardous zone. The continuing absence of a major road serving upper Kaumana would perpetuate the vulnerability to severe traffic blockage during evacuations or as a result of major traffic accidents. No lava tube caves would be affected.

Lower Portion: Alignment A vs. B

The improvement of the Lower Portion would accommodate greater volumes of traffic from Kaumana in case of emergencies. No difference in exposure to hazards exists between Alignments A and B. No known difference with respect to lava tube caves exists.

Upper Portion: Alignment 1 vs. 2 vs. 10

All three alignments are equally exposed to lava flow hazard. Alignment 1 offers a more direct route with more numerous and shorter connections between existing and future roads in Kaumana. Therefore, Alignment 1 is marginally preferable for use during evacuations. ~~Both~~ The shared segment between Komohana Street and Sunrise Estates in the Upper Portion overlies a portion of Sunrise Estates Cave, and all routes are likely to contain lava tube caves (as would any route on a pahoehoe surface). ~~although the cave openings discovered so far have all been associated with Alignments 1~~.

4.1.1.3 Mitigation

A built-in mitigation measure of the road is the reduction of hazard exposure for the residents of Kaumana by providing an alternate escape route in the event of natural disasters or accidents. Unlike the existing Akolea-Waianuenue escape route, the Puainako Extension would have several access points to Kaumana Drive. These would include, at a minimum, Wilder Road and the terminus near Country Club Drive, with the possible addition of Edita Street. This street network would more efficiently conduct traffic away from Kaumana. The wider roadbed and shoulders of the proposed highway would also be less likely to become completely blocked in case of a traffic accident or hazardous substance incident.

Special Contract Requirements that will be incorporated into the construction contract documents will stipulate that in case a lava tube cave is breached during construction, the Hawaii County Department of Public Works (DPW) will implement a contingency plan in coordination with the State Historic Preservation Division:

1. Contractors will be supplied with maps identifying general areas where lava tube caves are known to exist;
2. If a lava tube cave is encountered, all construction with the potential to impact the lava tube will immediately cease;
3. The appropriate personnel at DPW will be contacted;

4. These personnel will contact SHPD, the USGS and the USFWS to determine whether historic sites or burials are present, and whether the lava tube cave has special geological, biological or other value that merits investigation and data collection; and

5. Organizations with an interest in lava tube caves will also be consulted.

Depending on the context and resources associated with the cave, several alternative courses of action may be pursued:

1. If burials or historic sites are present, the mitigation directed by the State Historic Preservation Division and Hawaii Island Burial Council will be followed, in accordance with Chapter 6E, HRS, Section 106 of the National Historic Preservation Act, P.L. 101-85, and P.L. 101-601. In addition, if the historic sites are determined to be important for preservation in place, Section 4(f) will be triggered (see Section 5 for explanation). All work on that portion of the project will cease while the State evaluates measures to avoid the significant site.

2. If no historic sites are present, the disposition of the cave will be as follows:

   a. If appropriate and feasible, the cave will be disturbed as little as possible and left as-is.

   b. If the cave poses a structural hazard to the road or related features, appropriate actions will be taken to produce a structurally sound surface for construction, such as collapse, bridging, structural modification, or some combination of these.

4.1.2 Physiography and Soils

4.1.2.1 Impacts

Road construction would have varying impacts on the topography and natural landforms because of excavation and fill necessary to meet design standards for grades, curves, sight distance and speeds. Many driveway and side road grade levels would require adjustment. Although substantial earthwork would be required in several locations, little noticeable alteration of natural landforms would occur because of the existing low-relief topography.

Because of incipient soil development in project area soils and shallow depth to bedrock, soil disturbance and stability are not substantial issues in project design. There is negligible potential for landslides or subsidence. Similarly, if Best Management Practices are followed, soil erosion potential is minimal. Mitigation measures to avoid erosion are discussed in Section 4.1.3.

4.1.2.2 Comparison Among Alternatives

No-Build Alternative

This alternative may or may not impact physiography or soils, depending upon what improvements are made.

Lower Portion

Some excavation of the existing roadway and adjacent right-of-way would be necessary in order to achieve design grades and sight distances. This would alter topography, with the principal impact of lowering or raising driveway approaches.

Alignment A vs. B

No substantial difference exists between the topographic impacts due to grading on these alignments.

Upper Portion: Alignment 1 vs. 2 vs. 10

No substantial difference exists between the topographic impacts due to grading on these alignments.

4.1.3 Hydrology and Floodplains

4.1.3.1 Impacts and Mitigation Measures

Construction of the roadway would involve several categories of hydrologic effects: encroachments on floodplains; alteration of minor drainage channels and existing drainage patterns; and disturbance of ground surface. Impacts and mitigation in each category are discussed in detail below.

Encroachments on Floodplains: Impacts

Route design for all alignments had among its goals directing the road around floodplains, where practical and avoidance of longitudinal crossings of floodplains where practical. Nevertheless, all Build Alternative alignments involve several crossings of areas identified as within the 100-year floodplain (see Fig. 3-2). Alignments A and B each encroach once on a floodplain, for a total of 0.30 ha (0.74 ac.) and 0.05 ha (0.13 ac.), respectively. Alignment 1 makes a total of 6 floodplain crossings, with a total area of 2.17 ha (5.36 ac.); Alignment 2 would involve 10 floodplain crossings, with a total area of 2.56 ha (6.33 ac.); and Alignment 10 would involve 7 floodplain crossings, with a total area of 2.47 ha (6.11 ac.).

Location hydraulic studies were conducted for each encroachment in all alignments under consideration (see Appendix F). In all cases, no substantial increase to the base flood (100-year) backwater elevations is anticipated. There is low risk of overtopping the highway or damaging adjacent property.

Impacts to the natural and beneficial aspects of the floodplains would be minimal. No permanent streams would be affected in any way. Few native plant species, little wildlife, and no native or valuable aquatic fauna are present. The area is not used for recreation, scientific study, forestry, agriculture, or hunting. The floodplains do have value as open space and as areas for flood moderation and groundwater recharge. The alteration of the natural surface will be minimal – consisting principally of elevating the area immediately under the right of way and supplying culverts to pass flows during flood events. The ability of the floodplains to moderate floods and recharge groundwater would be essentially undiminished.

The Project would not support development incompatible with preserving the natural and beneficial values of the floodplain. The land within the floodplain makes up a relatively small proportion (less than 25%) of available land in this area of Hilo. In addition, considerable developable land exists within and immediately adjacent to Hilo that lacks the severe constraints imposed when developing within a floodplain. In terms of opening up access to properties within the floodplain, virtually every property crossed by the roadway has alternate means of access. Furthermore, HDOT plans to limit the ability to take access from the Puainako Street Extension, in keeping with its function as a primary arterial transporting traffic from the Saddle Road and Kaumana to Waiakea. Permitted accesses other than the major streets identified in the *Hawaii County General Plan* (Kaumana Drive, Wilder Road, Edita Street [Alignment 1 only]; in the future: Kukuau Street, Kupulau Street) will be few or none.

Encroachments on Floodplains: Mitigation Measures

In locations where the proposed roadway crosses flood hazard zones, several measures will be taken as part of implementing Chapter 27 of the Hawaii County Code, in order to ensure sound floodplain management and construction practices within the flood hazard areas.

1. The County of Hawaii will require a flood zone determination and study during the design phase of the project to locate the actual limits of the floodplain and determine the expected flood water elevations.

2. The County of Hawaii will require a final drainage plan that integrates flood water elevation and flow characteristics into the design of flood zone crossings to determine the best final design, and at the same time, evaluate upstream areas for potential flood damages. Floodplain management strategies would include sizing culverts at the floodplain crossings to allow the passage of 50-year frequency of return flood waters and to prevent any increase in the flood water elevations or limits of inundation. This could also include replicating flood storage volumes in areas where it is necessary to fill floodways to construct the roadway embankment.

   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 and activities within designated flood zones. The review will require that all storm runoff is contained onsite as required in the County's *Storm Drainage Standards* (1970).

3. The drainage plan will restrict the zone of disturbance to the smallest possible area in order to preserve the natural and beneficial values of the

floodplain. Included as Special Contract Requirements that will be incorporated into the construction-contract documents will be specifications for the limits of disturbance and requirements that in disturbed areas outside the roadway, the surface will be replanted with appropriate native vegetation to preserve open space, runoff buffering and groundwater recharge values.

Alteration of Stream Channels and Existing Drainage Patterns: Impacts

The only crossing of a stream identified as permanent or intermittent on USGS maps occurs at the Waiakea Flood Control Channel. Triple box culverts are proposed for this crossing. However, a number of crossings of smaller, intermittent, unnamed drainage ways would also occur. Neither Waiakea Stream nor the unmapped drainages are known to contain aquatic resources.

Alteration of Stream Channels and Existing Drainage Patterns: Mitigation Measures

1. The project would require a Stream Channel Alteration Permit (SCAP) for all activities that take place within an identified permanent or intermittent stream, i.e., at the Waiakea Flood Control Channel. This permit is administered by the Hawaii State Commission on Water Resources Management (CWRM). The permit review process considers impacts to the hydrological and biological values of the stream and may specify mitigation measures for impacts to these resources. Since the flow of this stream is highly intermittent and the stream contains no aquatic resources, no mitigation measures other than BMPs to reduce sedimentation are expected to be required.

2. In areas where the proposed roadway traverses minor drainage courses, the drainage plan referenced above will specify that drainage culverts will be installed to pass the runoff beneath the roadway. The location, alignment and hydraulic design of these structures will seek to prevent alterations to the general drainage and flood patterns within the project limits. The culverts would be sized to allow the passage of the normal or base flow of the drainage along with the runoff associated with the design rain storm. The design storm would have a frequency of return of 50 years or less. In the final design stage, the proposed culverts would be checked against a design storm having a frequency of return of 100 years and recommendations made based upon their performance.

Disturbance of Existing Ground Surface: Impact

The construction activities for the extension of the roadway would include clearing and grubbing, excavation, embankment construction and paving of the roadway and associated structures. The reader is referred to Section 4.4.1 for Construction-phase impacts and mitigation measures.

On a permanent basis, paving of the roadway would increase the amount of impervious surface area within the project limits. This increased impervious area has the potential to increase the amount of rainfall runoff within the project limits.

Disturbance of Existing Ground Surface: Mitigation Measures

The final roadway design will specify a typical section that is crowned to shed water and prevent standing water on the roadway. This runoff will be collected in roadside ditches and drainage structures (i.e. drywells, retention ponds and/or detention ponds) and disposed of by ~~both~~ infiltrating it into the ground ~~and discharging it into the natural drainage paths~~. This mitigation measure will ensure that any increase from storm runoff due to greater impermeable surface will be contained onsite.

4.1.3.2 Comparison Among Alternatives

No-Build Alternative

This alternative would avoid impacts to the current, semi-natural hydrological system in the area.

Lower Portion: Alignment A vs. B

In the Lower Portion, drainage mitigation would consist mainly of designs and structures to collect roadway runoff in roadside ditches and drywells. Mitigation on Alignments A and B is essentially similar, consisting mainly of a bridge at the Waiakea flood control channel, and is projected to cost roughly the same, approximately $4.6 million. Appendix F contains more information on the projected drainage structures.

Upper Portion: Alignment 1 vs. 2 vs. 10

In the drainage study (see Appendix F), the proposed roadway alignments were delineated on topographic maps and then tributary drainage areas to each required drainage structure or culvert were determined. The corresponding quantity of runoff for each of the sub-areas was calculated using the *Rational Method* and the drainage structures sized accordingly. Detailed information (including maps and tables) of the drainage areas and structures is contained in Appendix F. Although the precise design of drainage structures will occur during final design, it appears that a series of reinforced concrete pipe (RCP) and steel arch culverts varying in diameter between 0.6 m (2.0 ft.) and 3.7 m (12.3 ft.) would be required.

In addition to the preliminary design of the proposed roadway culverts, the existing 2.4 meter (8.0-ft.) diameter corrugated metal pipe (CMP) and the 1.5-meter (5.0-foot) diameter (RCP) culverts along Wilder Road were checked for their capacity to ensure proper drainage of the proposed roadway. Upgrades to these structures would be undertaken during construction, as appropriate.

Drainage mitigation costs on Alignments 1,, ~~and~~ 2, and 10 are projected at $5.655 million, ~~and~~ $8.798 million, and $5.731 million, respectively.

4.1.3.3 Only Practicable Alternative Finding

Executive Order 11988 (and 23 CFR 650, Subpart A) has as its goal the avoidance of long and short-term adverse impacts associated with the modification and occupancy of floodplains, along with the avoidance of the direct and indirect support of floodplain development where there is a practicable alternative. The Order further directs federal agencies that propose to undertake an activity in a floodplain to consider alternatives to avoid adverse effects and incompatible development in the floodplains.

If the head of the agency finds that the only practicable alternative requires siting in a floodplain, the agency shall, prior to taking action, design or modify its action in order to minimize potential harm to or within the floodplain, and prepare and circulate a notice containing an explanation of why the action is proposed to be located in a floodplain.

In the case of the Project, there is no Build Alternative capable of fulfilling the Project's purpose and need that can avoid crossing floodplains. Closely spaced parallel drainages occupy the entire surface across which the roadway must extend diagonally because of the location of the project termini. The No-Build Alternative avoids construction in floodplains, but does not fulfill the Project's purpose and need, and it would lead to more adverse traffic, social, and air quality impacts than the Build Alternatives. Under the Build Alternative, impacts to the natural and beneficial aspects of the floodplains would be minimal, with no effects to streams, native plant species, wildlife, native aquatic fauna, recreation, scientific study, forestry, agriculture, or hunting. The floodplains do have value as open space and as areas for flood moderation and groundwater recharge. The alteration of the natural surface will be minimal – consisting principally of elevating the area immediately under the right of way and supplying culverts to pass flows during flood events. The ability of the floodplains to moderate floods and recharge groundwater would be essentially undiminished. The mitigation measures described above in Section 4.1.3.1 ensure that impacts to floodplains wetlands will be minimized.

The floodplain encroachment levels of each Alternative Alignment are roughly equal. The principal difference is that the combination of Alignment B/Alignment 10 – the Preferred Alternative for the project – has been identified as the Least Environmentally Damaging Practicable Alternative (LEDPA) under the NEPA 404 MOU process (see Section 4.2.2.4, below). Although the LEDPA decision is made with regard to wetlands, impacts to wetlands and floodplains are often closely related. The Preferred Alternative is thus also determined to be the best alternative with regard to floodplain impacts.

Based on the above considerations, it is determined that there is no practicable alternative to the proposed construction in floodplains and that the proposed action includes all practicable mitigation measures to minimize harm to floodplains that may result from such use.

4.1.4 Water Quality

4.1.4.1 Impacts

A report discussing water quality impacts and mitigation measures for the project is included as Appendix H. Impacts related to highway utilization are summarized below, while construction-related impacts are discussed in Section 4.4.1.

Stormwater discharges to intermittent stream channels are regulated by the EPA through the Clean Water Act (CWA) and the National Pollutant Discharge Elimination System (NPDES) Program.

Impacts to water quality from a highway project, including construction, use and maintenance, contribute to non-point source pollution. Detrimental effects from this pollution may occur far from the source. The Project's potential areas of impact are Wailoa Estuary, greater Hilo Bay, and the subsurface aquifer.

Potential impacts to water quality occur from the following sources:

- Soil erosion during construction and highway utilization;
- Contaminants associated with heavy equipment and other sources during construction;
- Chemical pollutants during utilization of highway, including hydrocarbons (gas, grease, oil, etc.) and heavy metals. Petroleum hydrocarbons can include polychlorinated biphenyls (PCB), which are known to bioaccumulate;
- Solids from tire and pavement wear, brake shoe and drum wear, rust, car exhaust, mud and dirt from vehicle bodies, erosion from highway right-of-way, pavement maintenance, litter, and spilled loads and
- Herbicides applied along road verges.

The construction and use of any highway inevitably entails at least minimal levels of chemical pollution. Without mitigation, construction and utilization of highway projects can have serious adverse impacts on the quality of groundwater, streams and coastal waters. All Build Alternatives would increase the area of impermeable surface in the immediate area due to widening the road and construction of sidewalks (Table 4-1). Enlarging the area of impermeable surface increases surface-water runoff during precipitation events and potentially increases the speed of delivery of polluted surface floodwater.

Table 4-1
Change to Impermeable Surface

Alignment	Current Proportion of Impermeable Surface Within 250 Meters of Proposed Centerline	With Project Proportion of Impermeable Surface Within 250 Meters of Proposed Centerline
A	Medium	Medium High
B	Medium	Medium
1	Low	Medium Low
2	Very Low	Low
10	Very Low	Low

Notes: Very Low < 5% impermeable; Low = 5-15%; Medium Low = 15-25%; Medium = 25-40%; Medium High = 40-55%; High = 55-75%; Very High = 75-100%. Determinations are estimates based on airphoto and map analysis. Impermeable areas included paved streets, driveways, and parking lots, as well as structures. Future condition assumes conversion of entire 37-meter (120-foot) right-of-way to impermeable.

Uncontrolled or large releases of these pollutants may seriously impact water quality, including the quality of groundwater, as well as the organisms, ecosystems and recreational activities dependent on clean water. Sediments may choke streams and alter the biological and recreational value of stream and ocean water (flood control is treated above in Section 4.1.3). Chemical pollutants may inhibit reproduction and growth and may kill organisms. Through organism-selective effects, this can alter the composition of ecosystems. An excess of nutrients such as nitrogen or phosphorus can lead to eutrophication.

Without mitigation, increased areas of low permeability surface created by the proposed project also may increase the volume of total runoff, the size of peak flood, increase channel sizes through scouring, decrease the lag-time to discharge peak, and decrease groundwater infiltration. Because percolation of the water through the substrate has a mitigating effect on water pollution, the increased speed of delivery of runoff into the receiving waters (Wailoa Estuary and Hilo Bay) can also affect the concentration of particulate matter, and microbial, as well as chemical, pollution.

4.1.4.2 Comparison Among Alternatives

Traffic volumes, and thus the potential for highway operation pollution, would increase regardless of the alternative selected. The decrease in traffic flow efficiency associated with the No-Build Alternative would lead to increases in highway-related pollutants. The reduction in pollution gained by more efficient traffic flow in the Build Alternative would be partially offset by a slight increase in total traffic volume.

In addition, with increased traffic volumes and reduced traffic-flow efficiency under the No-Build alternative, automobile accidents and vehicle breakdowns would be expected to increase, although to a lesser extent than with the Build Alternative (which involves more total traffic). With an increase in vehicle incidents under both alternatives, the potential for chemical and petroleum residues to be deposited on the roadway would be expected to increase. Stormwater flowing over impermeable surfaces may pick up such residues, and if not controlled, transport them off site. Contaminated stormwater could degrade the quality of surface waters.

Groundwater quality is not expected to be affected under either the No-Build or the Build Alternatives. Soil materials naturally filter and clean runoff as it filters to the groundwater. Recent studies conducted for the Saddle Road EIS (USDOT 1997) of existing wells and well shafts adjacent to major highways on the Big Island showed no detrimental effects from surface runoff contamination. Under the Build Alternative, mitigation measures employed to control runoff will further reduce the likelihood of impacts to groundwater.

Selection of Alignment A would increase the area of impermeable surface at a level marginally greater than Alignment B (Table 4-1). Alignment 2 would necessitate considerably greater conversion to impermeable surface than Alignment 1.

While the area of impermeable surface would increase under any combination of alignments in the Build Alternative, the overall addition of paved area in relation to the size of the Hilo Bay watershed is quite small (less than 0.1 percent), and the increase in the area of impermeability is not a significant consideration. Any potential for contamination of stormwater under the Build Alternative will be reduced through mitigation measures, and the risk of contaminated waters reaching offsite locations will be slight.

4.1.4.3 Mitigation

In order to comply with the CWA, measures must be taken during and after construction, to prevent pollutants, including sediment and hazardous chemicals from degrading the quality of stormwater runoff. As required by EPA regulations on stormwater discharges, measures to prevent stormwater pollution will be required for the Project both during and after construction.

Special Contract Requirements which will be incorporated in the construction contract documents will require the following permanent pollution control measures in order to minimize degradation of stormwater quality after construction of the road is completed:

- Minimizing the steepness of slopes where possible;
- Vegetating slopes to filter out silt and chemical pollutants;
- The use of drywells and percolation ponds to reduce siltation of receiving waters ;
- Providing velocity reducers and/or settlement basins at culvert outlets;
- Stabilizing stream banks in appropriate locations; and
- Use of mowing and minimization of herbicides to control roadside weeds.

It should be recognized that under any Build Alternative, a substantial portion of the traffic on the roadway would simply be diverted from other locations, and not generated by the roadway itself, tempering the increase in net impact to the region.

Despite all mitigation measures, residual impacts involving sediment impact and chemical contaminants would occur. However, these impacts would be minimal, and it is expected that all standards of the Department of Health regarding impacts to groundwater, streams and coastal waters would be met.

If a major hazardous spill were to occur within the Project limits, clean-up efforts would be coordinated through the Hawaii County Civil Defense Agency and the Hawaii State Department of Health.

4.1.5 Air Quality

4.1.5.1 Impacts and Alternative Comparisons

Impacts to air quality in the project area are covered in a report included as Appendix L and summarized below. Refer to Section 3.1.6 for discussion of the source, health effects and regulation of various air pollutants. Construction-phase impacts are discussed in Section 4.4.2.

An emission burden study, also called a mesoscale analysis, provides an overall assessment of the potential impact of a roadway project. This was performed to provide estimates of existing and future air pollution emissions from traffic operating within the project corridor. A microscale air quality analysis, meant to study air quality impacts at critical on-ground locations, was also conducted at five intersections along Puainako Street.

Mesoscale Air Quality Analysis

The analysis divided the project area into four segments, based on differing traffic characteristics. The segments were (1) Puainako Street between Kilauea Avenue and Komohana Street, (2) Puainako Street between Komohana Street and Kaumana Drive (if project is constructed), (3) Komohana Street between Puainako Street and Kaumana Drive, and (4) Kaumana Drive between Komohana Street and Country Club Drive.

The MOBIL5A emissions computer model calculated emission burdens based on several factors including vehicle miles traveled (VMT; based on the roadway length and the average daily traffic counts and projections derived for this EIS), average travel speeds (ATS), and other climatic and vehicular factors. Emission estimates for future (Project Year 2020) scenarios – Build and No Build Alternatives – were done for the primary three air pollutants emitted by motor vehicles: carbon monoxide, nitrogen oxides and hydrocarbons. As a baseline estimate for comparison, 1994 emissions were also calculated.

The final results of the analysis are presented in Table 4-2. It was estimated that in 1994 hydrocarbon emissions from traffic traveling within the project corridor amounted to 64 tons. Carbon monoxide emissions were estimated at 510 tons and nitrogen oxide emissions were calculated at 41 tons. Most of the emissions occurred along the Puainako Street and Komohana Street segments.

Table 4-2
HC, CO and NO_x Emissions (Tons Per Year)

	1994			2020 Without Project			2020 With Project		
	HC	CO	NO_x	HC	CO	No_x	HC	CO	NO_x
Puainako St.: Kilauea Ave. to Komohana St.	28	231	15	91	811	20	37	387	19
Puainako St.: Komohana St. to Kaumana Dr.	–	–	–	–	–	–	30	231	25
Komohana St.: Puainako St. to Kaumana Dr.	27	209	20	31	262	23	33	279	25
Kaumana Dr.: Komohana St. to Country Club Rd.	9	70	6	144	1,274	31	20	200	9
Total	64	510	41	266	2,347	74	120	1,097	78

Source: Appendix L

Build vs. No-Build

In the year 2020 without the Project, emissions are estimated to increase substantially (Table 4-2). This is due to the expected increase in traffic volumes and decrease in average travel speeds (ATS). Traffic moving less efficiently produces far more pollutants per vehicle mile traveled. Much of the increase is predicted to occur along the Kaumana Drive segment due to very slow ATS.

In the year 2020 with any combination of build alignments, hydrocarbon and carbon monoxide emissions would also increase, but by a smaller factor. Compared to the No-Build case, emissions along the Kaumana Drive segment would be substantially reduced due to lower ADT and higher ATS. On Puainako Street, despite the increase in ADT, emissions would increase only slightly because of better traffic flow. Emissions would increase slightly on Komohana Street and Kaumana Drive, again despite great increases in estimated ADT. Quite obviously, emissions would rise in the currently vacant land where the Puainako Extension would be located.

Alternative Comparison

In terms of total emissions, the model did not predict much difference between the alternative alignments. However, based on air quality considerations, the alignments offering the greater buffer distance between the roadway and the existing homes (Alignments A and 2) are preferable.

Table 4-2 illustrates that emissions in the year 2020 are calculated to rise from current levels by factors ranging between approximately 1.2 to 15.0, depending on the pollutant measured and the alternative selected. Note that emission levels would be far greater without the project than with it. This is because motor vehicles traveling in congested conditions burn fuel less efficiently. Without the Project, carbon monoxide levels and hydrocarbon emissions would be over twice as high, although nitrogen oxides would be slightly lower.

Microscale Air Quality Analysis

Despite the benefit to overall (regional) air quality, vehicles on Puainako Street would contribute to a long-term increase in air pollution emissions along the actual project corridor – 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 area. CO was selected for modeling because it is the most stable and abundant of the pollutants generated by vehicles (see Appendix L).

Generally speaking, roadway intersections are the primary locations of concern because of vehicular emissions associated with traffic queuing in congested conditions. The study focussed on four intersections that are now or would be signalized on the existing portion of Puainako Street because these intersections will be the most affected by the proposed project. Also studied were the intersections near the Waiakea School complex.

The main objective of the modeling study was to estimate maximum 1-hour and 8-hour CO concentrations for the four intersections at the present (1998) and the future (2020) for both the Build and No-Build 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 m/sec., blowing towards the most sensitive areas) were used in order to arrive at a conservative estimate.

Tables 4-3 and 4-4 provide the results of the analysis for four intersections (Waiakea School complex is discussed at the end of this section).

Table 4-3
Estimated Worst-Case 1-Hour Carbon Monoxide Concentrations
(milligrams per cubic meter)

Roadway Intersections with Puainako	Year/Alternative					
	1998/Present		2020 No-Build		2020 Build	
	AM	PM	AM	PM	AM	PM
Kilauea Ave.	13.1	9.8	10.6	8.7	10.1	9.6
Kinoole St.	6.2	5.8	7.5	7.2	9.2	7.8
Iwalani/Kawili Sts	8.9	6.1	8.0	6.8	11.0	8.9
Komohana St.	7.8	6.1	11.6	13.2	9.8	8.2

Source: Appendix L
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 4-3, the predicted worst-case for the 2020 Build Alternative ranged between 7.6 and 11.0 mg/m^3. In general, air quality would be similar in the Build and No-Build scenarios, with the most frequent exceedance occurring in the No-Build situation. All of the locations studied were predicted to meet the National AAQS, but the more-stringent State Standard was predicted to be exceeded near the Puainako Street – Kilauea Avenue and the Puainako – Iwalani/Kawailani Street intersections.

Table 4-4 supplies the worst-case 8-hour concentrations for these intersections. For the 2020 scenarios, all predicted low concentrations that were within the National AAQS, but concentrations that equaled or exceeded the more-stringent State AAQS near the Puainako Street Intersection with Kilauea Avenue and with Iwailani/Kawailani Streets.

The projected microscale impacts of the proposed project are not significant in terms of compliance with the National AAQS. Existing CO concentrations in the project area may exceed the more-stringent State ambient air quality standards at times. This exceedance is likely to occur in the future with or without the Project. With the Project, however, the highest concentrations in the project area will likely be lower, compared with either the existing case or with the No-Build scenario.

Table 4-4
Estimated Worst-Case 8-Hour Carbon Monoxide Concentrations
(milligrams per cubic meter)

Roadway Intersections with Puainako	Year/Scenario		
	1994/Present	2020/Without Project	2020/With Project
Kilauea Ave.	6.6	5.3	5.0
Kinoole St.	3.1	3.8	4.6
Iwailani/Kawili Streets	4.4	4.0	5.5
Komohana St.	3.9	6.6	4.9

Source: Appendix L
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.

Currently, four driveways access the Waiakea School Complex. In consultation with school officials, final design will determine the number and location of access points for these intersections. Therefore, precise modeling of microscale air quality impacts at future intersections is not possible. The model estimated existing conditions at one intersection and future conditions at another, and determined that in no cases would 1-hour or 8-hour State or national AAQS be exceeded.

Alternative Comparison

The Build Alternative results in slightly better microscale air quality at the subject intersections than the No-Build Alternative. No difference exists among any of the Alignments with respect to microscale air quality impacts.

4.1.5.2 Mitigation

Impacts to regional air quality will be less severe if the Build Alternative is selected. Furthermore, any potential impacts are not significant in terms of compliance with the National AAQS. Since no mitigation measures would be enforceable under the No-Build Alternative, none are suggested here.

4.1.6 Noise Levels

A report analyzing the noise impacts of the various alternatives is included as Appendix K (revisions in Appendix K2) and is summarized below and in Section 3.1.7. Construction-related impacts are dealt with in Section 4.4.3. Refer to Section 3.1.7 for a discussion of the methodology involved in the measurement of existing noise and the FHWA Traffic Noise prediction model used to estimate impacts.

4.1.6.1 Impacts

Federal and state regulations and policies (23 CFR 772; U.S. Transportation Policy and Procedure Memorandum 90-2; HDOT's *Noise Analysis and Abatement Policy*) define a traffic noise impact as occurring when the predicted noise levels for the project year either:

- o Approach or exceed FHWA's noise abatement criteria (NAC), or
- o Substantially exceed the existing noise levels.

The NAC for residences, schools, churches, and similar land uses – i.e., the entire project area - is 67 L_{eq} (equivalent sound level, A-weighted scale – see Table 3-3). Approach is defined in the HDOT policy as within 1.0 decibels of the applicable NAC; i.e., 66 L_{eq} or greater. Substantial exceedance is defined as an increase of at least 15 dBA over existing noise levels.

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 State policy, the price of mitigation should not exceed $35,000 per affected residence. It is FHWA policy that only existing homes or lots with a current, active building permit are factored in for calculation of both impacts and benefits. 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 m (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 m (6.0 ft. requires a building permit and is subject to 9 m (30 ft. property-line setback requirements (which may be smaller in some zones). Exceptions to such setbacks require variance applications on a property-by-property basis.

Because of the way noise impacts on the Project are spatially distributed, the discussion for the noise section divides the project area in a slightly different manner than for other impacts. For the No-Build Alternative, the area under consideration is the existing Puainako Street between Kilauea Avenue and Komohana Street. For the Build Alternative, three sub-areas are identified: the segment of the Lower Portion where the existing Puainako Street will simply be widened (Kilauea Avenue to the Waiakea School complex); the segment of the Lower Portion where the proposed Alignments A and B "bypass" the existing Puainako Street; and the Upper Portion.

Future noise impacts were estimated for all existing residences, residences under construction, and public-use structures along all alternative alignments. Because of the prevailing custom of free air circulation through louvered windows in East Hawaii homes, noise mitigation barriers rather than air conditioning and soundproofing are generally preferred when noise abatement measures are required. At all properties where noise impacts were predicted, the location and size of noise mitigation barrier walls necessary to reduce sound levels by at least 5 dBA were determined. Finally, a preliminary evaluation of whether these measures were "feasible and reasonable" was made.

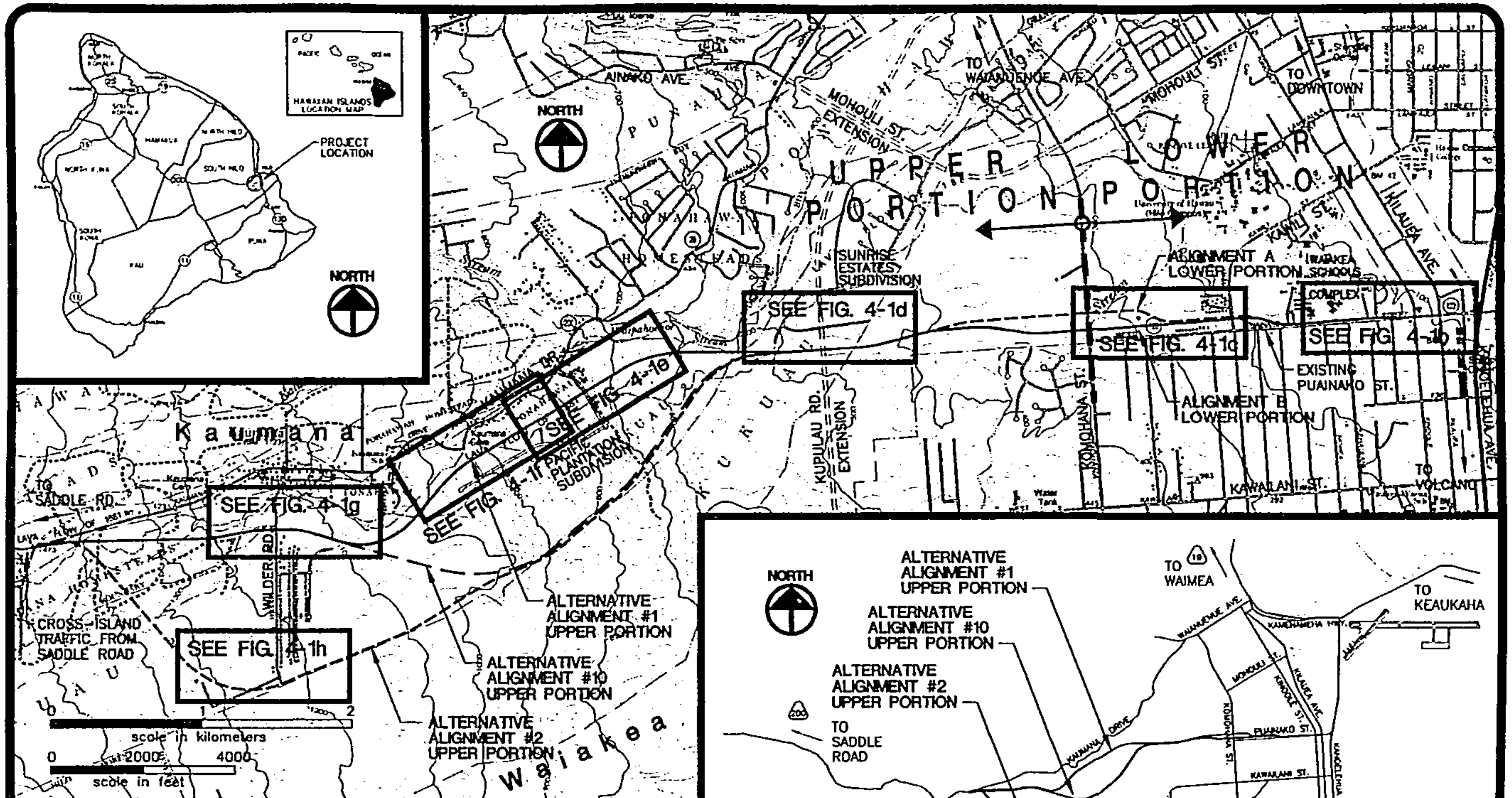
Table 4-5 provides an overall tally of properties that would be impacted by the No-Build Alternative. Because no funding for noise mitigation would be available if the Project is not implemented, no further information is provided.

Figures 4-1 a-h depict noise-impacted properties, i.e., residences and public use structures, under the various alignments of the Build Alternative. The figures also show the sound reduction barriers proposed to mitigate these impacts. For each noise impacted property identified in Figures 4-1a–h, Tables 4-6a–e provide information the nature and level of the impact and the amount of sound reduction achieved by the barriers. The reader is referred to Appendix K for more detailed discussion of methodology along with tables and maps of noise impacts.

Table 4-5
Noise Impacted Properties, No-Build Alternative, Kilauea Avenue to Komohana Street

SEGMENT	IMPACTED STRUCTURES
Kilauea Ave. to Kinoole St.	2 homes
Kinoole Street to Lokahi St.	3 homes
Lokahi St. to Naniakea St.	7 homes
Naniakea St. to Anela St.	1 home
Anela St. to Kanoelani St.	None
Kanoelani St. to W. Kawili St.	1 home
W. Kawili St. to Kapualani St.	7 homes
Kapualani St. to Komohana St.	2 homes
Komohana St. to W. End of Puainako St.	None
Kilauea St.	2 homes
Kinoole St.	1 church building
TOTAL	25 homes, 1 church building

Source: Appendix K, Table 9. Number for each segment is the maximum of the number impacted at either the AM or PM peak hour.
Notes: Impact is defined as increase that: 1) approaches (defined as 66 L_{eq}) or exceeds FHWA NAC of 67 L_{eq} for residences, schools, churches, or similar land uses; 2) exceeds HUD's 65 L_{dn} criterion for residences; or 3) equals or exceeds 15 dBA above existing noise levels. All listed structures are private; no public use or park lands are impacted.



TITLE

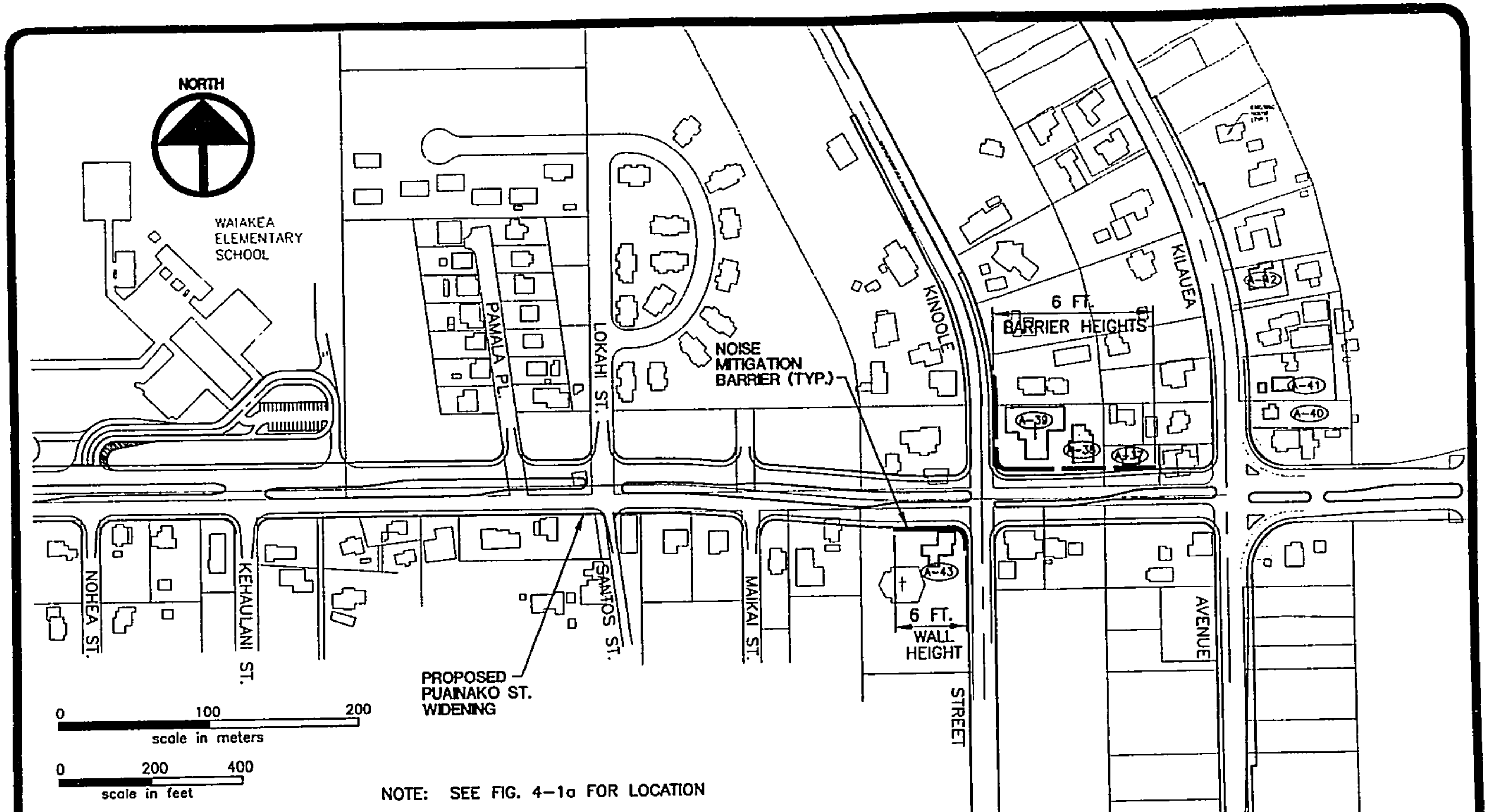
NOISE IMPACTS & MITIGATION

KEY TO MAPS

FIGURE 4-1a

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 10/26/98



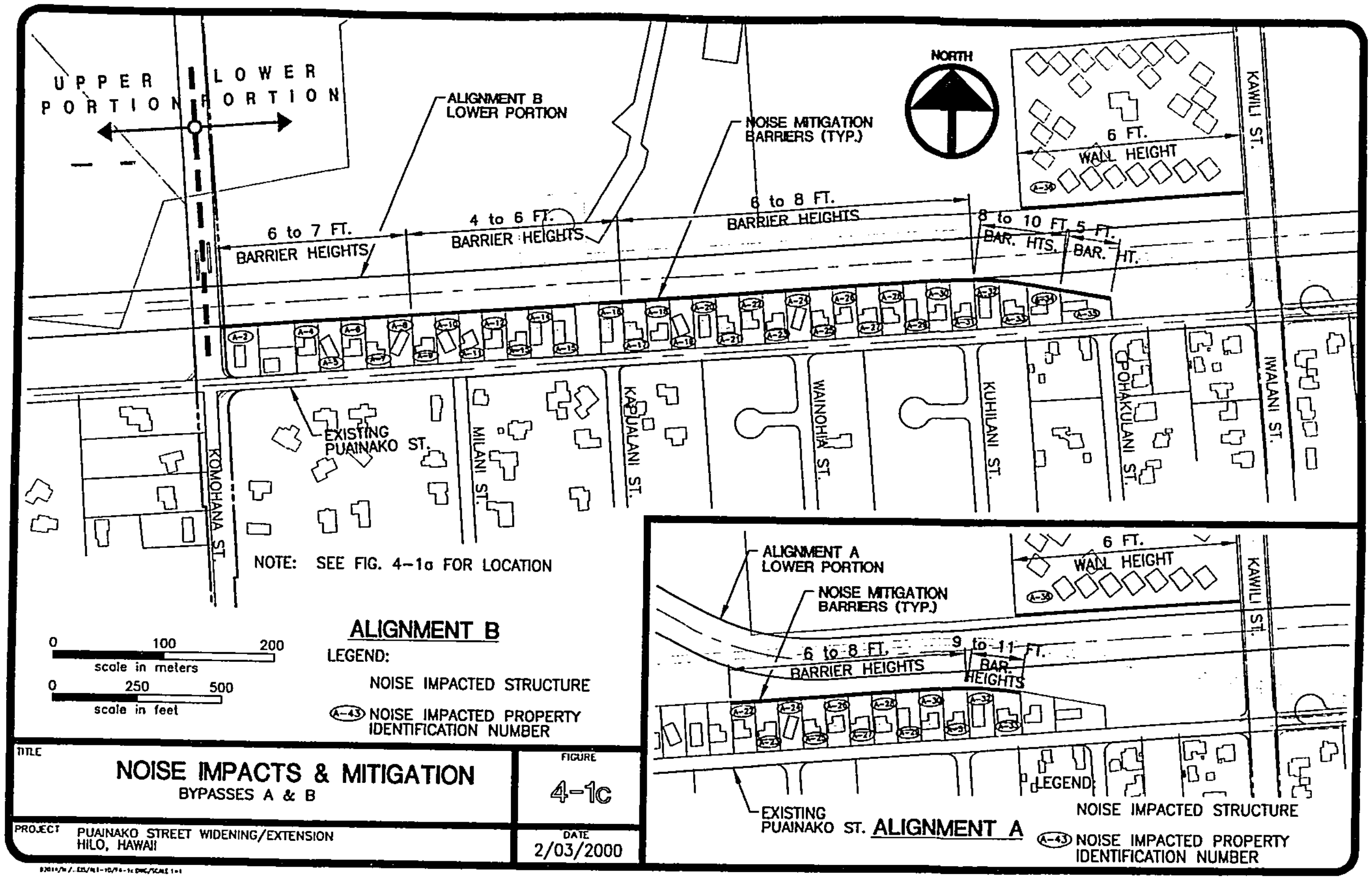
NOTE: SEE FIG. 4–1a FOR LOCATION

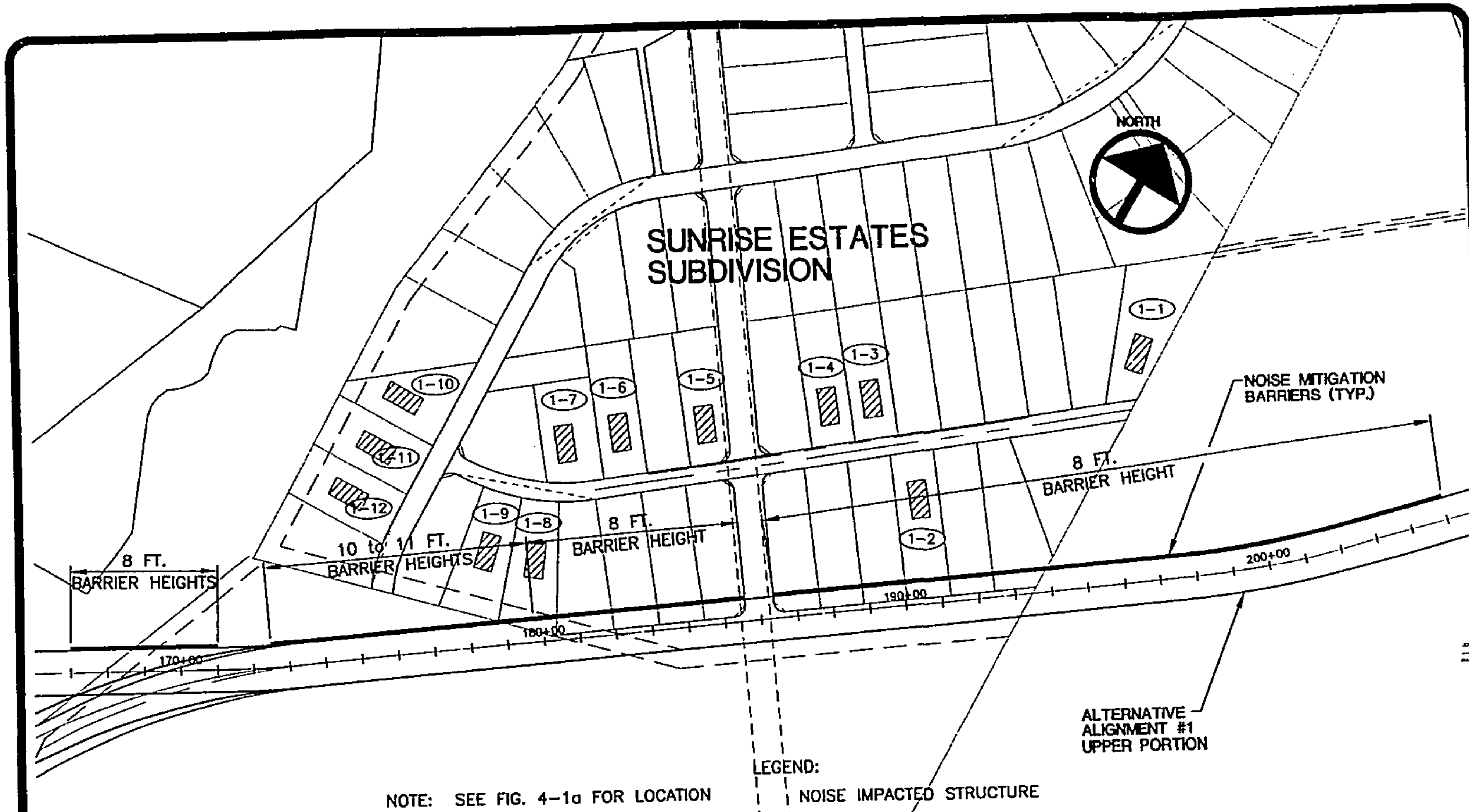
LEGEND:

NOISE IMPACTED STRUCTURE

A-43 NOISE IMPACTED PROPERTY IDENTIFICATION NUMBER

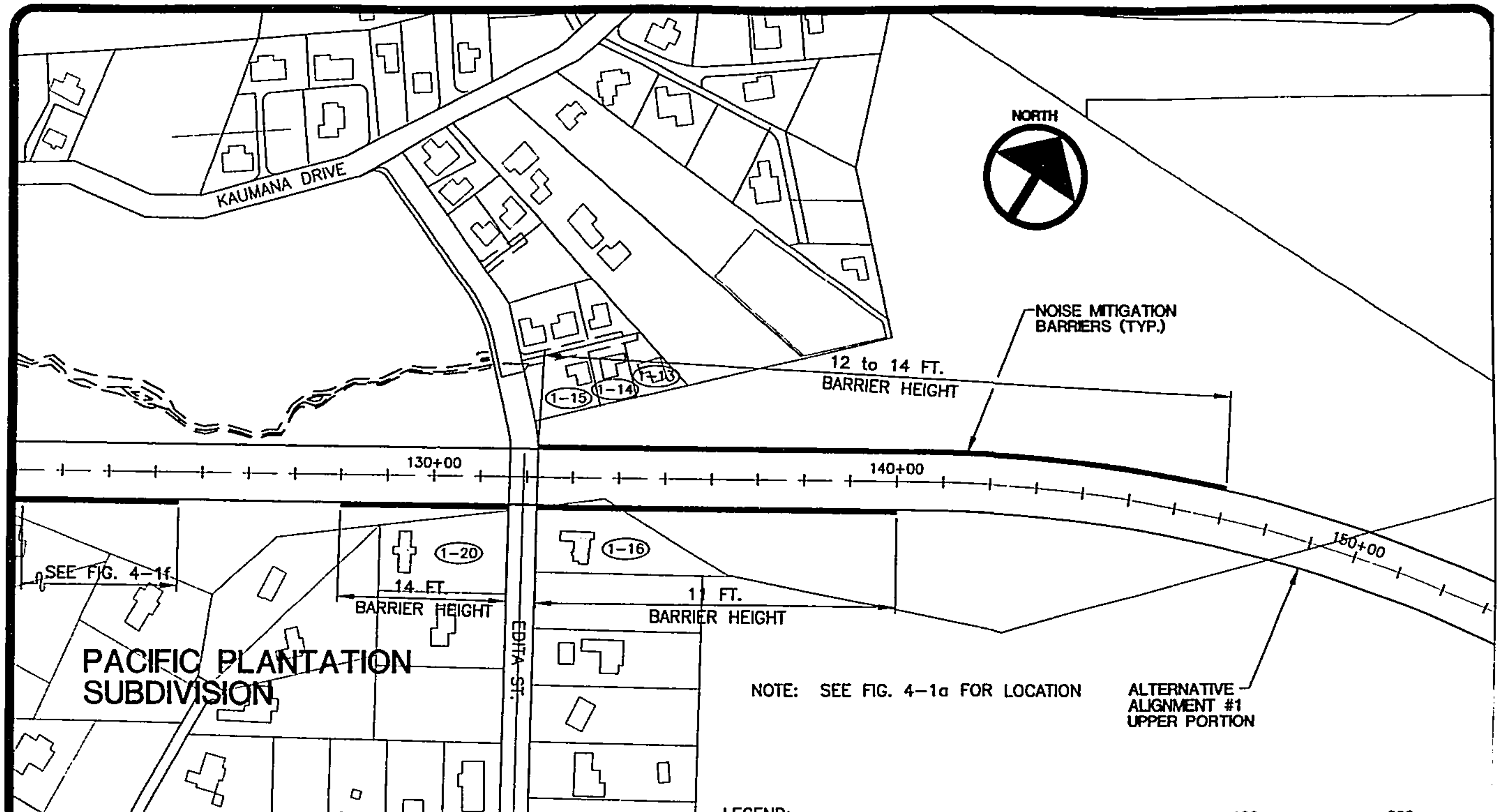
TITLE **NOISE IMPACTS & MITIGATION** KILAUEA AVE. TO WAIAKEA SCHOOLS	FIGURE 4–1b
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000


UPPER PORTION
LOWER PORTION
ALIGNMENT B LOWER PORTION
NOISE MITIGATION BARRIERS (TYP.)
NORTH
6 FT. WALL HEIGHT
KAWILI ST.
6 to 7 FT. BARRIER HEIGHTS
4 to 6 FT. BARRIER HEIGHTS
6 to 8 FT. BARRIER HEIGHTS
8 to 10 FT. BAR. HTS.
5 FT. BAR. HT.
EXISTING PUAINAKO ST.
KOMOHANA ST.
MILANI ST.
KAPUALANI ST.
WAINOHIA ST.
KUHILANI ST.
POHAKULANI ST.
IWALANI ST.
NOTE: SEE FIG. 4-1a FOR LOCATION
0 100 200
scale in meters
0 250 500
scale in feet
ALIGNMENT B
LEGEND:
NOISE IMPACTED STRUCTURE
A-43 NOISE IMPACTED PROPERTY IDENTIFICATION NUMBER
ALIGNMENT A LOWER PORTION
NOISE MITIGATION BARRIERS (TYP.)
6 FT. WALL HEIGHT
KAWILI ST.
6 to 8 FT. BARRIER HEIGHTS
9 to 11 FT. BAR. HEIGHTS
EXISTING PUAINAKO ST.
ALIGNMENT A
LEGEND
NOISE IMPACTED STRUCTURE
A-43 NOISE IMPACTED PROPERTY IDENTIFICATION NUMBER
TITLE
NOISE IMPACTS & MITIGATION
BYPASSES A & B
FIGURE
4-1c
PROJECT
PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII
DATE
2/03/2000



NOTE: SEE FIG. 4-1a FOR LOCATION

TITLE **NOISE IMPACTS & MITIGATION** UPPER PORTION TO SUNRISE ESTATES	FIGURE 4-1d
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000

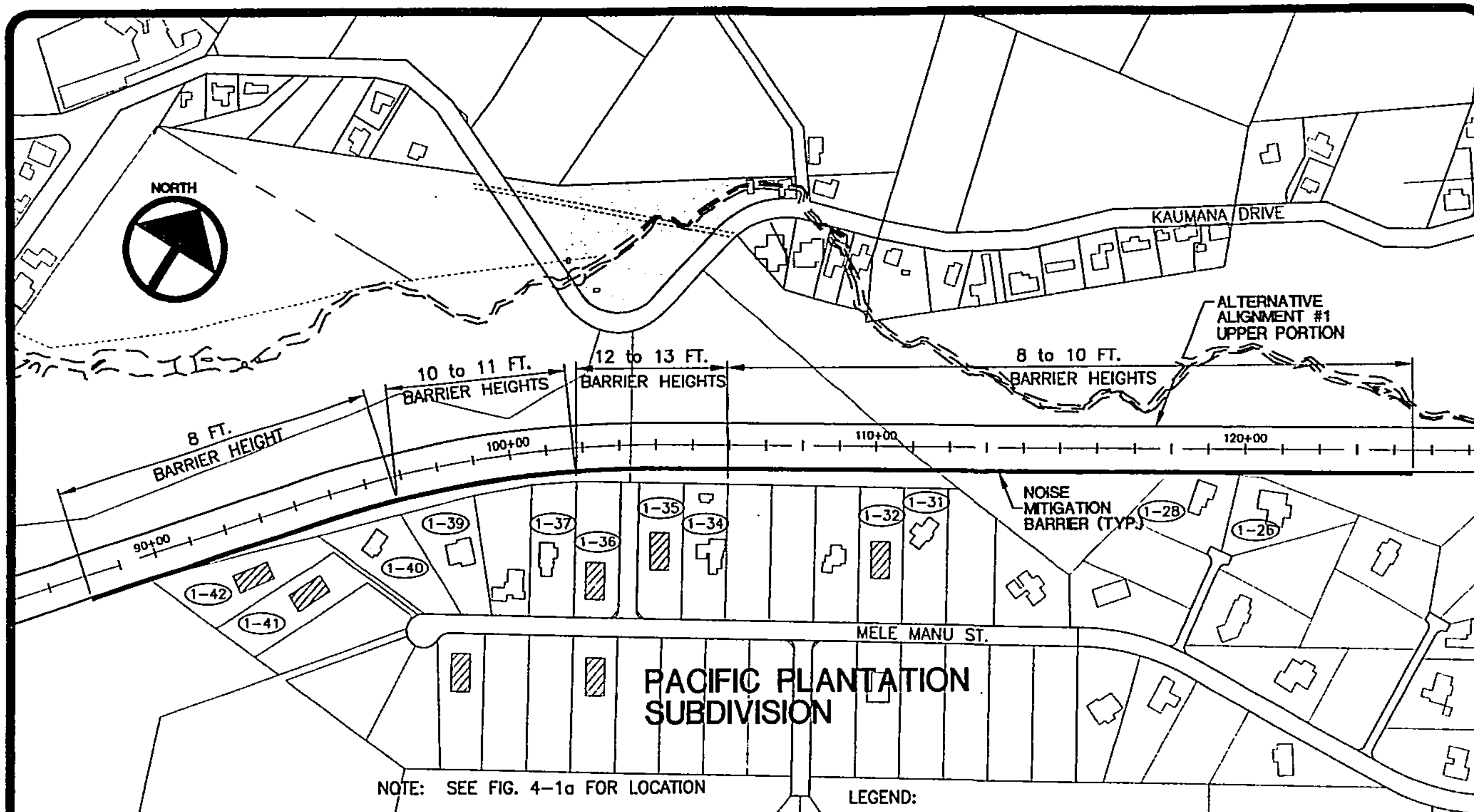


TITLE **NOISE IMPACTS & MITIGATION**
UPPER PORTION, ALIGNMENT 1 – EDITA ST. AREA

FIGURE 4-1e

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000



TITLE

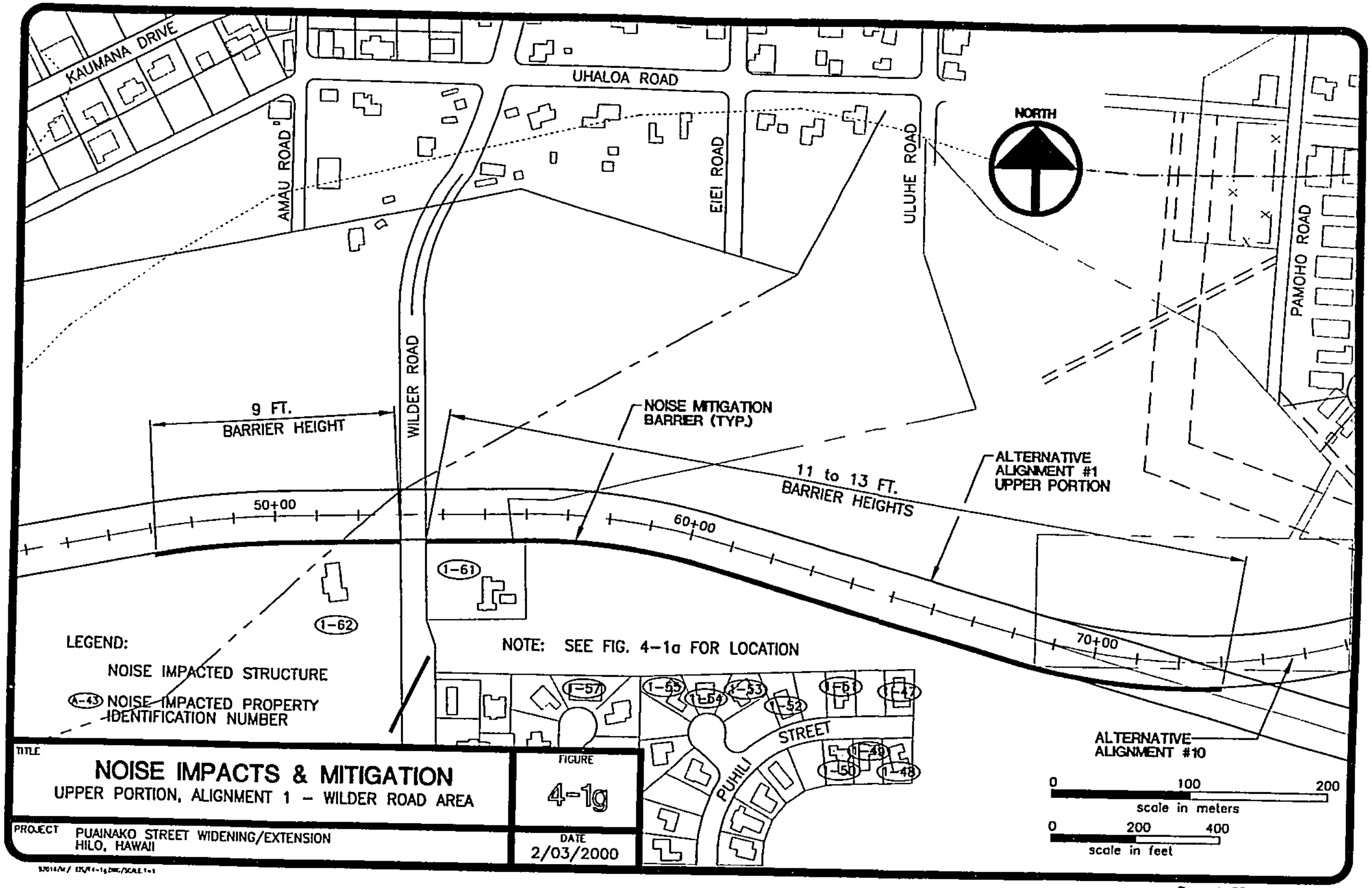
NOISE IMPACTS & MITIGATION

UPPER PORTION, ALIGNMENT 1 – PACIFIC PLANTATIONS

FIGURE 4-1f

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

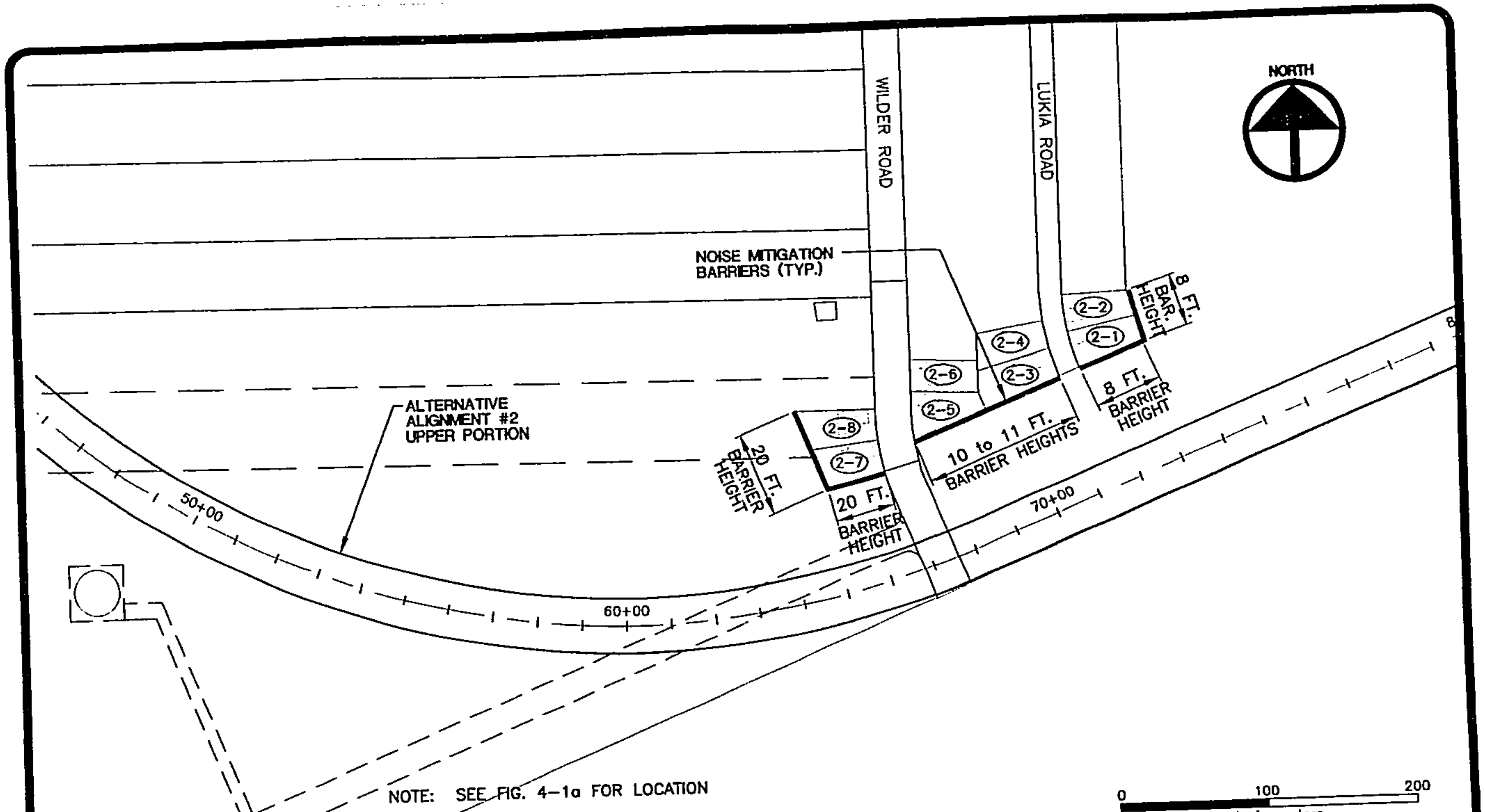


TITLE
NOISE IMPACTS & MITIGATION
UPPER PORTION, ALIGNMENT 1 – WILDER ROAD AREA

FIGURE 4-1g

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000



TITLE
NOISE IMPACTS & MITIGATION
UPPER PORTION, ALIGNMENT 2

FIGURE 4-1h

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

Table 4-6a
Noise Impacted Properties, Build Alternative, Kilauea Avenue to Waiakea Schools

TMK	Street Address	Property I.D.	Future Leq	Modeled Wall Height	Sound Level Reduction
2-2-39:58	22. W. Puainako St.	A-37	**66.5****	6.0-Foot wall*	-5.9 L_{eq}
2-2-39:11	1815 Kinoole St.	A-38	**66.5****	6.0-Foot wall*	-5.9 L_{eq}
2-2-39:11	1815 Kinoole St.	A-39	**66.4**	6.0-Foot wall*	-5.8 L_{eq}
2-2-39:31	1957 Kilauea Ave.	A-42	**67.6**	N/a	N/a
2-2-39:55	1975 Kilauea Ave.	A-41	**67.4**	N/a	N/a
2-2-39:84	1983 Kilauea Ave.	A-40	**68.3**	N/a	N/a
2-2-40:42	1842 Kinoole St.	A-43	**66.1**	6.0-Foot wall*	-6.8 L_{eq}

*Notes: Impact is defined as increase that at project year either: 1) approaches (defined as 66 L_{eq}) or exceeds FHWA NAC of 67 L_{eq} for residences, schools, churches, or similar land uses; or 2) equals or exceeds 15 dBA above existing noise levels. Levels constituting impacts are in boldface. See Figure 4-1a,b. N/a = not applicable (no mitigation proposed) * = Cost of mitigation exceeds guidelines and is not considered reasonable. ** Represents recalculated and reduced levels based on post-Draft EIS design changes.*

Table 4-6b
Noise Impacted Properties, Build Alternative, Alignment A Bypass Section

TMK	Street Address	Property I.D.	Future L_{eq}	L_{eq} Increase in Noise Level	Modeled Wall Height	Sound Level Reduction
UHH ASH (28 Units) 2-4-10:162	430 W. Kawili St.	A-36	64-66 (apprx.)	**+17-19 L_{eq} (approx.)**	6.0-foot wall	-8 to -10 L_{eq} (approx.)
2-4-01:125	308 W. Puainako St.	A-33	63.8	**+16.8 L_{eq}**	11.0 foot wall	-5.6 L_{eq}
2-4-01:126	312 W. Puainako St.	A-32	63.0	**+16.0 L_{eq}**	10.0 foot wall	-5.5 L_{eq}
2-4-01:127	316 W. Puainako St.	A-31	64.0	**+17.0 L_{eq}**	7.0 foot wall	-5.1 L_{eq}
2-4-01:128	320 W. Puainako St.	A-30	62.6	**+15.6 L_{eq}**	6.5-foot wall	-5.1 L_{eq}
2-4-01:129	324 W. Puainako St.	A-29	63.5	**+16.5 L_{eq}**	6.5-foot wall	-5.3 L_{eq}
2-4-01:130	328 W. Puainako St.	A-28	63.2	**+16.2 L_{eq}**	6.0-foot wall	-6.4 L_{eq}
2-4-01:131	330 W. Puainako St.	A-27	64.0	**+17.0 L_{eq}**	7.5-foot wall	-6.8 L_{eq}
2-4-01:132	334 W. Puainako St.	A-26	64.0	**+17.0 L_{eq}**	6.0-foot wall	-6.8 L_{eq}
2-4-01:133	338 W. Puainako St.	A-25	63.6	**+16.6 L_{eq}**	7.0-foot wall	-5.2 L_{eq}
2-4-01:134	342 W. Puainako St.	A-24	62.4	**+15.4 L_{eq}**	6.5-foot wall	-5.9 L_{eq}
2-4-01:135	344 W. Puainako St.	A-23	62.2	**+15.2 L_{eq}**	6.5-foot wall	-5.4 L_{eq}
2-4-01:136	348 W. Puainako St.	A-22	62.3	**+15.3 L_{eq}**	6.0-foot wall	-5.4 L_{eq}

Notes: Ambient noise assumed to be 47 L_{eq} at all lots. Impact is defined as increase that at project year either: 1) approaches (defined as 66 L_{eq}) or exceeds FHWA NAC of 67 L_{eq} for residences, schools, churches, or similar land uses; or 2) equals or exceeds 15 dBA above existing noise levels. Levels constituting impacts are in boldface. Heights of walls are above wall-base elevations along lot boundaries. Roadway Alignment B profile assumed for Alignment A. See Figure 4-1b.

Table 4-6c
Noise Impacted Properties, Build Alternative, Alignment B Bypass Section

TMK	Street Address	Property I.D.	Future L_{eq}	L_{eq} Increase in Noise Level	Modeled Wall Height	Sound Level Reduction
UHH ASH (28 Units) 2-4-10:162	430 W. Kawili Street	A-36	64-66 (approx.)	+17-19 L_{eq} (approx.)	6.0-foot wall	-8 to -10 L_{eq} (approx)
2-4-01:123	W. Puainako St	A-35	62.3	+15.3 L_{eq}	5.0 foot wall	-7.3 L_{eq}
2-4-01:124	W. Puainako St	A-34	65.1	+18.1 L_{eq}	10.0 foot wall	-5.0 L_{eq}
2-4-01:125	308 W. Puainako St.	A-33	66.1	+19.1 L_{eq}	10.0 foot wall	-5.0 L_{eq}
2-4-01:126	312 W. Puainako St.	A-32	66.5	+19.5 L_{eq}	9.0 foot wall	-5.2 L_{eq}
2-4-01:127	316 W. Puainako St.	A-31	66.2	+19.2 L_{eq}	7.0 foot wall	-5.5 L_{eq}
2-4-01:128	320 W. Puainako St.	A-30	66.3	+19.3 L_{eq}	6.5 foot wall	-5.9 L_{eq}
2-4-01:129	324 W. Puainako St.	A-29	66.3	+19.3 L_{eq}	6.5 foot wall	-5.6 L_{eq}
2-4-01:130	328 W. Puainako St.	A-28	66.5	+19.5 L_{eq}	6.5 foot wall	-6.2 L_{eq}
2-4-01:131	330 W. Puainako St.	A-27	66.5	+19.5 L_{eq}	7.5 foot wall	-5.2 L_{eq}
2-4-01:132	334 W. Puainako St.	A-26	66.6	+19.6 L_{eq}	6.5 foot wall	-6.8 L_{eq}
2-4-01:133	338 W. Puainako St.	A-25	67.6	+20.6 L_{eq}	6.5 foot wall	-6.1 L_{eq}
2-4-01:134	342 W. Puainako St.	A-24	67.2	+20.2 L_{eq}	6.5 foot wall	-7.3 L_{eq}
2-4-01:135	344 W. Puainako St.	A-23	66.9	+19.9 L_{eq}	6.0 foot wall	-6.7 L_{eq}
2-4-01:136	348 W. Puainako St.	A-22	66.5	+19.5 L_{eq}	6.0 foot wall	-6.1 L_{eq}
2-4-01:137	352 W. Puainako St.	A-21	66.4	+19.4L_{eq}	6.0 foot wall	-7.7 L_{eq}
2-4-01:138	356 W. Puainako St.	A-20	66.4	+19.4L_{eq}	7.0 foot wall	-6.2 L_{eq}
2-4-01:139	358 W. Puainako St.	A-19	66.7	+19.7 L_{eq}	7.5 foot wall	-5.7 L_{eq}
2-4-01:140	362 W. Puainako St.	A-18	66.6	+19.6 L_{eq}	7.5 foot wall	-6.5 L_{eq}
2-4-01:141	366 W. Puainako St.	A-17	66.5	+19.5 L_{eq}	7.5 foot wall	-7.0 L_{eq}
2-4-01:142	370 W. Puainako St.	A-16	66.1	+19.1 L_{eq}	5.5 foot wall	-7.9 L_{eq}
2-4-01:144	376 W. Puainako St.	A-15	67.6	+20.6 L_{eq}	4.0 foot wall	-7.8 L_{eq}
2-4-01:145	380 W. Puainako St.	A-14	68.2	+21.2 L_{eq}	4.0 foot wall	-7.0 L_{eq}
2-4-01:146	384 W. Puainako St.	A-13	68.2	+21.2 L_{eq}	4.0 foot wall	-7.9 L_{eq}
2-4-01:147	388 W. Puainako St.	A-12	68.3	+21.3 L_{eq}	4.0 foot wall	-7.4 L_{eq}
2-4-01:148	390 W. Puainako St.	A-11	67.9	+20.9 L_{eq}	4.0 foot wall	-6.6 L_{eq}
2-4-01:149	394 W. Puainako St.	A-10	67.0	+20.0 L_{eq}	4.0 foot wall	-6.8 L_{eq}
2-4-01:150	398 W. Puainako St.	A-9	66.3	+19.3 L_{eq}	5.5 foot wall	-6.4 L_{eq}
2-4-01:151	400 W. Puainako St.	A-8	66.5	+19.5 L_{eq}	6.5 foot wall	-6.0 L_{eq}
2-4-01:152	404 W. Puainako St.	A-7	66.5	+19.5 L_{eq}	6.5 foot wall	-6.3 L_{eq}
2-4-01:153	408 W. Puainako St.	A-6	66.5	+19.5 L_{eq}	7.0 foot wall	-5.5 L_{eq}
2-4-01:154	412 W. Puainako St.	A-5	66.2	+19.2 L_{eq}	6.5 foot wall	-5.9 L_{eq}
2-4-01:155	416 W. Puainako St.	A-4	66.0	+19.0 L_{eq}	6.5 foot wall	-5.7 L_{eq}
2-4-01:156	424 W. Puainako St	A-2	66.0	+19.0 L_{eq}	6.0 foot wall	-5.7 L_{eq}

Notes: Ambient noise assumed to be 47 L_{eq} at all lots. Impact is defined as increase that at project year either: 1) approaches (defined as 66 L_{eq}) or exceeds FHWA NAC of 67 L_{eq} for residences, schools, churches, or similar land uses; or 2) equals or exceeds 15 dBA above existing noise levels. All listed structures are private; no public-use or park lands are impacted. Heights of walls are above wall-base elevations along lot boundaries. See Figure 4-1c.

Table 4-6d
Noise Impacted Properties, Build Alternative, Alignment 1

TMK	Street Address	Property I.D.	Future L_{eq}	L_{eq} Increase in Noise Level	Modeled Wall Height	Sound Level Reduction
2-4-75:31	(no number) Puloku St	1-1	54.3	**+19.3 L_{eq}**	8.0 foot wall	-5.1 L_{eq}
2-4-75:35	513 Puloku St	1-2	59.4	**+24.4 L_{eq}**	8.0 foot wall	-7.5 L_{eq}
2-4-75:25	517 Puloku St	1-3	52.8	**+17.8 L_{eq}**	8.0 foot wall	-5.6 L_{eq}
2-4-75:24	541 Puloku St	1-4	52.8	**+22.7 L_{eq}**	8.0 foot wall	-5.8 L_{eq}
2-4-75:22	527 Puloku St	1-5	52.1	**+17.1 L_{eq}**	8.0 foot wall	-5.5 L_{eq}
2-4-75:20	517 Puloku St	1-6	52.4	**+17.4 L_{eq}**	8.0 foot wall	-5.9 L_{eq}
2-4-75:19	513 Puloku St.	1-7	52.6	**+17.6 L_{eq}**	8.0 foot wall	-5.3 L_{eq}
2-4-75:43	510 Puloku St	1-8	60.2	**+25.2 L_{eq}**	8.0 foot wall	-6.9 L_{eq}
2-4-75:44	504 Puloku St	1-9	58.0	**+23 L_{eq}**	10.0 foot wall	-5.0 L_{eq}
2-4-75:49	1070 Kukuau St.	1-10	50.4	**+15.4 L_{eq}**	8.0 foot wall	-5.1 L_{eq}
2-4-75:48	1072 Kukuau St.	1-11	51.0	**+16 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-4-75:47	1078 Kukuau St.	1-12	53.2	**+18.2 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-27:67	1265 K Kaumana Dr	1-13	59.7	**+17.7 L_{eq}**	8.0 foot wall	-5.0 L_{eq}
2-5-27:66	1265 L Kaumana Dr.	1-14	58.7	**+16.7 L_{eq}**	13.0 foot wall	-5.0 L_{eq}
2-5-27:65	1265 M Kaumana Dr.	1-15	58.9	**+16.9 L_{eq}**	14.0 foot wall	-5.0 L_{eq}
2-5-61:33	282 Edita St.	1-16	62.8	**+20.8 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-61:01	281 Edita St.	1-20	59.8	**+17.8 L_{eq}**	14.0 foot wall	-5.0 L_{eq}
2-5-61:19	1414 C Mele Manu St.	1-26	64.1	**+22.1 L_{eq}**	10.0 foot wall	-5.0 L_{eq}
2-5-61:20	1414 C Mele Manu St.	1-28	67.7	**+25.7 L_{eq}**	10.0 foot wall	-5.0 L_{eq}
2-5-61:43	1488 Mele Manu St.	1-31	59.4	**+17.4 L_{eq}**	8.0 foot wall	-5.5 L_{eq}
2-5-61:48	1540 Mele Manu St.	1-34	58.7	**+16.7 L_{eq}**	12.0 foot wall	-5.0 L_{eq}
2-5-61:49	(no number) Edita St.	1-35	57.7	**+15.7 L_{eq}**	13.0 foot wall	-5.0 L_{eq}
2-5-61:51	1540 Mele Manu St.	1-37	57.3	**+15.3 L_{eq}**	10.0 foot wall	-5.0 L_{eq}
2-5-61:53	1610 Mele Manu St.	1-39	58.9	**+16.9 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-61:54	1616 Mele Manu St.	1-40	62.6	**+20.6 L_{eq}**	8.0 foot wall	-7.2 L_{eq}
2-5-61:56	1628 Mele Manu St.	1-41	58.6	**+16.6 L_{eq}**	8.0 foot wall	-5.1 L_{eq}
2-5-61:55	1620 Mele Manu St.	1-42	63.6	**+21.6 L_{eq}**	8.0 foot wall	-6.1 L_{eq}
2-5-51:40	92 Puhili St.	1-47	61.5	**+22.5 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-51:41	91 Puhili St.	1-48	56.6	**+17.6 L_{eq}**	13.0 foot wall	-5.0 L_{eq}
2-5-51:42	93 Puhili St.	1-49	55.7	**+16.7 L_{eq}**	12.0 foot wall	-5.0 L_{eq}
2-5-51:43	97 Puhili St.	1-50	54.4	**+15.4 L_{eq}**	12.0 foot wall	-5.0 L_{eq}
2-5-51:38	98 Puhili St.	1-51	57.7	**+18.7 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-51:36	102 Puhili St.	1-52	56.0	**+17.0 L_{eq}**	12.0 foot wall	-5.0 L_{eq}
2-5-51:34	103 Puhili St.	1-53	56.0	**+17.0 L_{eq}**	12.0 foot wall	-5.0 L_{eq}
2-5-51:33	101 Puhili St.	1-54	55.2	**+16.2 L_{eq}**	12.0 foot wall	-5.0 L_{eq}
2-5-51:32	100 Puhili St.	1-55	54.5	**+15.5 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-51:14	101 Lukia St.	1-57	54.2	**+15.2 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-46-06	91 S. Wilder Rd.	1-61	61.4	**+22.4 L_{eq}**	12.0 foot wall	-5.0 L_{eq}
2-5-45-14	90 S. Wilder Rd.	1-62	64.3	**+25.7 L_{eq}**	9.0 foot wall	-5.0 L_{eq}

Notes: Ambient noise assumed to be 47 L_{eq} at all lots. Impact is defined as increase that at project year either: 1) approaches (defined as 66 L_{eq}) or exceeds FHWA NAC of 67 L_{eq} for residences, schools, churches, or similar land uses; or 2) equals or exceeds 15 dBA above existing noise levels. Levels constituting impacts are in boldface. All listed structures are private; no public-use or park lands are impacted. Heights of walls are above wall-base elevations along rights-of-way. See Figures 4-1c,d,e.

NOTE: Cost of mitigation exceeds guidelines for all impacted structures and is thus not considered reasonable.

Table 4-6e
Noise Impacted Properties, Build Alternative, Alignment 2

TMK	Street Address	Property I.D.	Future L_{eq}	L_{eq} Increase in Noise Level	Modeled Wall Height[1]	Sound Level Reduction
2-4-75:31	(no number) Puloku St.	1-1	54.3	**+19.3 L_{eq}**	8.0 foot wall	-5.1 L_{eq}
2-4-75:35	513 Puloku St	1-2	59.4	**+24.4 L_{eq}**	8.0 foot wall	-7.5 L_{eq}
2-4-75:25	517 Puloku St	1-3	52.8	**+17.8 L_{eq}**	8.0 foot wall	-5.6 L_{eq}
2-4-75:24	541 Puloku St	1-4	52.8	**+22.7 L_{eq}**	8.0 foot wall	-5.8 L_{eq}
2-4-75:22	527 Puloku St	1-5	52.1	**+17.1 L_{eq}**	8.0 foot wall	-5.5 L_{eq}
2-4-75:20	517 Puloku St	1-6	52.4	**+17.4 L_{eq}**	8.0 foot wall	-5.9 L_{eq}
2-4-75:19	513 Puloku St.	1-7	52.6	**+17.6 L_{eq}**	8.0 foot wall	-5.3 L_{eq}
2-4-75:43	510 Puloku St	1-8	60.2	**+25.2 L_{eq}**	8.0 foot wall	-6.9 L_{eq}
2-4-75:44	504 Puloku St	1-9	58.0	**+23 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-4-75:49	1070 Kukuau St.	1-10	50.4	**+15.4 L_{eq}**	11.0 foot wall	-5.1 L_{eq}
2-4-75:48	1072 Kukuau St.	1-11	51.0	**+16 L_{eq}**	8.0 foot wall	-5.0 L_{eq}
2-4-75:47	1078 Kukuau St.	1-12	53.2	**+18.2 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-49:33	201 Lukla St.	2-1	55.4	**+16.8 L_{eq}**	8.0 foot wall[1]	-7.8 L_{eq}
2-5-49:34	195 Lukia St.	2-2	54.0	**+15.4 L_{eq}**	8.0 foot wall	-5.2 L_{eq}
2-5-49:32	202 Lukia St.	2-3	55.6	**+17.0 L_{eq}**	8.0 foot wall	-9.7 L_{eq}
2-5-49:31	198 Lukia St.	2-4	54.0	**+15.5 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-49:04	205 S. Wilder Rd.	2-5	55.9	**+17.3 L_{eq}**	8.0 foot wall	-6.6 L_{eq}
2-5-49:05	201 S. Wilder Rd.	2-6	53.9	**+15.3 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-49:01	206 S. Wilder Rd.	2-7	56.5	**+17.9 L_{eq}**	8.0 foot wall	-6.8 L_{eq}
2-5-49:02	204 S. Wilder Rd.	2-8	54.9	**+16.3 L_{eq}**	20+ foot wall	-5.0 L_{eq}

[1] Wall heights are above estimated lot elevations.

Notes: Ambient noise assumed to be 38.6 L_{eq} at all lots. Impact is defined as increase that at project year either: 1) approaches (defined as 66 L_{eq}) or exceeds FHWA NAC of 67 L_{eq} for residences, schools, churches, or similar land uses; or 2) equals or exceeds 15 dBA above existing noise levels. Levels constituting impacts are in boldface. All listed structures are private; no public use or park lands are impacted. See Figures 4-1c,f.

NOTE: Cost of mitigation exceeds guidelines for all impacted structures and is thus not considered reasonable.

Table 4-6f
Noise Impacted Properties, Build Alternative, Alignment 10

TMK	Street Address	Property I.D.	Future L_{eq}	L_{eq} Increase in Noise Level	Modeled Wall Height[1]	Sound Level Reduction
2-4-75:31	(no number) Puloku St.	1-1	54.3	**+19.3 L_{eq}**	8.0 foot wall	-5.1 L_{eq}
2-4-75:35	513 Puloku St.	1-2	59.4	**+24.4 L_{eq}**	8.0 foot wall	-7.5 L_{eq}
2-4-75:25	517 Puloku St.	1-3	52.8	**+17.8 L_{eq}**	8.0 foot wall	-5.6 L_{eq}
2-4-75:24	541 Puloku St.	1-4	52.8	**+22.7 L_{eq}**	8.0 foot wall	-5.8 L_{eq}
2-4-75:22	527 Puloku St.	1-5	52.1	**+17.1 L_{eq}**	8.0 foot wall	-5.5 L_{eq}
2-4-75:20	517 Puloku St.	1-6	52.4	**+17.4 L_{eq}**	8.0 foot wall	-5.9 L_{eq}
2-4-75:19	513 Puloku St.	1-7	52.6	**+17.6 L_{eq}**	8.0 foot wall	-5.3 L_{eq}
2-4-75:43	510 Puloku St.	1-8	60.2	**+25.2 L_{eq}**	8.0 foot wall	-6.9 L_{eq}
2-4-75:44	504 Puloku St.	1-9	58.0	**+23 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-4-75:49	1070 Kukuau St.	1-10	50.4	**+15.4 L_{eq}**	11.0 foot wall	-5.1 L_{eq}
2-4-75:48	1072 Kukuau St.	1-11	51.0	**+16 L_{eq}**	8.0 foot wall	-5.0 L_{eq}
2-4-75:47	1078 Kukuau St.	1-12	53.2	**+18.2 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-51:40	92 Puhili St.	1-47	61.5	**+22.5 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-51:41	91 Puhili St.	1-48	56.6	**+17.6 L_{eq}**	13.0 foot wall	-5.0 L_{eq}
2-5-51:42	93 Puhili St.	1-49	55.7	**+16.7 L_{eq}**	12.0 foot wall	-5.0 L_{eq}
2-5-51:43	97 Puhili St.	1-50	54.4	**+15.4 L_{eq}**	12.0 foot wall	-5.0 L_{eq}
2-5-51:38	98 Puhili St.	1-51	57.7	**+18.7 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-51:36	102 Puhili St.	1-52	56.0	**+17.0 L_{eq}**	12.0 foot wall	-5.0 L_{eq}
2-5-51:34	103 Puhili St.	1-53	56.0	**+17.0 L_{eq}**	12.0 foot wall	-5.0 L_{eq}
2-5-51:33	101 Puhili St.	1-54	55.2	**+16.2 L_{eq}**	12.0 foot wall	-5.0 L_{eq}
2-5-51:32	100 Puhili St.	1-55	54.5	**+15.5 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-51:14	101 Lukia St.	1-57	54.2	**+15.2 L_{eq}**	11.0 foot wall	-5.0 L_{eq}
2-5-46-06	91 S. Wilder Rd.	1-61	61.4	**+22.4 L_{eq}**	12.0 foot wall	-5.0 L_{eq}
2-5-45-14	90 S. Wilder Rd.	1-62	64.3	**+25.7 L_{eq}**	9.0 foot wall	-5.0 L_{eq}

[1] *Wall heights are above estimated lot elevations.*

Notes: Ambient noise assumed to be 38.6 L_{eq} at all lots. Impact is defined as increase that at project year either: 1) approaches (defined as 66 L_{eq}) or exceeds FHWA NAC of 67 L_{eq} for residences, schools, churches, or similar land uses; or 2) equals or exceeds 15 dBA above existing noise levels. Levels constituting impacts are in boldface. All listed structures are private; no public use or park lands are impacted. See Figures 4-1c,f.

NOTE: Cost of mitigation exceeds guidelines for all impacted structures and is thus not considered reasonable.

4.1.6.2 Comparison Among Alternatives (Including Mitigation)

No-Build Alternative

If Puainako Street is not widened and/or re-routed behind the State Housing Project above Kawili Street, increasing traffic would generate elevated noise levels. The noise model calculated a potential increase of 1.4 to 3.3 dBA L_{eq} (abbreviated hereafter L_{eq}) for most locations along Puainako Street. Because increasing congestion would result in slower traffic movement, actual increases during peak traffic may not be this large. However, off-peak noise levels may increase at this magnitude. As many as one hundred homes would be affected to some degree. At least 25 homes and 1 church would be impacted such that noise would approach or exceed the 67 L_{eq} Noise Abatement Criteria (NAC) (Table 4-5).

Noise levels in the areas proposed to be traversed by Alignments 1, 2 and 10 in the Upper Portion would remain similar to current levels. However, noise levels at several hundred homes on the existing Kaumana Drive, although not modeled as part of the study, would increase under the No-Build Alternative. This would occur because if the Project is not built, traffic is expected to triple on this section of Kaumana Drive by the year 2020. It is likely that a large portion of the several hundred homes along Kaumana Drive would experience noise levels approaching or exceeding 67 L_{eq} under the No-Build Alternative.

Importantly, none of the homes or lots that would come to be impacted by increasing traffic levels would be eligible for mitigation measures under the No-Build Alternative. Therefore, these increases would not be mitigated unless private owners undertook their own measures, such as building sound barrier walls, or unless separate road improvement projects undertaken by the State or County incorporated noise mitigation measures.

Build Alternative: Lower Portion East of Kawili Street

Widening of Puainako Street east (makai) of Kawili Street would also increase noise by approximately 3.0 to 4.2 L_{eq} above current levels. This increase would approach or exceed 67 L_{eq} at four homes, three church buildings, and two other public use (Salvation Army) structures (Table 4-6a and Fig. 4-1a). Consultation with the Salvation Army management has determined that these buildings are not noise-sensitive, and therefore are not considered impacted.

At the homes on Kilauea Avenue (Fig. 4-1b), there is no design for noise mitigation walls that could reduce noise levels by at least 5.0 L_{eq} without also eliminating the access to the homes. No feasible and reasonable mitigation noise measure would be effective here, and none is proposed. As illustrated in Fig. 4-1b, the original noise analysis determined that two traffic noise barriers 1.8 m (6.0 ft) high with a total length of approximately 245 m (800 ft.) would be capable of reducing sound levels by at least 5.0 L_{eq} at the impacted properties - three church buildings and one home - near the intersection of Puainako and Kinoole Streets. However, with a total cost of \$172,000, the average cost per benefited structure of \$43,000 would exceed the cost limit of "reasonable" mitigation measures, which according to State DOT policy is \$35,000 per protected structure. Furthermore, access considerations make the walls near Kinoole Baptist Church infeasible. Therefore, the Draft EIS stated that no feasible and reasonable mitigation noise measure would be effective here, and none is proposed. The Draft EIS stated that a final decision on the installation of these mitigation measures would be made upon completion of project design and the public involvement process. If during final design conditions substantially change, these mitigation measures may be reconsidered.

After publication of the Draft EIS, the board and various members of the Kinoole Baptist Church raised objections in comment letters to the finding that because noise mitigation walls that could reduce sound levels by at least 5.0 L_{eq} were judged to cost greater than $35,000 (and were in any case infeasible because of access considerations), no noise mitigation measures would be offered to the Church (see Appendix A3 for comment letters). Additionally, they expressed concern that the combination of loss of parking, decrease in circulation efficiency and noise impacts would combine to render the church unusable. In response to these concerns, the project sponsor agencies attempted to reduce impacts to the greatest extent practicable and explore alternative mitigation. A redesign of the highway between Kinoole Street and Kilauea Avenue shifted the travel lanes about 2 m (6 ft.) to the south. Combined with a redesign of the sidewalk, this shifted the traffic lane nearest the church about 3 m (10 ft.) further away. This redesign reduced the level of noise to 66.4 L_{eq} at the main chapel and to 66.5 L_{eq} at the side building (Receptors A-39 and A-38, respectively, on Fig. 4-1b – see Appendix K2 for noise calculation results). However, because this level approaches or exceeds the 67 L_{eq} criterion, a noise impact still occurs. Therefore, alternative mitigation was explored. The FHWA and HDOT are in the process of revising their policy regarding the cost level at which mitigation for noise impacts is considered reasonable for non-profit institutional structures. These agencies adopted a model developed by the Florida Department of Transportation that redefines "reasonable" costs in terms of the amount, nature and timing of use a structure receives, in recognition that public use structures may involve far greater number people/hours than residences. This model has been applied to Kinoole Baptist Church (see Appendix K2). The result is that noise reduction measures costing more than $35,000 (up to a ceiling of $290,500), such as sound-proofing and air-conditioning, may be considered reasonable. Although the actual cost of sound-proofing and air-conditioning has not been calculated, these measures are estimated to cost less than the specified ceiling. Therefore, based on cost, sound reduction and other factors, noise mitigation measures for the Kinoole Baptist Church would appear to be reasonable and feasible, and they are expected to be built, or to be considered as part of damages to the church as part of the right-of-way acquisition procedure, if a Build Alternative is selected. 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, these mitigation measures may not be provided.

The grounds at Waiakea Intermediate and Elementary Schools would experience an increase in noise because of increased traffic and a shorter setback distance to Puainako Street. However, the 66 L_{eq} contour is expected to be at approximately 12 m (40 ft.) from the street centerline; i.e., near the sidewalk. The nearest structure is found at approximately 31 m (100 ft.) from the new centerline, while most of the structures would be considerably more distant. Therefore, no noise impacts are expected at the schools.

Build Alternative: Alignment A vs. B

Re-routing Puainako Street between Kawili Street and Komohana Street would raise noise levels at the backyards of homes on the existing Puainako Street and lower noise levels in the front yards. Noise levels at the University of Hawaii Adult Student Housing (ASH) would increase.

As shown in Table 4-6c, the construction of Alignment B would cause noise impacts at 61 homes, including 28 apartment units at ASH housing. Construction of Alignment A would result in impacts at 40 residences, including 28 apartment units at ASH housing (Table 4-6b).

If Alignment B is selected, as illustrated in Fig. 4-1c, a series of five noise barrier mitigation walls varying between 1.3 and 2.4 m (4.0-8.0 ft) in height and totaling approximately 800 m (2,600 ft.) in length would be capable of reducing sound levels by at least 5.0 L_{eq} at all noise-impacted properties. The total cost of noise mitigation would be approximately $710,100, with an average cost per benefited structure of $11,640. Based on cost, sound reduction and other factors, the use of noise mitigation barriers for Alignment B would appear to be reasonable and feasible, and they are expected to be built if this Alignment is selected. 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, these mitigation measures may not be provided.

Because Alignment A veers away from the row of houses in this area, its selection would reduce the number of residences impacted by noise to 40 (Table 4-6b). Construction of approximately 250 m (800 ft) of walls 1.8-2.4 m (6.0-8.0 ft) in height, as illustrated in Fig. 4-1c, would reduce sound levels by at least 5.0 L_{eq} at all noise-impacted properties. The total cost of noise mitigation for Alignment A would be approximately $353,000, with an average cost per benefited structure of $8,820. Based on cost, sound reduction and other factors, the use of noise mitigation barriers for Alignment B would appear to be reasonable and feasible, and they are expected to be built if this Alignment is selected. 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, these mitigation measures may not be provided.

Whether Alignment A or Alignment B is selected, the visual impact of noise barrier walls in this section would be minimal. The walls could easily be hidden from the view of motorists through landscaping on the edge of the right-of-way inside the noise walls.

It is noteworthy that after mitigation of noise impacts, overall noise levels to homes on Puainako Street between Kawili and Komohana Streets would decrease, no matter which alignment is chosen. The existing Puainako Street would become a minor feeder road with light traffic. The greatest benefit would be to the four dozen homes on the south side of existing Puainako Street.

Build Alternative: Upper Portion: Alignment 1 vs. 2 vs. 10:

Alignment 1 would result in increased traffic noise at existing residences northeast of the Edita Street crossing, Uhaloa Road cul-de-sac, south of Wilder Road crossing, at existing and future residences of the new Pacific Plantation Subdivision, and at future residences of the upper portion of Sunrise Estates

Subdivision (Table 4-6d). Although future traffic noise levels are not expected to approach or exceed 67 L_{eq}, increases in background ambient noise levels due to the new roadway are predicted to exceed the State DOT "15 dBA" increase criterion in these areas. A total of 39 homes would be impacted.

The noise analysis concluded that noise barrier walls of 1.8-2.4 m (6.0-8.0 ft) could not achieve a substantial reduction (i.e., greater than 5.0 L_{eq}) at most of the impacted homes. Walls between 2.8 to 4.3 m (9.0 and 14.0 ft.) would be required to meet this goal (Table 4-6d and Fig. 4-1d-g). The total cost of noise mitigation barriers required to reduce noise levels 5.0 L_{eq} or more for Alignment 1 would be approximately $3,651,900. The average cost per benefited structure is $93,640. Because the cost greatly exceeds $35,000 per residence, the use of noise mitigation barriers in this section does not appear to be reasonable and feasible, and they are not expected to be built if Alignment 1 is selected. A final decision on the installation of these mitigation measures will be made upon completion of project design and public involvement.

On Alignment 2, the Project would increase noise levels more than 15 dBA L_{eq} at 20 existing residences at the south end of Wilder Road and at Sunrise Estates subdivision (the common portion with Alignment 1) (Table 4-6e and Fig. 4-1d & h). Adverse noise impacts are less than those along Alignment 1 due to the much larger setback from existing and planned residences.

The total cost of noise mitigation barriers required to reduce noise levels 5.0 L_{eq} or more for Alignment 2 would be approximately $1,343,100 (excluding the common portion with Alignment 1, which is discussed above). The average cost per benefited structure is $67,150. Because the cost greatly exceeds $35,000 per residence, the use of noise mitigation barriers in this section does not appear to be reasonable and feasible, and they are not expected to be built if Alignment 2 is selected. A final decision on the installation of these mitigation measures will be made upon completion of project design and the public involvement process.

On Alignment 10, the Project would increase noise levels more than 15 dBA L_{eq} at 24 existing residences at the north end of Wilder Road and at Sunrise Estates subdivision (the common portion with Alignment 1) (Table 4-6f and Fig. 4-1d & g). Adverse noise impacts are less than those along Alignment 1 due to the much larger setback from existing and planned residences.

The total cost of noise mitigation barriers required to reduce noise levels 5.0 L_{eq} or more for Alignment 10 would be approximately $1,778,700 (excluding the common portion with Alignment 1, which is discussed above). The average cost per benefited structure is $74,100. Because the cost greatly exceeds $35,000 per residence, the use of noise mitigation barriers in this section does not appear to be reasonable and feasible, and they are not expected to be built if Alignment 10 is selected. A final decision on the installation of these mitigation measures will be made upon completion of project design and the public involvement process.

4.2 Biological Environment

4.2.1 Flora and Plant Communities

4.2.1.1 Impacts

Construction of this project would result in the unavoidable destruction of some or all the existing vegetation within the right-of-way. However, the flora and vegetation of the project area were found to have minimal conservation value for the following reasons:

- No plant species listed as threatened or endangered, or proposed for listing, by the U.S. Department of the Interior or the State of Hawaii, are known to occur in the project area (see App. A1 for coordination letters with USFWS);
- No unique or high-diversity native plant communities occur in the project area; and
- Construction of this project would not eliminate any plant community type from the region. Therefore, it is concluded that the impact on native species and vegetation is minor.

Construction and operation of this project may lead to the spread of alien plant species along the right-of-way. Some of these species may invade and degrade native plant communities along the right-of-way. This impact is considered to be negligible because most of the native vegetation has already been degraded by alien plant invasion and because the vegetation has little conservation value for the reasons listed in the above paragraph.

4.2.1.2 Comparison Among Alternatives

No-Build Alternative

The No-Build Alternative would avoid disturbance to all plants and vegetation communities found within the proposed road corridors.

Build Alternatives

The Lower Portion contains little native vegetation in either alignment, although some native plants are present. No communities were found that merit high priority for protection on the basis of uniqueness, although all three alignments in the Upper Portion have areas with viable native plant communities. Of the three proposed alignments, Alignment 1 would displace the greatest extent of native vegetation (3,380 linear meters/1100 feet), all of it on the 1881 lava flow. Alignments 2 and 10 would disturb somewhat lesser extents (2,580 m/8,400 ft. and 2,490 m/8,100 ft., respectively). Therefore, selecting Alignment 10 would have the least adverse direct impact on native vegetation. It should be noted that these communities are remnants of native ecosystems near the outskirts of the Hilo urban area or may be former agricultural lands reclaimed by native species. Although it might be desirable from a landscape conservation perspective to maintain some areas of native ecosystem near Hilo, these lands do not appear to be strong candidates for conservation protection, because most of these areas are privately owned and currently zoned for agriculture or development, rather than conservation.

~~Native vegetation of varying quality covers part of both proposed alignments in the Upper Portion. Because of low species diversity and a lack of rare plants or unique character, these plant communities are judged to have no special conservation value. Alignment 1 supports slightly more early succession 'Ohi'a/Uluhe Fern Forest that is nearly free of alien species than Alignment 2. However, Alignment 2 has somewhat higher diversity of vegetation types and species. Given that the value of this vegetation is judged to be unimportant on a regional scale, no recommendation of alignments based on vegetation character is justified.~~

Natural vegetation along the portion of Alignment 1 has potential habitat value for organisms inhabiting Kaumana Cave. Impacts to this vegetation and mitigation are discussed in Section 4.2.3, below.

4.2.1.3 Mitigation

Even alien-dominated vegetation without conservation value for native flora or fauna may have general resource value for other purposes, such as controlling erosion, aesthetics/open space, and microclimatic cooling effects.

Special Contract Requirements that will be incorporated into the construction-contract documents will specify that vegetation will be left undisturbed adjacent to the right-of-way to the greatest extent practicable.

4.2.2 Wetlands

4.2.2.1 Overview of Impacts

A detailed discussion of wetlands delineation, distribution and function is contained in Section 3.2.2.1 To reiterate, Alignment A contains a tiny wetland of approximately 2 m^2 (20. $ft.^2$); Alignment B contains no wetlands; Alignment 1 contains four discrete wetlands totaling 3,442 m^2 (36,366 $ft.^2$); Alignment 2 contains isolated pockets estimated to total 32,568 m^2 (344,000 $ft.^2$); and Alignment 10 contains ten wetlands totaling 1,669 m^2 (17,630 $ft.^2$). Any Build Alternative would involve disturbance to wetlands, including filling wetlands with road-building materials and directing flow through culverts.

In addition to assessing the area of fill, impacts to wetlands functions and values are considered. *Biological* functions and values considered are conservation of native plants, animals or ecosystems. Conservation of habitat for alien organisms or habitat for such is not considered a biological function, as most alien organisms adversely impact native ecosystems, which are under severe stress in Hawaii. *Hydrological* functions include flood-storage capacity, erosion control, and the capacity of wetlands to filter sediment, nutrients, and other pollutants, thereby protecting surface waters and groundwater. *Other functions* supplied by wetlands (regardless of whether they are dominated by native or alien components) are open-space, scenery, and recreation (including habitat for edible species).

1 See Section 3.2.2 for a discussion of the NEPA-404 MOU process and the revision of the approach to wetlands taken in the Draft EIS. Note that only the revised version is presented in the Final EIS – see end of Appendix B2 for superseded section.

In general, there is little if any biological function accomplished by any of the wetlands potentially affected by the project. Impacts to biological functions from the Project would therefore be minimal. In many areas the wetlands themselves are products of human or feral animal disturbance, but in others they are naturally occurring elements within the native forest community. Overall, the wetlands are dominated by alien plants, in most cases to a far greater degree than the upland areas surrounding them. The plants that grow in the wetlands are either species that occur in the surrounding communities on drained soils (e.g. 'ohi'a, waiawi, California grass, Wainaku grass) or are ubiquitous, pan-tropical species (e.g., spikerush and kamole). No native aquatic organisms are present, and the wetlands do not appear to provide special habitat for native birds. In general, no important biological functions or values would be impacted by filling associated with the project.

With the exception of W-3 (which may perform a flood storage function, and is discussed in the context of the comparison of Upper Portion alignments, below), the project area wetlands all perform the same minor hydrological functions. These small, depressional wetlands, isolated from other surface water bodies, retain a small amount of rainfall, may slow overland runoff and may allow some sedimentation. Even these small effects are likely to have little influence on surface water quality because drainageways in this watershed are poorly developed and no surface water bodies flow out of the project area. Similar small wetlands are abundant outside the proposed alignments, and no loss of hydrological function would occur as a result of fill in any of these wetlands.

Some of the wetlands may provide habitat for introduced invertebrates, amphibians and fish, possibly including edible species such as Tahitian prawns, although much better habitat for such species exists in streams. Since similar wetlands and better habitat for these alien aquatic species are available elsewhere, little impact would be experienced as a result of wetlands fill from the Project. The variation in vegetation form and appearance that the open wetland areas provide produces interest in the landscape, which is otherwise mostly forested. As similar wetlands and other vegetation with a similar open appearance is abundant in the general area, no appreciable loss of this open space function would occur.

4.2.2.2 Comparison Among Alternatives

No-Build Alternative

The No-Build Alternative would avoid disturbance to any wetland within the proposed road corridors.

Build Alternative: Lower Portion: Alignment A vs. B

Alignment A would fill approximately 2 m^2 (20 $ft.^2$) of wetlands. No wetlands occur within Alignment B. No appreciable loss of wetlands functions and values would occur as a result of the fill.

Build Alternative: Upper Portion: Alignment 1 vs. 2 vs. 10

Alignment 1 contains four discrete wetlands totaling 3,442 m^2 (36,366 $ft.^2$); Alignment 2 contains scattered pockets of estimated to total 32,568 m^2 (344,000 $ft.^2$); and Alignment 10 contains ten wetlands totaling 1,669 m^2 (17,630 $ft.^2$).

In general, the impacts to functions and values would be relatively small regardless of alternative. In terms of biological functions and values, the low biological value of the wetlands does not justify choosing an alignment based on wetland biological function. This is especially true considering that in this project area, the plant communities surrounding the wetlands are often of higher biological function and value than the wetland inclusions.

Hydrologically, there is little difference in function among the various alignments. Most impound very small amounts of water, typically under 1,000 m^3 (36,000 $ft.^3$), which in the context of the precipitation and flow in the area is negligible. The exception is W-3, which is contained on Alignment 1 only. This large grassy opening, averaging over a meter (3 feet) in depth, contains a total area of about 21,000 m^2 (221,850 $ft.^2$), of which 2,474 m^2 (26,136 $ft.^2$) is within the study corridor. A potential hydrological function of this wetland is temporary water storage and sedimentation. This depressional wetland receives precipitation and overland water moving through a surface drainageway indicated by the flood zone map. The wetland *may* also function as part of floodplain and water storage when discharge of intermittent drainage exceeds capacity during high rainfall, although any connection of this wetland to the drainage is not confirmed. The water storage capacity of the entire wetland has been estimated as 30,500 m^3 (1,089,000 $ft.^3$). Assuming a connection between this drainage and the wetland, this capacity would delay peak flooding of the 100-year flood by 213 seconds, and would contain the full discharge of the 10 year flood for 307 seconds. This delay would be of very minor benefit during a flooding event, which would typically last hours or days. Furthermore, the drainage disappears underground a short distance downslope, reducing any function (and the importance of any potential adverse effects filling the wetland would have upon it) in flood retention or surface water quality filtering. Again, there is little justification for selecting an alignment based on minimization of loss to hydrologic functions and value.

In terms of other functions and values, losses would be similar (and minor) with any alignment.

The most important difference among the alternative alignments is the *size* of the total area of wetlands fill. The fill area for Alignment 2, at 32,568 m^2 (344,000 $ft.^2$), is almost ten times as large as that of Alignment 1, which in turn is over twice as large as that of Alignment 10, with 1,669 m^2 (17,630 $ft.^2$).

4.2.2.3 Mitigation

Construction of any Build Alternative would require a Department of the Army Permit for Dredge and Fill in the Waters of the United States. Although the project was initially granted a provisional Nationwide Permit No. 26 for the construction of Alignments A and 1 on September 10, 1996, this permit has elapsed. The Nationwide Permit has itself been discontinued. In any case, the LEDPA, which is normally the only alternative that is advanced for consideration of a permit, now involves the combination of Alignments B and 10. The permit is being sought concurrently with the filing of this Final EIS. The following mitigation measures, which have received preliminary agreement from the NEPA 404 partner agencies (see App. A5 for coordination letters), have been proposed as part of the permit:

- Obtain a Section 401 Water Quality Certification or waiver thereof from the Hawaii State Department of Health;
- Provide adequate drainage through the wetland areas, including culverts in selected wetlands as determined in final design;
- Road runoff will be collected in roadside ditches and drainage structures and disposed of by infiltrating it into the ground through drywells, ensuring that any increase of storm runoff due to greater impermeable surface will be contained onsite and that groundwater recharge will occur;
- Significant earth-moving activities will occur only during periods of no or low rainfall; the County of Hawaii will make every effort to conduct construction activities during the "dry season" (May through September);
- Construction activities will be conducted in a manner as to minimize and control erosion and sedimentation;
- All fill and other construction material will be clean, uncontaminated and free of deleterious substances, including toxic chemical, debris and fine grained material;
- Particular care will be taken to ensure that no petroleum products, trash or other debris enter the water;
- No construction or excavated materials will be stockpiled in the aquatic environment.
- The Project will provide $110,250 in funding to the National Park Service for a wetlands enhancement project. The funding will be applied to the efforts of the Olaa-Kilauea Partnership (OKP) Wetland Restoration Project, which is currently being undertaken by a partnership of federal and state agencies in the region. A Memorandum of Understanding (MOU) is under development and will be signed by all participating agencies as part of the Record of Decision (see Appendix N for Interim Project Description and location map). This MOU will outline the structure of the fund, the estimated costs and proposed implementation schedule of the project, and the responsibilities of all participating agencies. The project has as its goals the protection and partial restoration of portions of 22 ha (55 ac.) of wetlands in the Mauna Loa Boy's School area of Kulani Correctional Facility (portions of TMKs 2-4-008: 001 & 009) to enhance the long-term survival of native plant and animal communities and recover rare and endangered species. Specifically, the project involves the following components: a) *Fencing and Feral Animal Control*: Construct a fenced management unit to protect wetlands from ungulates (pigs, mouflon sheep and goats), and inspect and maintain fences and remove ungulates from the fenced unit; b) *Propagation and Outplanting*: Propagate native plants for outplanting in protected wetlands to restore wetland species composition and function, and monitor the survival and reproduction of outplanted plants to provide guidance for future management; c) *Alien Plant*

Control: Determine and implement effective methods to control invasive non-native plants in the wetlands; and d) *Monitoring and Mitigation Success Evaluation:* The success of the mitigation will be judged by the OKP partners jointly with the U.S. Army Corps of Engineers through monitoring of the wetlands species composition and ecosystem health before mitigation is applied and at specified intervals afterwards.

4.2.2.4 Least Environmentally Damaging Practicable Alternative

Based on the alternative analysis developed as part of the NEPA 404 MOU process (see Appendices A1, A3 and A5 for agency correspondence and documentation), a Least Environmentally Damaging Practicable Alternative (LEDPA) was determined.

Briefly, the No-Build Alternative would avoid all disturbance to wetlands. However, this alternative was rejected because it would not accomplish the project purpose and need. Of the Build Alternatives in the Upper Portion, Alignment 10 offered by far the least area of wetlands fill, with only 1,669 m^2 (17,630 $ft.^2$), as compared to 3,442 m^2 (36,366 $ft.^2$) for Alignment 1 and 32,568 m^2 (344,000 $ft.^2$) for Alignment 2. No substantial differences exist with respect to functions and values among the alignments, all of which cause very minor adverse effects. Therefore, it was unanimously agreed by all participatory agencies in the NEPA 404 MOU process that Alignment 10 represents the LEDPA for the Project (see letters at end of Appendix A5 for agency comments on LEDPA).

4.2.2.5 No Practicable Alternative Finding

Executive Order 11990 (and 23 CFR 771.126(a)(1)) state that it is federal policy to avoid long and short-term adverse impacts associated with the destruction or modification of wetlands, and to avoid direct and indirect support of new construction in wetlands where there is a practicable alternative. The Order further directs federal agencies to avoid undertakings in wetlands unless the head of the agency finds that there is no practicable alternative to such construction, and that the proposed action includes all practicable mitigation measures to minimize harm to wetlands which may result from such use. In the case of the Project, no Build Alternative capable of fulfilling the Project's purpose and need can avoid wetlands, as isolated patches of wetlands are an integral part of the landscape in all areas through which the highway could reasonably be located without causing extraordinary environmental harm to other resources. The No-Build Alternative avoids construction in wetlands, but does not fulfill the Project's purpose and need, and it would lead to more adverse traffic, social, and air quality impacts than the Build Alternatives. The combination of Alignment B/Alignment 10 has been identified as the Least Environmentally Damaging Practicable Alternative under the NEPA 404 MOU process (see Section 4.2.2.4, above). This combination has also been determined to be the Preferred Alternative. The mitigation measures described above in Section 4.2.2.3 ensure that impacts to wetlands will be minimized. Based on the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands and that the proposed action includes all practicable mitigation measures to minimize harm to wetlands which may result from such use.

4.2.3 Fauna

4.2.3.1 Impacts

Vertebrates

Although the Hawaiian hoary bat does occur within the project area, the construction of this project does not pose a threat to this endangered species. This species is well established in the lowlands in and around Hilo, and readily forages around lighted structures.

The construction of this project has the potential to impact two listed seabird species, the Newell's Shearwater and the Dark-rumped Petrel. The installation of exterior lighting along the roadway, or the use of external lighting in the construction phase of the Project, poses a threat to both seabird species during the breeding season, especially to fledging birds, which can become disoriented by exterior lighting on their way to sea in the fall months. When disoriented, seabirds often collide with man-made structures. If not killed outright, the dazed or injured birds are easy targets of opportunity for feral mammals. Collision with utility structures is considered by many to be the second most significant cause of mortality of these two seabird species in Hawaii.

The physical actions of clearing and grubbing the selected alignment have the potential to disturb nesting endangered Hawaiian Hawks if there are any present within the right-of-way at the time of clearing. It is unlikely that the construction of the roadway will have a significant impact on this endemic species. This species has seemingly adapted better than any other endemic avian species to the alien-dominated lowland areas of the Island. Hawaiian Hawks occupy a wide variety of habitats and are found in almost all habitats with trees. They are all but absent from completely or largely treeless grasslands and lava fields.

The project will not impact any other proposed, threatened or endangered avian species since there are no others currently known from within the proposed corridors.

Invertebrates

No listed endangered invertebrate species are known to exist within the project area. However, endemic invertebrate cave species, new to science, are periodically described, and some of these species may later become candidate or listed endangered species. The impact of construction projects on native invertebrate species is not generally known because populations of above-ground invertebrate species are poorly known to science. It is assumed that there would be some loss of invertebrate individuals and habitat since the Project would result in the destruction of some native plants and native vegetation. It is considered highly unlikely that this project would seriously threaten the existence of a single species or an entire population because this action, by itself, would not eliminate or even substantially reduce the extent of any native plant community type.

Project design has routed the right-of-way to approach no closer than 4.6 m (15 ft.) of Kaumana Cave (see Section 3.2.3.3). This was done in order to avoid impacts to the structural integrity, groundwater, or native vegetation above the cave, which supports a largely endemic ecosystem dominated by invertebrates. The degree to which the fauna in this cave is similar to that occurring in other lava tube caves, cracks and other interstitial spaces in lava is not yet known. However, Kaumana Cave has special value for research and teaching about such fauna.

4.2.3.2 Comparison Among Alternatives

No-Build Alternative

This No-Build Alternative would avoid any increase in impacts to native fauna.

Build Alternative Lower Portion

There will be potential indirect impacts to Newell's Shearwaters, and Dark-rumped Petrels as a result of increased lighting. There is no difference in potential impacts between Alternatives A and B.

Build Alternative Upper Portion

Alignment 2 contains somewhat more diverse and mature native or semi-native forest and may offer greater habitat potential for native fauna than Alignments 1 or 10. Each alignment poses similar potential indirect impacts to Newell's Shearwaters, and Dark-rumped Petrels as a result of increased lighting. The endangered Hawaiian Hawk may nest within the project area. Alignment 2 has more area with trees tall enough to be used for nests by Hawaiian Hawks than does Alignment 1 or 10; however, none of the project area represents high quality nesting habitat for the Hawaiian Hawk. Impacts to this species resulting from the selection of either alignment are estimated to be negligible.

The edge of Alignment 1 approaches Kaumana Cave in two locations (see Fig. 3-1). As discussed in Chapter 3, this EIS commissioned the first accurate mapping of the cave by professional surveyors. The final alignment affords sufficient undisturbed buffer between the road and the cave, with the right-of-way coming no closer than 4.6 horizontal meters (15.0 feet) and generally passing much farther away (see Figure 3-1). This in turn will avoid substantial impacts to cave organisms. No disturbance to the vegetation above Kaumana Cave or to the structural integrity of the cave will occur. Alignments 2 and 10 completely avoids the vicinity of Kaumana Cave.

4.2.3.3 Mitigation

To avoid the potential disorientation of Dark-rumped Petrels and Newell's Shearwaters by their interaction with external construction lighting, no construction or unshielded equipment maintenance lighting will be permitted after dark between the months of April and October. This prohibition will be one of the Special Contract Requirements that will be incorporated in the construction-contract documents. All street lights installed along the roadway will be shielded, so as to minimize the potential for disorientation of Newell's Shearwaters and Dark-rumped Petrels.

In order to avoid impacts to nesting Hawaiian Hawks, a nest search of the right-of-way and surrounding environs will be conducted by a qualified ornithologist immediately prior to the onset of construction. Hawaiian Hawks nest between May and October. If an active nest is detected during construction, construction activity shall be halted within 500 m (1600 ft.) of the nest until a consultation with the USFWS, under the terms of the Endangered Species Act of 1973 as amended, can take place and appropriate mitigation measures implemented. The impacts to this species following the completion of construction efforts will be negligible.

If Alignment 1 is selected, in order to minimize and compensate for impacts to fauna of Kaumana Cave, Special Contract Requirements will strictly limit construction activity (e.g., staging, clearing, cut and fill, slope easements) to the area within the right-of-way (ROW) in the section between Station 114 and 130, where the ROW approaches the cave most closely. Furthermore, the following mitigation measures are proposed: 1) the County of Hawaii will commit to providing an informational kiosk at Kaumana Caves County Park that will inform visitors about the unique fauna of the cave prior to completion of Project construction; and 2) FHWA will devise and fund a monitoring study of cave fauna, in consultation with the USFWS. Included will be one pre-construction and two post-construction surveys, separated by at least one year, covering the section of the cave where the ROW approaches within 15 m (50 ft.). A Memorandum of Agreement will be developed between the USFWS and the FHWA as part of the Record of Decision to guarantee implementation of these measures.

4.3 Socioeconomic Environment

As discussed in detail in Section 3.3.2, minority or low-income groups in the project area will not experience disproportionately high and adverse impacts from construction, right-of-way taking, long-term noise and air quality, and other direct, indirect or cumulative impacts of the Project per Executive Order 12898 regarding environmental justice (refer to Section 4.3.2 for discussion of characteristics of the residents who must be relocated). Census Tract 201.01 contains a high proportion of elderly residents and a 20 percent low-income population. This tract will be most affected by construction impacts and right-of-way taking associated with street widening. Census Tract 205 contains a 44 percent low-income population and will experience most of the relocations associated with the project (See Section 4.3.2, below). Comparatively, however, the impacts are dispersed, and therefore this project will not have a disproportionate high and adverse effect on minority and low-income populations as discussed in Executive Order 12898. The Project generally is beneficial to local residents, the same population that also experiences some adverse impacts.

4.3.1 Consistency with Local Land Use and Planning

Chapter 6 contains a detailed discussion of the Project's relationship to relevant plans, policies and regulations. Two specific policies relate the Project to its immediate socioeconomic environment.

The Puainako Road Extension was first identified in 1961 as part of *A Plan for Metropolitan Area of Hilo*, prepared by Belt Collins and Associates for the County of Hawaii. This corridor was subsequently identified as part of the roadway network for the City of Hilo with the adoption of the *Hawaii County General Plan*, which designated Puainako as a secondary arterial street. It was planned that the Puainako Corridor would ultimately connect the Saddle Road to the Hilo

International Airport. Most of the right-of-way in the Lower Portion (east of Komohana Street) has been owned by the State of Hawaii for several decades and is dedicated to eventual use by the highway. Housing developments have been granted approval with the ultimate development of the highway in mind. Affected property owners have built knowing that a highway would eventually be built nearby. Thus, while some negative impacts to landowners immediately adjacent to the right-of-way are unavoidable, they have been anticipated for several decades.

The project is consistent with the *Hawaii County General Plan*, the *Hilo Zone Map* and all other State and County Plans (see Chapter 6). Consequently, the Project would not result in any unanticipated development within the Hilo area. However, the highway might accelerate the pace of development in Kaumana by providing quicker access to planned housing subdivisions (see Section 4.5).

4.3.2 Relocation and Right-of-Way Acquisition

4.3.2.1 Impacts

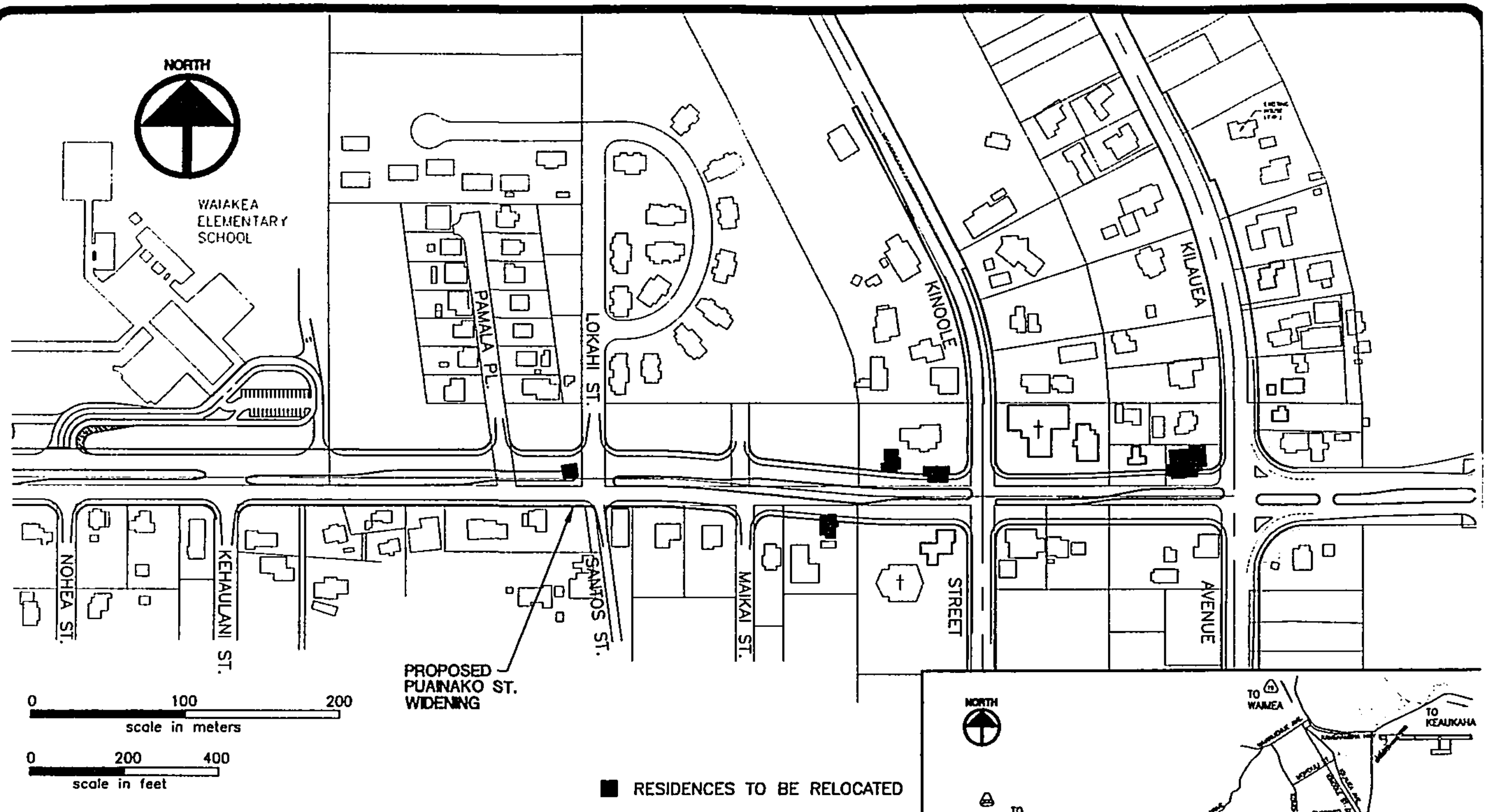
Residential Relocation

Widening the existing Puainako Street between Kilauea and Kawili Streets would necessitate the acquisition of five (5) single family residential units. No other relocations are associated with the Project.

Table 4-7 summarizes the potential relocation impacts to impacted residences, which are indicated in Figure 4-2. A field survey was conducted to identify and record the basic characteristics of each residence. Three of the existing residential units impacted by this project are vacant, and all but one of these three is likely to remain so or even be dismantled before commencement of the Project. Consequently, potential displacement of residents is limited to a total of two households within the entire project corridor. These two households have a total of four occupants. Two of these occupants are over 65 years of age, and none are reported to be disabled.

Following selection of a preferred alternative, each unit identified for actual relocation will be subject to an assessment to determine its individual characteristics and value before acquisition proceedings are initiated. All households affected under the selected alternative will be interviewed to determine their specific requirements before any acquisitions are made or relocations are begun. Each non-residential relocation will be similarly assessed for specific value and characteristics before acquisition.

Property values for residential and nonresidential properties from current records of Hawaii County Real Property Tax records do not adequately reflect current market values. Therefore, the data were supplemented from discussions with local real estate professionals to obtain current market values for comparable sales and rental prices in the project area.



TITLE

RESIDENTIAL RELOCATIONS

FIGURE 4-2

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

Table 4-7
Potential Displaced Residential Units

Location/ Home	Total Number of Occupants	Owner or Renter	Number of Disabled	Number Over 65 Years
Lower Portion				
Home 1	2	Renter	0	2
Home 2	0	n/a	n/a	n/a
Home 3	0	n/a	n/a	n/a
Home 4	0	n/a	n/a	n/a
Home 5	2	Renter	0	0

Note: Home numbers are arbitrarily assigned for reasons of confidentiality.

The 1998 median sales price for three-bedroom homes in Hilo was approximately $155,000. The average price for homes sold within a 1.7 km (1.0 mi.) radius of the affected area was approximately equal to this value, according to Multiple Listing Service (MLS) listings in 1998. The homes to be relocated are relatively old homes compared to the average home in the neighborhood and contain between one and three bedrooms. The value of these homes is estimated to range between $100,000 and $175,000.

Nonresidential Relocations

One business, a barber shop, would be displaced by this project. The widening of the Kilauea Avenue-Puainako Street intersection would require the displacement of a 60 m^2 (600 sq. ft.) free-standing structure within which this business is located. The proprietor leases this structure in order to conduct her business. The structure is within a residential zoned area and is therefore considered an existing non-conforming use.

Right-of-Way Acquisition

In addition to actual relocation, right-of-way must be acquired from between 100 and 135 individual properties, depending on the precise combination of alignments chosen. At least 17 of these parcels (and most of the length of Alignments 1 and 2) currently belong to the State of Hawaii. The following areal amounts would be required:

Alignment 1	18.5 ha (45.7 ac.)
Alignment 2	23.0 ha (56.8 ac.)
Alignment 10	20.1 ha (49.7 ac.)
Alignment A	1.4 ha (3.5 ac.)
Alignment B	1.4 ha (3.5 ac.)

4.3.2.2 Comparison Between Alternatives

No-Build Alternative

This alternative would avoid all relocation and right-of-way acquisition impacts.

Lower Portion: Alignment A vs. B

The relocation impacts occur in the section of Puainako Street between Kilauea Avenue and Kawili Street. According to current project design, five homes would be affected. Choice of alignments would not affect relocation or right-of-way acquisition impacts.

Upper Portion: Alignment 1 vs. 2 vs. 10

No relocation would occur in the Upper Portion. Right-of-way requirements would be approximately 25 percent greater under Alignment 2 than under Alignments 1 and 10.

4.3.2.3 Mitigation

Relocation will be in accordance with federal Uniform Relocation and Real Property Acquisition Policies Act of 1970 (P.L. 91-646), as amended as well as State regulations. In relocating households and businesses, full advantage will be taken of all resources available to affect the successful relocation of those concerned. These include but are not limited to the following:

For **residential** displacements, all households will be provided with advisory assistance. This includes distribution of available rental listings specific to their needs and assistance in searching for and securing replacement dwelling units.

All eligible households will be provided with a moving assistance payment. This may be in the form of actual reasonable moving costs, related expenses, or under certain circumstances, a fixed payment. All eligible rental households will be provided with Relocation Assistance housing payments to supplement differences between the rent they currently pay and the calculated cost of their replacement unit. Rental households will be advised that they may convert any rental supplement payments to a down payment for the purpose of purchasing a replacement dwelling. Exercising this option is contingent on each household's ability to qualify for the needed financing on a replacement unit.

All eligible home owners will be provided with a housing payment supplement should the replacement cost exceed the acquisition cost of the displaced dwelling.

For **non-residential** displacements, all impacted entities will be provided with advisory assistance. All eligible entities will be provided with funds for moving their personal items to their new location. Search expenses in locating a new site may be compensated if properly documented. Re-establishment costs for expenses such as carpets, advertisement, etc., may be eligible for payment under the "Re-establishment" expense rule. Eligible non-residential displaced persons may be entitled to an increased cost of operating payment which could offset higher lease rates paid at a new location. All entities may be eligible for a fixed payment in lieu of actual moving expenses, personal property losses, re-establishment payments, and searching expenses.

Residential Relocation Resources

Table 4-8 provides a summary of the number of available homes currently available for sale and rent within Hilo in various price ranges. This information, supplemented by discussions with local real estate professionals, indicated that the Hilo area contains and will contain at the date of the Project implementation, a sufficient supply of vacant housing and commercial property with similar characteristics to absorb any displaced households within the five residential units and the one business.

Table 4-8
Availability and Price of Rental and Purchase Homes, Hilo, April 1998

	HOMES FOR SALE	HOMES FOR RENT
Number of homes	530	72
Price Range	$53,000 - $949,000	$500-$800 / $400-$700
Median Price	$155,000	$750 / $600

Sources: Sales figures from Multiple Listing Service March 1998 data.
Rental figures from July 5, 1998 Hawaii Tribune Herald classified ads.
First range pertains to 3-bedroom homes, second range to 2-bedroom.

A full inventory of available relocation housing will be conducted prior to acquisition. The inventory will identify the most recent vacancy and market values of relocation housing in addition to other factors.

Detailed inspection of the affected households and businesses and interviews of residents to be relocated will be conducted after the preferred alternative is selected and the construction schedule is determined. Specific housing and community characteristics will be determined based upon the requirements of those households identified for actual relocation. Replacement housing will be determined on the basis of current market availability and costs for the relocation resource area.

In order to facilitate this process, the State Department of Transportation and the Department of Public Works initiated meetings with the potentially displaced residents and business owners see Appendix for coordination letters). These meetings were conducted on 11 September 1995, and were intended to gather information about the household characteristics of the residents and the activities of the businesses and to provide information about their rights and benefits in the event they are displaced.

Right-of-Way Acquisition Mitigation

All acquisition of real property for right-of-way purposes will conform with the requirements of the Uniform Relocation Assistance and Real Property Acquisition Policies of 1970 (P.L. 91-646). For remnant parcels created by the right-of-way acquisition, appropriate access will be provided to the landowner. Alternatively, remnant parcels may be acquired as part of the project right-of-way.

4.3.3 Community Cohesiveness and Identity

4.3.3.1 Impacts

The County of Hawaii invited public participation in the Puainako Street project by holding a series of meetings with the general community or special interest segments between 1992 and ~~1997~~ 1999 (see Chap. 9 for discussion of public consultation). The purposes of the meetings included gauging support for the general idea of the Project, assessing priority needs of the community, and identifying environmental issues. The process has generated evidence of the perceived effects of the Project – or the lack of it – on neighborhood issues such as identity, cohesion, and safety.

The meeting drawing the largest attendance in early phases of project development occurred on *20 July 1992 at the Waiakea Intermediate School cafeteria (transcripts from this meeting are* contained in Appendix A). A majority of residents from the affected neighborhoods of Kaumana, Waiakea Homesteads and Waiakea Uka testified in favor of both the extension and widening extension components of Puainako Street. Concerns about adverse impacts generally fell into three categories:

- o The impact on current residents of Puainako Street, especially those on the north side of the street between Kawili Street and Komohana Street;
- o The impact of the completed project on traffic levels and safety at and near Waiakea Elementary and Waiakea Intermediate schools; and
- o The phasing of the Project construction to maximize benefit.

A concern of some members of this audience, which was later reiterated during meetings with the University of Hawaii at Hilo Ho‘oikaika Hawaiian Awareness Organization, was the preservation of archaeological features.

Community input at the public hearing for the Draft EIS on 19 January 1999 (see Appendix A4 for transcripts), reiterated the perception of need and general support for the project. However, a number of comment letters to the Draft EIS (see Appendix A3) expressed concerns relating to loss of community cohesion at Pacific Plantations if Alignment 1 were selected. Various commenters noted the potential function of the road to better link the greater Hilo community.

The extension and widening of Puainako Street is unlikely to have major impacts on neighborhood or community cohesion. Puainako Street serves as a boundary to the Waiakea Homestead neighborhood and as an artery for access to and from Waiakea Uka. The extension would allow Puainako Street to serve the same role for the Kaumana community. Given that the road would facilitate access to and from the neighborhoods but not through many of the neighborhoods, it would not create many additional divisions within the neighborhoods.

4.3.3.2 Comparison Between Alternatives

No-Build Alternative

Although little change to the physical elements of the roadway would occur under this scenario, the substantial increase in traffic would have the effect of making the road more of a barrier within the community, thus slightly reducing community cohesiveness.

Lower Portion

The Build Alternative in the Lower Portion would impose a road three times the width of the current road. Although traffic volumes would not rise substantially solely *as a result* of the Project (volumes are forecasted to rise regardless of improvements), the width of the road would tend to isolate at least marginally those on one side of the road from those on the other. However, the residential areas below Kawili/Iwalani Streets are mostly confined to the south side of Puainako Street, minimizing the barrier effect.

Above Kawili/Iwalani Street, the proposed re-routing of the road would have the beneficial impact of reinforcing community cohesion by allowing more interchange across a road segment with much-reduced traffic.

Alignment A vs. B

Selection of Alignment A or B would have equally negligible impact on the community cohesion and related issues for Waiakea.

Upper Portion

The impacts on community cohesion in Kaumana would probably be minor, but would vary in terms of separating certain housing developments south of Kaumana Drive from the rest of Upper Kaumana. Alignment 1 would separate Pacific Plantation subdivision and the Wilder Road subdivisions from the rest of the Upper Kaumana neighborhood. Alignment 2 passes south of all the housing developments in Kaumana, thus encircling rather than separating the housing south of Kaumana Drive. Selection of Alignment 2 would slightly increase traffic on Wilder Road (and on Edita Street, if and when an extension is constructed), which has numerous driveways, leading to increased safety concerns. Similar to Alignment 2, Alignment 10 would combine the advantages of Alignment 2, which avoids separating Pacific Plantations from the rest of Kaumana, with the benefits of Alignment 1, which intersects Wilder Road in an area that minimizes community impacts on the neighborhood served by this street.

Project Phasing

The public expressed opposing views regarding which part of the Project to complete first. Kaumana residents felt that the need for a second access route should give the Upper Portion priority. Waiakea residents felt that the traffic congestion on the current road gave the Lower Portion priority. Ideally, both sections would be completed concurrently.

4.3.3.3 Mitigation

The mitigation measures proposed in Section 4.3.11 for impact to pedestrians and bicycles would have beneficial impacts for neighborhood cohesion as well.

4.3.4 Community Facilities and Public Services

No permanent impact to any utility (water, electricity/phone transmission lines, gas) would occur as a result of any alternative action. Construction impacts are discussed in Section 4.4. Discussed here are impacts to schools and public services.

4.3.4.1 Impacts

Right-of-way acquisition (approximately 24 m [80 ft.] in width) from both Waiakea Elementary and Waiakea Intermediate School would be necessary under the Build Alternatives. This area is currently unused but its open landscaping and stands of eucalyptus trees add to the aesthetics of the school grounds. The access and circulation patterns of the schools would be affected by the Project. The FHWA, HDOT and DPW have been working with the Department of Education (DOE) and the two schools to prepare for final design, in order to ensure that the design satisfies school requirements and causes minimum inconvenience during construction.

A wider roadway would provide better access for police, fire and medical emergency services in the Lower Portion. The Upper Portion would provide a much shorter access route for such services to the Upper Kaumana area.

4.3.4.2 Comparison Among Alternatives

No-Build Alternative

No impact to Waiakea School Complex property would take place. Redesign and construction of access to the complex would be needed in response to the expected increase in traffic. This would have to be funded from some other source.

Police, fire and emergency services would have to contend with a congested and crowded roadway with only two through lanes. No alternative access to Kaumana would be available.

Build Alternatives

The Build Alternatives, whatever the combination of alignments used, would consume some school property, but would also help provide needed access redesign and construction. Police, fire and emergency services would be improved under these alternatives.

4.3.4.3 Mitigation

Initial discussions with school officials indicate that the benefits of redesigning the driveway at the Waiakea School Complex ~~would~~ have the potential to offset the impact of lost property area. Special Contract Requirements that will be included in the contract for final design and/or construction will specify the following:

- The contractor will be required to maintain access during construction;
- The contractor will verify location of utilities and coordinate with the schools to ensure efficient connection to and extension of utilities;
- The contractor will coordinate with the schools to ensure that satisfactory parking, drop-off, and access are accomplished as part of the project during the final design stages; and
- Temporary air conditioning will be installed at the administration building during the construction phase.

4.3.5 Parks and Recreation

None of the proposed alternatives would require any taking of or impact to public or private parks or recreational land, facilities or activities. A beneficial impact of mitigation if Alignment 1 is selected would be enhancement of interpretive facilities at Kaumana Cave, (see Sec. 4.2.3.3).

4.3.6 Visual Resources

4.3.6.1 Impacts

Visual impacts on the Lower Portion, where an existing road would be widened and realigned, would differ from those on the Upper Portion, where a new road would be created. If the proposed project were constructed, the existing Puainako Street would take on a more urban character in contrast to its suburban (although often congested) appearance. The road currently offers little of scenic interest for a driver whose attention, for reasons of safety, must be clearly focused on the roadway.

The topography in the Upper Portion of the project area lacks large promontories or depressions and is for the most part heavily covered with scrub or forest. These conditions would tend to obscure the road from the view of most nearby streets and the houses that front them. Exceptions would be a few houses with second stories facing the roadway, a few houses very close to the new road, and several houses on small hills near the road. Initially, the roadway would have little other development associated with it, and the road would thus pose little problem for residents within viewing distance. Later, as housing density increases in subdivisions near the road, views could become more urban than pastoral.

The surrounding terrain, from the perspective of a driver on the new road, would initially consist of pleasant vistas of low forest with many native trees in places. Little in the way of landscaping would thus be required until residences are constructed in planned or existing subdivisions.

Street lighting along the extension and widening sections would add to the total night luminance of Hilo. All lighting will be in compliance with the outdoor lighting code.

4.3.6.2 Comparison Among Alternatives

No-Build Alternative

The No-Build alternative would avoid visual impacts.

Lower Portion

Along the Lower Portion, expanding the right-of-way, creating turning lanes and signals, regrading the road, and noise mitigation barriers would cause noticeable differences in the appearance of the roadway.

Adverse visual impacts would be borne by residents of the State Housing Project on the north side of Puainako Street, who would have roadways on either side of their houses.

Alignment A vs. B

Within the Lower Portion, Alignment B passes very near the houses along the north side of the existing Puainako Street. Alignment A is farther north from Puainako Street, crossing open land. Selection of Alignment A would reduce the visual impact of the roadway on residents on the north side of Puainako, and the greater distance from the houses may provide motorists a less congested landscape.

Upper Portion: Alignment 1 vs. 2 vs. 10

Along the Upper Portion, Alignments 1, ~~and~~ 2, and 10 offer slightly different visual characteristics. Much of Alignment 1 parallels Kaumana Drive and passes near some developed areas, notably at Edita and Pamoho Streets and Wilder Road. Alignment 2 avoids these and adjoining developments by taking a more southeasterly route. Alignment 10 is intermediate between the two, passing through both developed and undeveloped areas. The levels of impact of these three ~~two~~ alignments on several aspects of the visual environment would be different. Selection of Alignment 2 would have less adverse visual impact for residents of existing developments and may provide a more pleasant, open landscape for motorists. However, from a regional perspective, selection of Alignment 2 would extend the boundary of urbanization further into open space lands of southwest Hilo. Selection of Alignment 1 would have less adverse aesthetic impact on the rural surroundings. Alignment 10 would have visual effects intermediate between Alignments 1 and 2.

Choice of alignment would not alter the visual impacts for future residents of Sunrise Estates since both alternatives share the same alignment along the southern side of this subdivision.

4.3.6.3 Mitigation

Views From Adjacent Residences

The mitigation structures described in Section 4.1.6, Noise Impacts, would partially screen residents of the Lower Portion from visual impacts as well. In order to ensure that visual impacts are minimized, Special Contract Requirements that will be incorporated into the construction-contract documents will specify that trees and shrubbery will be planted in a manner consistent with public safety on the edge of the right-of-way. In addition, the residents would be aware of the construction of the highway and would be able to take measures for themselves to screen out the highway with plantings or structures on their own property if they so choose.

Views from the Highway

The visual impact of noise mitigation barriers as viewed from the road would be mitigated by landscaping. However, there would be some unmitigable loss of the open character of the residential neighborhoods on Kilauea Avenue and Kinoole Street where fences and walls are largely absent and residents' yards are part of scenery.

Outdoor Lighting

Mitigation for the addition to Hilo's output of light would occur through full conformance with the Hawaii County Outdoor Lighting Ordinance. This law requires low pressure sodium lights with shields that prevent light from escaping upwards. This minimizes impacts to both the telescope facilities on Mauna Kea and night-flying seabirds that may become disoriented by lights shining upward.

4.3.7 Historic/Archaeological Resources

The reader is referred to Section 3.3.6 for full description of existing historic site resources. As discussed in Section 3.3.6, other cultural sites, such as Traditional Cultural Properties or gathering areas, have been determined not to be present or affected based on consultation with appropriate individuals and cultural groups.

4.3.7.1 Impacts

As indicated in Table 3-9, 14 historic-era plantation sites are located within the four separate road alignments and intervening segments under consideration for the proposed extension and widening of Puainako Street.

Various features of one site (Site 18921) are located in Alignment 1 and Alignment 10, and one site (Site 18920) is located in Alignment 2. The remaining 12 sites occur between approximately the 61 m (200 ft.) contour and 104 m (340 ft.) contour. Four of the sites are located east (makai) of where Alignment A and B diverge; five sites (sites 18913, 18914, 18915, 18917, and 18918) are located in Alignment A; and three sites (Sites 18916, 18919 and 20681) are in Alignment B (see Fig. 3-6). The significance of each site as determined by the State Historic Preservation Officer (SHPO) is listed above, in Table 3-9.

Impacts to the historic sites would consist of full or partial destruction of sites or features of sites that lie within the right-of-way of the alignment chosen for the Project. No adverse "proximity" impacts to the preservation sites would occur, because the capability of the sites to perform any of their vital functions would not be substantially impaired by having the roadway nearby.

Federal law contained in 49 U.S.C., Section 303 and 23 U.S.C. 138 [referred to as Section 4(f)] require that all actions or projects undertaken by agencies of the U.S. Department of Transportation ensure that special efforts are made to protect public parks and recreation lands, wildlife and waterfowl refuges, and historic sites. Special criteria apply to the analysis of impacts, mitigation measures and alternatives. A Section 4(f) evaluation of the Project is contained in Chapter 5 of this EIS.

4.3.7.2 Comparison Among Alternatives

No-Build Alternative

No historic sites would be impacted by the No-Build Alternative.

Alternatives

Because sites were identified in all four of the road alignments, the extension and widening of Puainako Street would undoubtedly impact some of the 14 sites. However, depending upon which alignments are selected in the final design of the proposed road construction, a higher or lower number of sites would be impacted.

Lower Portion: Alignment A vs. B

A segment of the eastern half of the Lower Portion Build Alternative alignment (below the 153 m [500 ft.] elevation) is a single route with no alternate choices. Regardless of which alignment is chosen, four sites (sites 18911, 18912, 18922 and 18923) located in the single route would be impacted by the extension and widening of Puainako Street. The SHPO initially recommended data recovery for two of the sites (Sites 18911 and 18912), which subsequent archaeological reporting has satisfied (see App. A5 for coordination letters). ~~Mitigation in the form of data recovery work would need to be done at two of these sites (sites 18911 and 18912).~~ No further work would be required at sites 18922 and 18923 as they are deemed to be no longer significant.

Importantly, Alignment A could not be selected without adversely affecting Sites 18914, 18915, and 18917, which have been judged to be significant and are recommended for preservation in place. The sites extend across the width of the 37-meter (120-foot) road corridor [refer to Chapter 5 of this document for discussion of Section 4(f) issues]. Shifting Alignment A to the north or south is technically feasible but would entail destruction of existing facilities and historic sites. To the south is a large water tank facility of the Hawaii County Department of Water Supply, as well as a number of unsurveyed archaeological features which would require survey. To the immediate north are additional archaeological features, and further north are more archaeological features and the Komohana Agricultural Extension Complex, the headquarters for a number of University of Hawaii agricultural agencies and offices.

If Alignment B is selected, three sites would be adversely impacted (sites 18916, 18919 and 20681). The SHPO initially recommended data recovery for these three sites, which subsequent archaeological reporting has satisfied (see App. A5 for coordination letters). ~~Data recovery at all three sites has been recommended by the SHPO~~. There is no recommendation for preservation in place of any sites in Alignment B.

Upper Portion: Alignment 1 vs. 2 vs. 10

Site 18921 would be impacted if either Alignment 1 or 10 is selected. The SHPO ~~has~~ initially recommended data recovery for this site, which subsequent archaeological reporting has satisfied (see App. A5 for coordination letters). If Alignment 2 is selected, one site (Site 18920) would be impacted. No further work, however, would be required at Site 18920, as it is deemed to be no longer significant.

4.3.7.3 Mitigation

Tables 4-9a and 4-9b list each site and the treatment recommended in the archaeological inventory survey reports and concurred with by the SHPO. Three of the ~~Two~~ sites, Sites 18914, 18915 and 18917 were recommended for preservation in place, and contain the features shown in Table 4-9b. The SHPO initially recommended data recovery for eight total sites (Sites 18911, 18912, 18916, 18917, 18918, 18919, 18921, and 20681), which subsequent archaeological reporting has satisfied (see App. A5 for coordination letters).

~~Eight total sites are eligible for data recovery (Sites 18911, 18912, 18916, 18917, 18918, 18919, 18921, and 20681). It should be noted that data recovery would only occur for sites that are inside an alignment selected for construction.~~

The following mitigation, which will be developed as part of a preservation ~~detailed mitigation~~ plan between DPW, HDOT, FHWA and the SHPO, is predicated upon the selection of Alignment B. This results from the Section 4(f) conclusion, which is presented in Chapter 5, that Alignment A may not be selected because a feasible and prudent alternative to its use exists, namely Alignment B.

Table 4-9a
Recommended Mitigation for Archaeological Sites

Site No. (50-10-35)	Site Type	Site Mitigation	Road Alignment Location
18911	Complex	No further work	East end of Lower Portion - west of Kawili St.
18912	Complex	No further work	East end of Lower Portion - west of Kawili St.
18913	Mound	No further work	Alignment A - east of Komohana St.
18914	Complex	**Preservation**	Alignment A - east of Komohana St.
18915	Complex	**Preservation**	Alignment A - east of Komohana St.
18916	Complex	No further work	Alignment B - east of Komohana St.
18917	Complex	**Preservation**	Alignment A - east of Komohana St.
18918	Complex	No further work	Alignment A - west of Komohana St.
18919	Complex	No further work	Alignment B - west of Komohana St.
18920	Complex	No further work	Alignment 2
18921	Complex	No further work	Alignments 1 and 10
18922	Modified outcrop	No further work	East end of Lower Portion - east of Kawili St.
18923	Modified outcrop	No further work	East end of Lower Portion - east of Kawili St.
20681	Complex	No further work	Alignment B – West of Komohana St.

Source: Appendices E1 and E2.

- o Sites 18914, 18915 and 18917 are significant for both their information and as excellent examples of their type (late 1800s – early 1900s sites associated with sugar cane cultivation), and will be preserved in place.
- o Special Contract Requirements that will be included in the construction documents will specify that no activity will be conducted within Alignment A. In order to restrict the area of disturbance to the Alignment B corridor, temporary plastic fencing will be erected along the north edge of Alignment B.
- o ~~Data recovery will be conducted for the 3 sites in Alignment B that would be destroyed by construction.~~
- o ~~Data recovery will be conducted for Sites 18911 and 18912.~~
- o ~~Data recovery will be conducted for Site 18921 if Alignment 1 is selected.~~

The SHPO concluded in a final letter of ~~15 July 1996~~ 7 April 2000 (see App. A5) that, given these measures, the Project will have "no adverse effect" on significant historic sites (see Appendix A1 for earlier coordination letters). It should be noted that after initial recommendations for data recovery at certain sites, upon review of archaeological work and reporting accomplished between the Draft and Final EIS, the SHPO has determined that no further data recovery is required (see App. A5 for final coordination letter).

Table 4-9b
Archaeological Sites Requiring Preservation

Site No. (50-10-35)	Feat. Name	No. of Feat.	Architectural Type	Size (sq. m.)	Interpreted Function	Significance	Recom-mended
18914	--	12	Complex of Structures	--	Historic Agriculture	C,D	P
	A		Rectangular platform	34	Clearing/Foundation		
	B		Rectangular platform	50	Clear/ramp		
	C		Irregular mound	25	Clearing		
	D		Irregular mound	34.5	Clearing		
	E		Linear terrace	55	Retaining Wall		
	F		Rectangular platform	66	Clear/ramp		
	G		Irregular mod. outcrop	1092	Clearing		
	H		Curvilinear mod. outcrop	62.5	Clearing		
	I		Irregular platform	49.2	Clearing		
	3		Rectangular mound	32.2	Clearing		
	4		Rectangular platform	54.2	Clear/ramp		
	5		Circular mound	0.7	Clearing		
18915	--	9	Complex of Structures	--	Historic Agriculture	C,D	P
	A		Oval enclosure	112.5	Clear/foundation		
	B		Linear terrace-mound	20	Railroad bed		
	C		Rectangular platform	42	Clear/ramp		
	D		Rectangular mound	3.5	Clear/ramp		
	E		Rectangular platform	42	Clear/foundation		
	F		Rectangular platform	46	Clearing		
	G		Rectangular mound	13	Clearing		
	H		Oval platform	45	Clear/foundation		
	I		Irregular mound	29.5	Clearing		
18917	--	3	Complex of Structures	--	Historic Agriculture	C,D	P
	A		Linear Stone Alignment	12.5	Clearing		
	B		Rectangular mound	9.5	Clear/foundation		
	C		Rectangular mound	21.5	Clearing		

Source: Appendix E2

4.3.8 Agricultural Land

4.3.8.1 Impacts

In coordination with the U.S. Natural Resources Conservation Service (USNRCS), a Farmland Conversion Impact Rating (FCIR) assessment (see Appendix J) was performed pursuant to FHWA regulations related to the federal Farmland Protection Policy Act (FPPA). The assessment is done to evaluate a highway project's relative impact on farmland in a region, county and state. It takes into account the acreage of farmland directly converted, the potential to indirectly convert agricultural land to non-agricultural uses, impacts to individual farms, and the relative size and importance of the farms affected.

No farmland is present in the Lower Portion. The process derived a maximum FCIR rating of 108 points on an ascending scale of impact from 0 to 260 points. This rating is below the threshold of 160, above which project planning must take into consideration the possibility of using non-farmland or finding an alternative less harmful for farming.

4.3.8.2 Comparison Among Alternatives

No-Build Alternative

The No-Build alternative would preclude any impact to farmland or agricultural resources.

Lower Portion: Alignment A vs. B

No farmland is located in the Lower Portion of the project area, and therefore there is no distinction in impacts between the alternative alignments.

Upper Portion: Alignment 1 vs. 2

The Farmland Conversion Impact Rating was 108 points for Alignment 1 and 95 for Alignment 2. Alignment 1's higher rating is due to the presence of the only farm in the project corridor, as discussed in Section 3.3.8. If Alignment 1 is chosen, the highway would consume some of the land currently used for farming and might discourage the farmer from continuing operations. As Alignment 10 was developed late in project planning, no Farmland Conversion Impact Rating was calculated. However, it is similar to Alignment 1 in all respects except that it involves less intrusion into the one parcel currently used for farming and no impact on the land that has been used in the past and is presently in use.

4.3.8.3 Mitigation

No mitigation is necessary or planned for the minor impact to farmland. However, the relocation and right-of-way compensation process discussed in Section 4.3.2 would apply to the farmer who operates the farm and the landowner.

4.3.9 Motorized Vehicle Transportation

4.3.9.1 Impacts

Project Area Road Network

Projections on impact to traffic volumes for roadway sections directly involved in the Project were conducted as part of the Traffic Report prepared for this study (Appendix G). The reader may refer to Section 1.4.3 for an explanation of traffic analysis and a definition of terms used in this section.

Average daily traffic (ADT) as well as AM and PM peak traffic volumes were estimated for the various alternatives under consideration (Table 4-10). In general, traffic congestion on lower Puainako Street would be greatly relieved by the widening, which would provide through lanes and separate turning lanes into the Waiakea schools. The use of the Upper Portion of the Project, however, would add traffic to the Lower Portion. It is anticipated that the improvements of the Lower Portion would be able to absorb the added traffic, and the net result will be much smoother traffic flows.

Level of Service (LOS) was also modeled for all major and most smaller intersections for the No-Build and Build Alternatives. Detailed maps of 14 intersections (including all turning movements) at the AM and PM peak hours are provided in Figures 8-16 of Appendix G. Table 4-11 provides a summary of the findings for all major intersections.

Under the No-Build Alternative, all major intersections would experience a Level of Service measured as D (Minimum Desirable), E (Undesirable) or F (Unacceptable) at either or both the AM or PM peak hour.

Under the Build Alternative, Level of Service meets or exceeds the goal of C or better. It should be noted that LOS at minor side streets feeding into Puainako may be less than C at peak hours. Although less than acceptable LOS would be experienced at these side streets even with the proposed improvements, the conditions under the No-Build Alternative are far worse in every instance.

4.3.9.2 Comparison Among Alternatives

No-Build Alternative

Without substantial improvements to Puainako Street, the twofold increase in traffic would act to further degenerate the Level of Service at most road segments and intersections.

Lower Portion

Traffic volumes on the Lower Portion would increase above No-Build levels as a result of two factors: an increase in traffic from the Puainako Extension, and the ability to handle more traffic with less congestion offered by four lanes.

Table 4-10
2020 Projected Traffic Volumes, by Alternative

ROADWAY SECTION	24-HOUR VOLUMES		AM PEAK HOUR VOLUMES		PM PEAK HOUR VOLUMES	
	NO-BUILD	BUILD	NO-BUILD	BUILD	NO-BUILD	BUILD
Puainako W of Kanoelehua	36,300	37,500	1,983	2,040	2,798	2,903
Puainako E of Kilauea	30,600	31,800	1,935	1,994	2,376	2,481
Puainako Between Kilauea and Kinoole	22,500	25,000	1,346	1,476	1,812	2,029
Puainako W of Kinoole	20,100	23,400	1,485	1,654	1,407	1,707
Puainako E of Iwalani/Kawili	18,000	21,100	1,403	1,572	1,284	1,584
Puainako W of Iwalani/Kawili	15,200	19,400	1,186	1,509	1,347	1,727
Puainako E of Komohana	15,000	19,800	1,009	1,381	1,364	1,744
Puainako W of Komohana	0	8,400	0	709	0	706
Komohana N of Puainako	24,000	25,500	2,222	2,402	2,058	2,143
Saddle Road W of Country Club	5,500	5,500	468	468	467	467
Saddle Road E of Country Club	5,500	1,800	468	182	467	125

Source: Appendix G.

Along with increased ADT and AM and PM peak values, the Project would improve Level of Service to a degree that would more than offset the rise in traffic volumes.

Alignment A vs. B

No difference exists in traffic volumes or Level of Service between the two alternative alignments. Alignment A offers a marginally more functional intersection at Komohana Street because of its greater distance from the existing Puainako Street.

Table 4-11
Level of Service (LOS) at Near or Over Capacity Major Intersections, by Alternative

INTERSECTION	DIRECTION BOUND	LEVEL OF SERVICE (LOS)			
		NO-BUILD		BUILD	
		LOS	LANE(S)	LOS	LANE(S)
Wilder at Kaumana	South	D	(All)	A	(All)
Edita at Kaumana	North	D	(All)	A	(All)
Puainako at Komohana	East West	F F	(All) (All)	C+ C+	(All) (All)
Komohana at Puainako	North South	(Not Modeled)		C+ C+	(All) (All)
Puainako at Kawili/Iwalani	East West	F F	(All) (All)	C+ C+	(All) (All)
Kawili at Puainako	North South	F F	(All) (Str. & Left)	B+ B+	(All) (All)
Puainako at Kinoole	East West	D D	(All) (All)	B+ B+	(All) (All)
Kinoole at Puainako	North South	D D	(Left) (Left)	C+ B+	(All) (All)
Puainako at Kilauea	East West	F F	(All) (Str. & Left)	C+ C+	(All) (All)
Kilauea at Puainako	North South	F F	(Str. & Left) (All)	C C	(All) (All)

Source: Appendix G - Figs. 8-16.
Note: LOS listed pertains to first listed street at the intersection, at the AM or PM peak, whichever is poorest. LOS codes: D: Desirable Minimum; E: Undesirable; F: Unacceptable (Refer to Table 1-1 for further definition of Level of Service). Str=Straight; Rt = Right.

Upper Portion: Alignment 1 vs. 2 vs. 10

No difference exists in traffic volumes or Levels of Service between the three ~~two~~ alternative alignments. Therefore, traffic modeling was conducted for Alignment 1 only.

4.3.9.3 Mitigation

If the No-Build Alternative is selected, there is little feasible mitigation to relieve poor Level of Service. The Build Alternative is in itself the mitigation for existing and future traffic problems. The overall pattern should be one of less congestion, and traffic congestion should be mitigated to below the pre-project level.

4.3.9.4 Regional Transportation Network

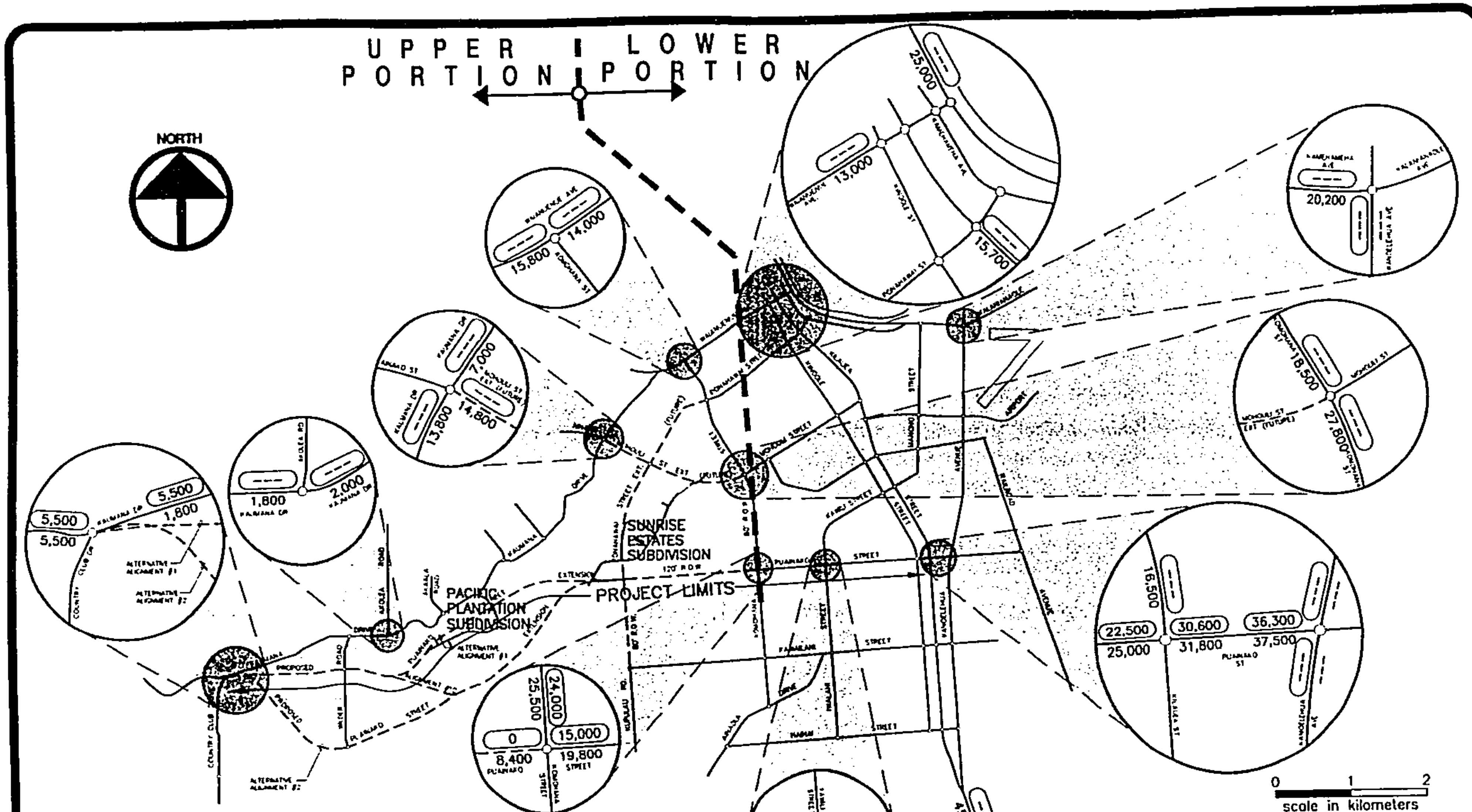
The goal of this section is to examine the effects of the proposed project on the "big picture" of the future transportation network in Hilo, including the three major highways that conduct traffic in and out of the region.

No single traffic model exists that could provide data for this picture. Therefore, the scenario presented here is a combination of several sources. Each employed computerized traffic models that focused on some aspect of Hilo traffic and produced data for a discrete number of roadway sections in the network. Each used 2020 as its project year, and included the Puainako Extension as one of its assumptions. Other assumptions of the models differed, and therefore somewhat different results are possible for certain sections. However, the models had sufficient overall agreement in the limited areas where their coverage overlapped that jointly they can be relied upon to produce a reasonable model of the larger network. The sources are: the *Island of Hawaii Long Range Highway Transportation Plan* commissioned by the State DOT (1991; updated in 1998 and renamed the *Hawaii Long Range Land Transportation Plan*); the *Mohouli Street Extension Traffic Assessment* prepared for an Environmental Assessment recently completed for that project (Hawaii County Dept. Of Public Works, 1997); and the traffic assessment prepared for this project, which was finished in 1997 (Appendix G). Figure 4-3 depicts the traffic volumes projected by the model and includes "No-Build" Alternative projections for the roads within the immediate project area that were modeled as part of the Traffic Study for this EIS.

If one compares 1994 conditions (Figure 3-8) to those for the year 2020, the principal difference is an increase in traffic volumes at nearly all locations, basically because of increasing population and visitor days. State Highways 19 (to Hamakua), 11 (to Puna) and the Saddle Road (State Highway 200) all show increased volumes. Within Hilo, traffic is expected to rise substantially on nearly every street. The only drop predicted is on Kaumana Drive at and below Wilder Road, and again below Ainako Avenue.

Average daily traffic volume on Kaumana Drive west of Country Club Drive is expected to increase from 1,630 in 1994 to approximately 5,500 by 2020, a joint result of increasing island population, visitor numbers and improvements to Saddle Road. The Puainako Extension would divert about two-thirds of that traffic. Further down Kaumana Drive just west of Ainako Avenue, the slow but steady growth expected for Kaumana will produce about a 15 percent rise in traffic – a percentage that would likely double without the proposed project. The Mohouli Extension, if built, will divert much of that traffic from Kaumana Drive below Ainako Avenue.

This overall view reveals that the Puainako Extension and the Mohouli Extension would function to capture traffic traveling between Kaumana Drive or Saddle Road and eastern parts of Hilo. Draining this volume of traffic away from narrow and winding Kaumana Drive onto these wider and straighter new roads would increase traffic safety and decrease congestion. If the No-Build Alternative is selected, it can be foreseen that traffic at all segments of Kaumana Drive east of Country Club Drive would increase by approximately 2,700 ADT. The Mohouli Street Extension, if constructed, would relieve some of this extra traffic, but only after 8.1 km (5.0 mi.) of travel along Kaumana Drive.



TITLE

2020 AVERAGE DAILY TRAFFIC VOLUMES

MAJOR PROJECT AREA ROADWAYS, BUILD & NO-BUILD SCENARIOS

FIGURE 4-3

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

LEGEND

27,246 (NO-BUILD) / 27,246 (BUILD) AVERAGE DAILY TRAFFIC LOCATION & COUNTS

Puainako Street itself (as discussed in the previous section) would experience a substantial rise in traffic, which would increase further if the proposed improvements occur. However, the increased number of lanes, improved vertical profile and improved intersections would more than offset the traffic increase.

In summary, the proposed project would benefit the regional traffic circulation relative to the No Project scenario.

4.3.10 Pedestrian and Bicycle Traffic

4.3.10.1 Impacts

Lower Portion

The existing facilities in the Lower Portion – dual asphalt sidewalk/bikeways separated from the roadway by intermittent raised asphalt curbing – would be improved by the separation of sidewalks and bicycle lanes under current project design.

Students crossing Puainako Street at the Waiakea School Complex would have to contend with a crossing three times longer than the current 12 m (40 ft.), although a signalized intersection with crosswalks would be present.

Upper Portion

As discussed in Section 3.3.8, there is currently no pedestrian or bicycle use of the area that would be traversed by the proposed project in the Upper Portion (west or mauka of Komohana Street). If the road were constructed, it would provide a new access route among discrete clusters of residential neighborhoods currently separated by open space, and between these areas and Komohana Street. The distance from Komohana Street uphill along the Puainako Extension to the nearest residential area would be a minimum (depending on selection of Alignment 1 or 2) of approximately 2.1 km (1.3 mi.). The Upper Portion does not provide the sort of links among areas that generate substantial pedestrian use. It is perhaps for this reason that the existing Puainako Street and the proposed Extension have not been planned as integral components of the bikeway system in the *Bike Plan Hawaii* (HDOT 1994). The lack of sidewalks and bike lanes in the Upper Portion would not adversely impact pedestrians or bicyclists. A wide shoulder would provide adequate areas for the small amount of pedestrian and bicycle traffic expected. The size of the right-of-way allows for future improvements in sidewalks as needed.

Kaumana and Komohana Drive

Bicycle lanes for portions of these roadways are called for in the *Bike Plan Hawaii: A State of Hawaii Master Plan* (HDOT 1994). Pedestrians and bicyclists would benefit from a reduction in traffic relative to the expected increase in the project year 2020.

4.3.10.2 Comparison Among Alternatives

No-Build Alternative

For Puainako Street, the current situation of a narrow asphalt "sidewalk" separated from the automobile travel lanes by asphalt, interrupted curbs would probably be maintained in the future. Increasing traffic by both automobiles and trucks as well as bicycles and pedestrians would lead to a slight worsening of road safety.

Because of the high traffic volumes, Kaumana Drive would continue to offer an unsafe avenue for both pedestrians and bicycles.

These conditions could be mitigated on both Puainako Street and Kaumana Drive by construction or upgrading of sidewalks and bicycle lanes. However, there are severe expansion constraints because of the limited land available for right-of-way along Puainako Street west (mauka) of Kawili Street and along the entire length of Kaumana Drive.

Lower Portion

Sidewalks, bicycle lanes and crosswalks are of particular importance in the Lower Portion because of the Waiakea School Complex. The roadway as currently designed improves the situation by separating bicycle lanes and sidewalks. Two traffic signals would be installed at the Waiakea School Complex. Research demonstrates that signals are more effective at slowing and stopping traffic for pedestrian crossing than are unsignalized crosswalks.

Alignment A vs. B

The re-routing of Puainako Street behind the existing Puainako Street west (mauka) of Kawili Street would greatly improve the situation for bicyclists and pedestrians in this neighborhood. The selection of Alignment A or B has no impact in this category.

Upper Portion: Alignment 1 vs. 2 vs. 10

Substantial numbers of pedestrians would probably not be expected on this portion because the relatively large distance between existing homes in Kaumana and Komohana Street. It is expected that some bicyclists currently intimidated by the dangerous condition of Kaumana Drive may feel safer using the Puainako Street Extension for commuting or recreational bicycling. Alignment 1 or Alignment 10 would be marginally better in that they are ~~it is~~ shorter than Alignment 2 and provides more convenient access to existing residential areas.

4.3.10.3 Mitigation

Pedestrian Use

The project as designed would increase pedestrian safety for most of the route and thus requires no mitigation. For pedestrian use near the Waiakea School Complex, the State Department of

Transportation will continue to consult with the State Department of Education concerning the final design and location of crosswalks, traffic signals, and other crossing facilities that maximize pedestrian access and safety. Elements of such a design will include sidewalks, crosswalks, well-marked and appropriate crossing points, traffic signal location, design and timing, and possible construction of a wall/hedge as a physical barrier between the roadway and adjacent houses to help reduce danger to children and other pedestrians.

Conformance with the provisions of the federal Americans with Disabilities Act (P.L. 101-336) will be achieved as part of the project. All design will comply with standards for curb cuts, detectable warnings, traffic signal crossings, and other aspects in order to ensure that facilities are accessible and safe for the disabled.

Bicycle Use

The project as designed would improve bicycling conditions along the entire route and thus requires no mitigation. ~~Although bicycle facilities are not identified~~ The bicycle facilities now planned for Puainako Street in the State *Bike Plan* would be fulfilled by the bike lanes planned as part of the project , which ~~and~~ would integrate with other existing and planned routes.

4.3.11 Hazardous Waste

As determined through consultation with the Hawaii State Department of Health, Office of Hazard Evaluation and Emergency Response (HERR), no known hazardous waste sites are present, no active or former generators of hazardous waste are or were present, and no releases of hazardous materials have been reported along the project corridor (see Section 3.3.9).

The proposed project would involve no impacts to areas known to contain hazardous waste. Normal procedures related to safety, storage of fuels and other hazardous materials, and response to hazardous waste incidents would ensure that the project would not generate hazardous waste impacts during construction.

4.3.12 Energy

4.3.12.1 Impacts

Energy implications of the project are essentially limited to vehicle considerations, since the project does not enable or substantially encourage secondary growth or development. The energy impacts of the project were not directly evaluated. However, the findings of the Air Quality analysis (see Appendix L) also provide guidance to energy consumption by vehicles.

4.3.12.2 Comparison Among Alternatives

No-Build Alternative

As indicated by modeling of engine emissions, fuel efficiency is far poorer because of low traffic Level of Service under this alternative.

Build Alternatives

Improved Levels of Service would provide superior energy efficiency. No difference in energy consumption exists between Alignments A and B. Alignment 1, 2 and 10 involve identical elevation gain and loss, but because of the shorter path of Alignments 1 and 10, they are ~~it is~~ marginally preferable for energy consumption considerations.

4.3.12.3 Mitigation

No mitigation is proposed for operation of the highway.

4.4 Construction-Phase Impacts

Construction of the proposed project would last three to four years depending on the availability of construction funding. During this period construction vehicles, power tools and heavy equipment would generate noise, traffic congestion, exhaust emissions and the potential for soil erosion.

4.4.1 Sediments, Water Quality and Flooding

4.4.1.1 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 and other sources during construction may also impact receiving stream, ocean and ground water.

Because of the scale of the project, a National Pollutant Discharge Elimination System (NPDES) permit would 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.

4.4.1.2 Comparison Among Alternatives

No-Build Alternative

The No-Build Alternative would entail a much smaller level of improvements and reduced construction-related impacts.

Build Alternatives

No difference exists among alternative alignments in terms of these impacts.

4.4.1.3 Mitigation

Mitigation for Sediment Pollution

If a Build Alternative is selected, Special Contract Requirements will contain measures to minimize the potential for soil erosion and the amount of sediment that leaves the construction limits. The following soil erosion and sediment control standard management practices, as described in the *Erosion and Sediment Control Guide for Hawaii* (U.S. Soil Conservation Service 1981), shall be implemented to the extent practicable:

1. Timing construction activities, such as grading or the installation of culverts, during periods of minimum rainfall.
2. Limiting the amount of surface area graded at any given time to reduce the area subject to potential erosion.
3. Constructing temporary drainage ditches to divert runoff away from areas susceptible to soil erosion.
4. 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. Planting grass as soon as grading operations permit to minimize the amount of time soils are exposed to possible erosion.
5. Building sedimentation basins to collect sediment which enters runoff waters. Utilizing geotextiles such as siltation fencing to minimize the amount of sediments which would leave the site to collect in drainage structures and streams.

4.4.2 Air Quality

4.4.2.1 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.

4.4.2.2 Comparison Among Alternatives

No-Build Alternative

The No-Build Alternative would entail a lesser level of construction-related impacts.

Build Alternatives

Alignments A and 2 are more distant from existing residences and would thus involve marginally less fugitive dust and exhaust emissions.

4.4.2.3 Mitigation

An effective dust control plan is necessary to mitigate construction-related impacts. Special Contract Requirements will include specification of a plan, which would be approved by DOH, that would include some or all of the following:

- Watering of active work areas;
- Wind screens;
- Cleaning adjacent paved roads affected by construction;
- Covering of open-bodied trucks carrying soil or rock;
- Limiting area to be disturbed at any given time;
- Mulching or chemically stabilizing inactive areas that have been worked; and
- Paving and landscaping of project areas as soon as practical in the construction schedule.

The high rainfall of the project area should serve to naturally control construction dust, but it is recommended that, during prolonged dry periods, active work areas be watered at least twice daily.

Construction vehicles and disrupted traffic due to construction activity can also produce increased exhaust emissions. This can be partially mitigated by moving construction equipment and workers on and off the site during off-peak traffic hours and by minimizing road closures during peak traffic hours.

4.4.3 Noise

4.4.3.1 Impacts

If a Build Alternative is selected, construction would result in noise, no matter which alignments are selected. 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.

4.4.3.2 Comparison Among Alternatives

No-Build Alternative

The No-Build Alternative would entail a lesser level of construction-related impacts. Because improvements would occur on existing streets and intersections, however, noise impacts might still be substantial.

Lower Portion

Construction-related noise impacts would be most severe in the Lower Portion, particularly in the segment east (makai) of the Kawili/Iwalani Streets intersection. The relatively large existing traffic volume (and hence slower pace and longer duration of construction), the short setback to homes on the south side of Puainako Street, and the presence of two schools and several churches on this segment are the cause.

Alignment A vs. B

The use of Alignment A would entail less construction-related noise impacts and fewer mitigation measures than Alignment B.

Upper Portion: Alignment 1 vs. 2 vs. 10

The use of Alignment 2 would entail less construction-related noise impacts and fewer mitigation measures than Alignment 1. Alignment 10 would have impacts on a scale intermediate between 1 and 2.

4.4.3.3 Mitigation

Special Contract Requirements shall include a condition requiring the contractor to obtain a permit in conformance 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.

4.4.4 Traffic Congestion

4.4.4.1 Impacts

During the construction period, operation of construction equipment, trucks, and worker vehicles would impede traffic along the east (makai) end of Puainako Street between Kilauea Avenue and Kawili Street, particularly during school hours. The public has expressed concern that the project be scheduled to minimize construction interference with school traffic.

Because neither Upper Portion alignment crosses major roadways, no substantial traffic problem is anticipated during construction in that portion.

4.4.4.2 Comparison Among Alternatives

No-Build Alternative

The No-Build Alternative would entail a lesser level of construction-related traffic impacts. Because improvements would occur on existing streets and intersections, however, traffic impacts might still be substantial.

Lower Portion: Alignment A vs. B

The construction-related impact on traffic congestion would be equal for Alignments A and B.

Upper Portion: Alignment 1 vs. 2 vs. 10

Negligible construction-related traffic congestion is anticipated for any ~~either~~ Alignment ~~1 or 2~~, except at the Komohana Street intersection, where impacts would probably be equal.

4.4.4.3 Mitigation

Special Contract Requirements shall specify that construction of the section in front of Waiakea Elementary and Waiakea Intermediate schools should be scheduled for the summer school vacation as much as possible to minimize increasing congestion. The noise-related restrictions upon construction hours (see Section 4.4.3.3, above) would mitigate traffic congestion by avoiding peak traffic hours. Professional traffic control shall be utilized when and where appropriate.

4.4.5 Economic Impacts from Construction

4.4.5.1 Impacts

The construction of the Project would require expenditures of County, State and federal funds, as outlined in Table 2-4, above.

The proposed project is expected to generate one-time income and employment from construction activities. Using the selection of Alignments 1 and B as a typical example of a Build Alternative combination, of the projected total construction cost of $56.65 ~~62.65~~ million, for Alignments 1 and B, approximately $51.80 ~~57.55~~ million would be spent on local construction and related expenditures over 12 to 18 months. In addition, $2.8 million would be spent on planning and engineering design work before construction, and $6.0 million on land acquisition and relocation costs. Income totaling over $24 ~~25~~ million is expected to be generated during this period. Considering indirect and induced impacts, the newly generated income could reach over $40 million over the same period.

The construction project is also expected to generate as many as 500 labor-years of direct construction and related jobs during this period. Additionally, 56 labor-years of professional jobs are expected to be generated from the Project. The construction activity is expected to increase employment in that sector by 11.8 percent during Project construction. In addition, approximately 700 labor-year equivalent indirect jobs would be created over the same period of time.

The Project would also have a positive impact on both State and County resources. Additional revenues to the government would be generated in the form of sales and income taxes, and by permits and other fees. The expected State revenue from general excise taxes is $2.6 to $2.8 million, based on a 4.16 percent general excise tax rate. The revenue from income taxes is estimated to be over $2 million from direct and indirect income from the Project, based on the average of a 5.8 percent State income tax rate.

4.4.5.2 Comparison Among Alternatives

The No-Build Alternative would save expenditure of revenue but would also fail to produce economic side benefits of construction. The Build Alternative would accomplish planning goals and produce construction jobs and revenue, but would require County, State, and federal funds. *No substantial difference exists among the economic impacts associated with various alignment* combinations.

4.4.6 Public Utilities

4.4.6.1 Impacts

Road construction would entail relocation and/or temporary removal of electricity/telephone poles and transmission lines, as well as water and gas mains and distribution lines. The location of these features is discussed in Section 3.3.3.

4.4.6.2 Comparison Among Alternatives

The No-Build Alternative would avoid disruption to existing utility infrastructure. No substantial difference exists among the various alignments in the Build Alternative. Slightly less cost and disruption would be entailed under Alignment 2 in the Upper Portion because utilities on Wilder Road would not be affected.

4.4.6.3 Mitigation

Special Contract Requirements shall specify that the contractor shall schedule construction so as to minimize the length of time utility customers are inconvenienced.

4.5 Secondary (Including Growth-Inducing) Impacts [1]

Aside from the direct effects that road construction and operation have on the physical environment, road construction projects can generate secondary impacts. 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. One potential source of

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1 The Final EIS has been revised and rewritten to combine Sections 4.5 (Growth-Inducing Impacts) and Section 4.7 (Secondary Impacts).

such secondary impacts is through increased access to environmentally sensitive areas. In the case of the project area, which for the most part lacks any sensitive areas that would be more accessible as a result of the Project, this is not a concern. Another potential source of secondary impacts is through creation or substantial acceleration of new opportunities for urban growth, which in turn generate secondary or induced physical and social impacts.

Analysis of growth-inducing impacts examines the potential for a project to induce or accelerate currently planned or unplanned project area development, encourage shifts in growth from other areas in the region, or intensify growth beyond the levels anticipated and planned for without the Project. It is important to examine potential growth in the context of growth policies and development constraints. No overriding physical resource stresses (e.g., lack of water or energy) constrain growth in the Hilo area. Limits to growth are set by both the market and government policy, specifically *Hawaii County General Plan* guidelines and State Land Use District restrictions.

The Lower Portion of Puainako Street is fully developed except for the State-owned land along the north side of the road. Most of these lands have been designated for expansion of educational facilities. All of this land is within the State Land Use Urban District and is designated for Medium Density Urban use in the Land Use Pattern Allocation Guide Maps of *the Hawaii County General Plan* (LUPAG) (see Sec. 6.5 for major discussion).

Virtually no potential for new development or acceleration of planned growth attributable even indirectly to the Project is anticipated in the Lower Portion. Scattered "in-fill" development of existing vacant lots within the areas along the lower portions of Puainako Street will continue, with or without Project improvements.

The Upper Portion extends primarily through lands that are in the State Land Use Agricultural District and are zoned for agricultural use by the county. Park Hokulani, along Wilder Road, is designated as SLU Urban and zoned for single and multiple family residential uses. The LUPAG maps identify the lands along the project area primarily for Low-Density Urban development and Agriculture. There are also limited areas identified for Medium-Density Urban and Conservation uses within the upper areas along the proposed Puainako Street Extension.

It is likely that the Project may support infilling of existing subdivisions containing undeveloped lots in the Kaumana area. A number of residential subdivisions, including Sunrise Estates, Pacific Plantation, Park Hokulani and others, currently have developed lots or have necessary entitlements to allow further residential and small lot agricultural development.

There is also the potential for rezoning of existing agricultural zoned lands to higher densities in the surrounding areas. A major limitation of development in the upper Kaumana area is the substandard conditions of Kaumana Drive, which provides primary access to the area. Accordingly, future subdivision proposals are to be expected in this area, perhaps encouraged by increased accessibility of the area provided by the proposed Project. However, development is also somewhat limited by lack of sewer and drainage improvements.

The nature and timing of growth would largely be at the discretion of the State and County governments, which through zoning, land use district and other approvals exercise considerable influence on growth. Government decisions must balance concerns over excessive urban development with the need for additional housing stock and demands for the quality of life afforded by development in this area.

The proposed highway would probably facilitate and accelerate development already anticipated for this area by the State and County. However, it would not open up new development areas that have not been identified for urban development by the *Hawaii County General Plan.*

Consequently, while the development of the Puainako Street Extension would facilitate and possibly accelerate planned development of the upper Kaumana Area, it would not modify the planned land use patterns.

It is also unlikely that project-related growth would detract from the anticipated growth at residential projects slated for other areas of East Hawaii. Far greater supplies of lots of various sizes, prices and zoning are available in these other locations than in the project area. Projects such as the C. Brewer residential subdivision in Puueo, the W.H. Shipman, Ltd. project in Keaau, and the potential agricultural or residential subdivisions on abandoned sugar cane land in Hamakua may represent intervening residential opportunities that exercise a restraining influence on growth in Kaumana and other portions of the project area.

4.6 Cumulative Impacts

Cumulative impacts may be defined as impacts on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes the action (Council on Environmental Quality [CEQ] 1997:v). ~~result when implementation of several projects that individually may have limited impacts combine to produce more severe impacts or conflicts in mitigation measures.~~ This discussion considers the impacts of the proposed Project in the context of the impacts from all past, present, and reasonably foreseeable future actions. [Note: this section of the Final EIS has been modified from the Draft EIS to conform more closely to the CEQ approach to cumulative impacts. Therefore, it has added discussion of primary resources and eliminated discussion of categories that are not primary resources but instead effects on primary resources. A section on agricultural lands has been added, and sections on noise, relocation and growth have been deleted by striking through the text.]

In general, the scale of the area under consideration varies with the resource being discussed. For the Puainako project, social impacts are limited to those neighborhoods through which the Project passes; biological impacts must be considered on an ecosystem-wide basis. Table 4-12 lists and briefly describes projects whose adverse impacts might be reasonably considered to have the potential to accumulate with those of the proposed Project. The projects are listed in chronological order. Those near the end of the list are sufficiently far in the future that their precise impacts – and even the likelihood of their completion – is uncertain.

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 & Roads	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~~-2000-2001	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~~ 2001?	Water Quality [Best Mgmt. Practices/Water Quality Permits] Floodplains Native Biota Wetlands Historic Sites [Minimal Impact]
Brilhante Subdivision 15-20 residential lots	Adjacent Upper Portion: ~~1999~~-2000-2002	[Impacts and Mitigation Similar to Above]
Kaumana Homesteads 112 1-acre ag./resid. lots	Intersects Upper Portion: [delayed or cancelled]	[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 [Impacts and Mitigation Similar to Above] Threat.& End. Spp [Habitat Replacement] Wetlands Noise Historic Sites Visual Quality [Impacts and Mitigation Similar to Above] Growth Induction [Limited Development Potential]
USDA Pacific Basin Ag Research Center; 100,000 sf laboratory, $5.5 M, 10-12 ac.	Mauka Komohana Street 2001-2005?	........................[Impacts and Mitigation Similar to Subdiv. Above]
Gentry Subdivision 700 sing./multifam. homes	Adjacent Upper Portion: [delayed or cancelled]	[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]
DHHL Scattered Houselots 41 single family homes	Adjacent Upper Portion: [ongoing]	[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 Through WQ Permits] Floodplains Native Biota Wetlands [Minimal Impact]
University Expansion 100-acre campus	W of Komohana Street: In planning.	[Impacts and Mitigation Similar to Above]

Source: Hawaii County General Plan; Hawaii County Planning Department Records; Hawaii State DOT *Hawaii Long Range Land Transportation Plan* (Draft, 1998); *Kaumana Homesteads Final Environmental Assessment* (October 1998); *Preliminary Drainage Study, Sunrise Estates Unit II* (Inaba &Associates, 1995); *Final EA, Hilo Scattered Houselots Residential Development* (Sept. 1997); *Final EIS, Hilo Judiciary Complex* (Feb. 1997), and other EA's/EIS's, newspaper stories. * Water Quality, Air Quality, Noise, Floodplains, Native Biota, Threatened and Endangered Species, Wetlands, Relocation, Historic Sites, Visual Quality, Growth Induction, and others.

The cumulative impact of the proposed Project with all present and proposed actions in the Hilo area could be severely adverse if no mitigation is associated with such actions. For example, these projects taken cumulatively have the potential to increase inappropriate development in the floodplains, degrade water quality, or convert large areas of wetlands to less environmentally valuable uses. An analysis of the cumulative impact of the Project on major environmental resource categories follows:

Water Quality. Each new project contributes in some measure to loading of surface waters (permanent and ephemeral streams and wetlands), groundwater, and receiving waters (Wailoa River Estuary and Hilo Bay) with sediments and chemical pollutants. As discussed in Section 3.1.5, Hilo Bay and Wailoa River are important fishing and recreational resources. The oceanic waters of Hawaii also support a number of endangered and threatened animals. Pollution in these waters is an ongoing problem. The primary source of pollution is sewage (Dudley et al 1991), principally through seepage from unsewered residences and businesses. In addition, chemical and sediment pollution also affect Hilo Bay. New developments, including roads such as the proposed Project, are now required to incorporate Best Management Practices to reduce erosion and pollution discharge. Development activities with potential to produce pollutant discharges require National Pollutant Discharge Elimination System permits from the Hawaii State Department of Health (HDOH). Better permit conditions and monitoring, along with the steady growth of the sewer system in Hilo, have led to decreases in sediment and sewage pollution in Hilo Bay (see Section 3.1.5). The level of chemical pollution associated with roads, residential subdivisions and industrial sources in Hilo is not well documented but does not appear to be a substantial problem. Based on the permitting requirements and Best Management Practices used to reduce the impact of erosion and pollution discharge on water quality, the cumulative impacts of the projects identified in Table 4-12 plus the Project are not expected to be adverse.

Wetlands. There has been little research on high-slope, pahoehoe wetlands, such as those affected by the Project. Consequently, little is known about their distribution or functions, much less the cumulative impact they have undergone as a result of various agricultural and development activities. In areas below 620 m (2,000 ft.) in elevation, it is unlikely that most have more than minimal biological value. Field observation indicates that they are usually composed of facultative wetland species (usually alien) at somewhat higher concentrations than found in the surrounding upland matrix, and rare plants are not present. Alien grasses often dominate the larger patches of wetlands. Research for the Saddle Road EIS (FHWA 1999) on wetlands in native forests at slightly higher elevations indicated a greater native component, but one which did not differ markedly from upland floral composition. Certain high elevation bogs are known to contain high rates of endemic species and have great conservation value, but these are generally located remote from development activities, and are threatened mainly by feral ungulates. The flood-mitigation and water quality functions of the wetlands are likely highly specific to the individual wetlands, based on the wetland's size and its relation to surface waters.

Based on the incidence of wetlands found in the project area, which varied from 0 to about 15 percent, it is likely that many hundreds or even thousands of hectares (or ac.) of wetlands have been filled by agricultural or development activities in the last 50 years in the upper parts of Hilo. Continuing development, which is not always subject to regulatory oversight, may increase these numbers. However, there is no indication that development in these particular wetlands has produced, or will produce, a substantial adverse effect on any wetlands functions. The amount of wetlands has diminished over the past 50 years, but the residual effects after the mitigation specified under the Section 404 Permit for Dredge and Fill in the Waters of the U.S. combined with the effects of projects listed in Table 4-12 is not likely to have an adverse cumulative effect on the remaining wetlands in the area.

~~*Air Quality*. As discussed in Section 3.1.6, Hilo has excellent air quality, with pollutants well within State and federal air quality standards. This results from few sources of pollution, the dispersive effects of trade winds, and the island's isolation from outside sources of pollution. Although the sum of projects present and in planning have the potential to increase air pollution, there is little risk that regional air quality would noticeably degrade. It is again worth noting that the emissions burden analysis conducted for this EIS indicates that the Project would have the effect of improving regional air quality by allowing more efficient operation of the transportation system (see Section 4.1.5). Microscale air quality effects associated with the Puainako Extension are highly localized and do not appear to have the potential to accumulate with effects from any nearby existing activity or the proposed Project.~~

~~*Noise*. Noise effects associated with a highway are in general highly localized. No additional projects (e.g., airport expansion) with the potential to add to noise levels of sensitive receptors are planned in the project area.~~

Floodplains. The upland areas of Hilo are traversed by numerous narrow, minor floodplains associated mostly with ephemeral drainage systems. Although none contain substantial native vegetation, aquatic flora and fauna, or fish or invertebrates with economic or subsistence value, they do help regulate floods. Virtually all development projects in the County of Hawaii must adhere to mitigation required by Chapter 27 of Hawaii County Code. The statute helps ensure that activities that may adversely affect the timing, intensity and/or level of floods may not legally be constructed. The U.S. Army Corps of Engineers regulates any activities that involve dredge and fill in waters of U.S. Fills of substantial size or impact in these waters must be thoroughly analyzed for alternatives, and mitigation for adverse impacts must be proposed and implemented. Activities involving modifications of stream channels trigger permits from the Hawaii State Department of Land and Natural Resources. Any modification that involves adverse impacts to beneficial instream uses or floodplain values must be avoided or mitigated. If activities include potential discharges into Waters of the U.S., the Hawaii State Department of Health must examine the project and ensure proper mitigation through permits associated with Section 401 of the Clean Water Act. Projects and activities subject to this permit must implement Best Management Practices that avoid, minimize or mitigate for adverse effects. The result of these various, sometimes overlapping permits is strict regulation of activities with the potential to adversely affect streams and floodplains. In a high-rainfall area such as Hilo, such oversight is necessary and generally sufficient to avoid adverse impacts to floodplains associated with the various projects that are underway or planned for the region. Based on all the regulatory constraints and monitoring described above, all floodplain values will remain viable and the cumulative effect on floodplains in the area will not be adverse.

Native Biota. Most of the area traversed by the project area contains semi-native vegetation with fairly common species and floral assemblages. Such areas provide only marginal habitat for most native fauna, with the exception of Hawaiian hawks and bats (discussed below). Of all substrates in the Hilo area, the 1881 lava flow has the greatest native vegetation component. In the area of development in Hilo – below elevation 640 m (2,080 ft.) – the 1881 lava flow occupies about 810 ha (2,000 ac.) (see Fig. 3-4 for extent of 1881 lava flow in project area). Until recently, much of this flow escaped disturbance due to its shallow, rocky soil, unsuitable for agriculture or grazing. As of 1998, about 25 percent has been altered from its natural state. Future projects listed in Table 4-12 have the potential to convert another 8 percent. It is in this context that the Project's conversion of an additional 18 ha (44 ac.), or some 2 percent of the extent of the 1881 lava flow in Hilo, should be viewed. Based on the above, there has been a 25 percent decrease in the extent of the 1881 lava flow in Hilo, with an additional 8 percent decrease expected from projects listed in Table 4-12 and another 2 percent from the Puainako project (under Alignment 1, the worst-case; selection of Alignment 10, the Recommended Alternative, would reduce this slightly.). The potential cumulative effect on the 1881 lava flow and its habitat is thus about 35 percent reduction. If Alignment 1 is selected, preservation efforts at Kaumana Cave County Park and adjacent State land would help minimize future deterioration. ~~Clearing and fragmentation associated with the Project can be seen as a relatively minor effect that is part of a greater cumulative impact. However, the Project also has the potential to promote preservation of a portion of the 1881 lava flow. through creation of a narrow buffer strip of mostly undisturbed State land containing approximately 10 ha (25 ac.) near Kaumana Cave. This strip is bounded by Alignment 1, Kaumana Drive or the residential lots that bound it, Edita Street, and Kaumana Cave County Park. It is anticipated that the State of Hawaii will not develop this area, indirectly helping to preserve the continued existence of at least some of this vegetation type in Hilo.~~

Threatened and Endangered Species. The only endangered species found in the area are the native bat and three species of birds. The Hawaiian Hoary Bat (*Lasiurus cinereus semotus*), or *ope'ape'a*, and the Hawaiian Hawk *(Buteo solitarius)* are both locally abundant in the Hilo area and have been recorded within the project area. Additionally it is probable that the site is overflown by the threatened Newell's Shearwater (*Puffinus newelli*) and the Dark-rumped Petrel (*Pterodroma phaeopygia sandwichensis*). Given the mitigation specified in Section 4.2.3, the cumulative ~~Project's~~ impact upon all these species is negligible~~, and there are therefore no adverse impacts to accumulate with those of other projects.~~

~~*Relocation.* Very few projects in the recent past, present or future in Hilo have resulted in displacements. The only major one was the Alenaio Flood Control Project, which resulted in less than 5 residential and business relocations. The large inventory of commercial space and housing for rent or purchase at a variety of price levels provided ample sites for relocation. The five residential and one business relocation associated with Puainako would experience similar conditions. No other projects with the potential to involve relocations are foreseen.~~

Historic Sites. Sugarcane cultivation, ranching, and construction activity of the last 150 years have destroyed most historic sites in windward Hawaii associated with prehistoric or early-historic Hawaiian cultivation and settlement. The Project does not affect such sites. There are abundant sites in the Hilo area and in the State of Hawaii; however, many of these sites are not included or eligible for the National Register of Historic Places. The cumulative effect of the projects listed in Table 4-12 plus the Project will likely further diminish the remnants of historic sugarcane cultivation. ~~Archaeological sites of the type that would be destroyed by the Project — remnants of historic sugarcane cultivation — are present in a variety of places in Hawaii, including Hilo. In general, few such sites are planned for inclusion on the State or National Registers of Historic Places, and the total impact of projects in Hilo does not detract substantially from the historic site resources of the Hilo area or the State of Hawaii.~~

~~*Visual Quality.* The gradual slopes of the upland Hilo area lead to subtle viewsheds. In general, sweeping views of the ocean are unusual except from elevated structures. Views of the volcanoes, particularly Mauna Kea, occur in many locations. Thus, the net effect of the new highway and subdivisions in the upper part of Hilo is to provide new vantage points for viewing these resources without substantially degrading viewsheds through their own impacts.~~

~~*Growth Induction.* Of the list of projects in Table 4-12, only the road projects are potentially capable of inducing growth. Such induction can occur because a new road can provide a new or greatly improved access that was not accounted for in regional planning, thus leading to unanticipated growth. However, each listed roadway project has been a long-standing element in local and state land use and transportation plans. There are no subdivisions in construction or planning that require the Project in any manner. The Puainako Extension (as well as the other projects) may give certain subdivisions in Upper Hilo an advantage over others in terms of the rate of infill, but any additions in these areas will be countered by corresponding losses in the rate of growth of other subdivisions. Therefore, whether separately or jointly, these highway projects are not expected to induce unanticipated or unplanned growth.~~

Agricultural Resources. Several thousand hectares/acres of land that has been used for farming at some time are present in and around the Hilo area. Most of this land is currently not farmed. Tens of thousands of hectares/acres are present within the Puna, South Hilo, North Hilo and Hamakua districts, within a distance of 100 km (62 mi.) of the project area. Most is not farmed. The Project would convert about 3.2 ha (7.9 acres) of such farmland, and the projects listed in Table 4-12 have the potential to convert an additional amount as great as 200 ha (500 ac.). Based on the high supply of agricultural land in the area, the cumulative impacts of the projects identified in Table 4-12 plus the Project are not expected to be adverse.

4.7 Overview of Impacts and Mitigation Measures

Potential adverse and beneficial impacts of the proposed action are summarized in the Impacts section of the Summary chapter of this EIS and can be graphically compared in Tables S-1 and S-2. Section 2.6 compares the No-Build and Build Alternatives to each other, and also compares the various Alternative Alignments, on the basis of fulfillment of purpose and need and major impacts in the context of selection of the Preferred Alternative.

5 FINAL SECTION 4(f) EVALUATION

5.1 Introduction

The material in this section complies with and is submitted pursuant to 42 U.S.C. 4332(2)(c), 49 U.S.C, 303, and 23 U.S.C 138 [referred to as Section 4(f)]. These requirements apply to all actions or projects undertaken by agencies of the U.S. Department of Transportation.

The purpose of Section 4(f) is to ensure that special efforts are made to protect public parks and recreation lands, wildlife and waterfowl refuges, and historic sites. The law states that the Secretary of Transportation shall approve a project which requires the use of publicly owned land from a public park, recreation area, wildlife or waterfowl refuge, or historic site of significance only if (1) there is no prudent and feasible alternative to such use and (2) the project includes all possible planning to minimize harm to the resource being used.

The Federal Highway Administration, in consultation with the State Historic Preservation Officer (SHPO – the agency with jurisdiction over the potential 4(f) properties), has determined that 4(f) properties in question consist of two archaeological sites which have been determined to be eligible for listing on the National Register of Historic Places and important for preservation in place within one of the alternative alignments. Consultation with the U.S. Fish and Wildlife Service, the Hawaii County Department of Parks and Recreation and the Hawaii State Department of Land and Natural Resources has determined that no public parks, public recreation areas, or wildlife/waterfowl refuges would be affected by any of the alternatives considered for the project (see Appendix A1 for consultation letters with these agencies).

5.2 Section 4(f) Resources Present

The 4(f) evaluation is applicable to the project because alternative Alignment A would impact two archaeological sites which have been determined to be eligible for listing in the National Register of Historic Places and important for preservation in place. The Section 4(f) resources which would be affected by Alignment A are both complexes of structures including enclosures, mounds and platforms related to 19th and 20th century sugar cane agriculture.

Figure 5-1 illustrates the location of Sites 18914, 18915 and 18917. Table 5-1 provides the characteristics of these ~~both~~ site complexes and individual features within each site.

5.2.1 Site 50-10-35-18914

Resource Description

Site 18914 is a complex of twelve features consisting of five platforms, four mounds, two modified outcrops, and one linear terrace covering an area of roughly 5,555 m^2 (60,000 $ft.^2$). Elevation at the site is approximately 85 m (280 ft.) above mean sea level. All site features are interpreted as being associated with historic sugar cane cultivation. All site features are believed to be the result of clearing land for cane cultivation, with subsequent use of three of the features for landing ramps and one as a possible foundation for a water tank. The site is located within land belonging to Waiakea Sugar Company designated as a cane lot in 1925. Appendices E1 and E2 describe the site in more detail.

The Hawaii State Historic Preservation Division (SHPD) uses criteria from 36 CFR Part 60 to evaluate the significance of archaeological sites and make mitigation and preservation recommendations. The site was evaluated as an excellent site type (Criterion C) in addition to having information potential (Criterion D).

Impact on the Resource

Build Alignment A of the Lower Portion would pass directly through this site complex and destroy at least some of the features.

Avoidance Alternatives

Avoidance alternative considerations consist of the following:

- Build Alignment B could be selected instead of Build Alignment A.
- Shifting Alignment A to the north or south is technically feasible but would entail destruction of existing facilities and archaeological sites. To the south is a large water tank facility of the Hawaii County Department of Water Supply, as well as a number of unsurveyed archaeological features which would require survey. To the immediate north are additional archaeological features, and further north are more archaeological features and the Komohana Agricultural Extension Complex, the headquarters for a number of University of Hawaii agricultural agencies and offices. Because this measure would involve extraordinary disturbance to existing facilities and would probably not avoid impacting archaeological sites, it is considered not prudent.
- The No-Build Alternative would avoid all disturbance to these and other sugar cane-related archaeological sites. However, this alternative would not accomplish the project purpose and need.

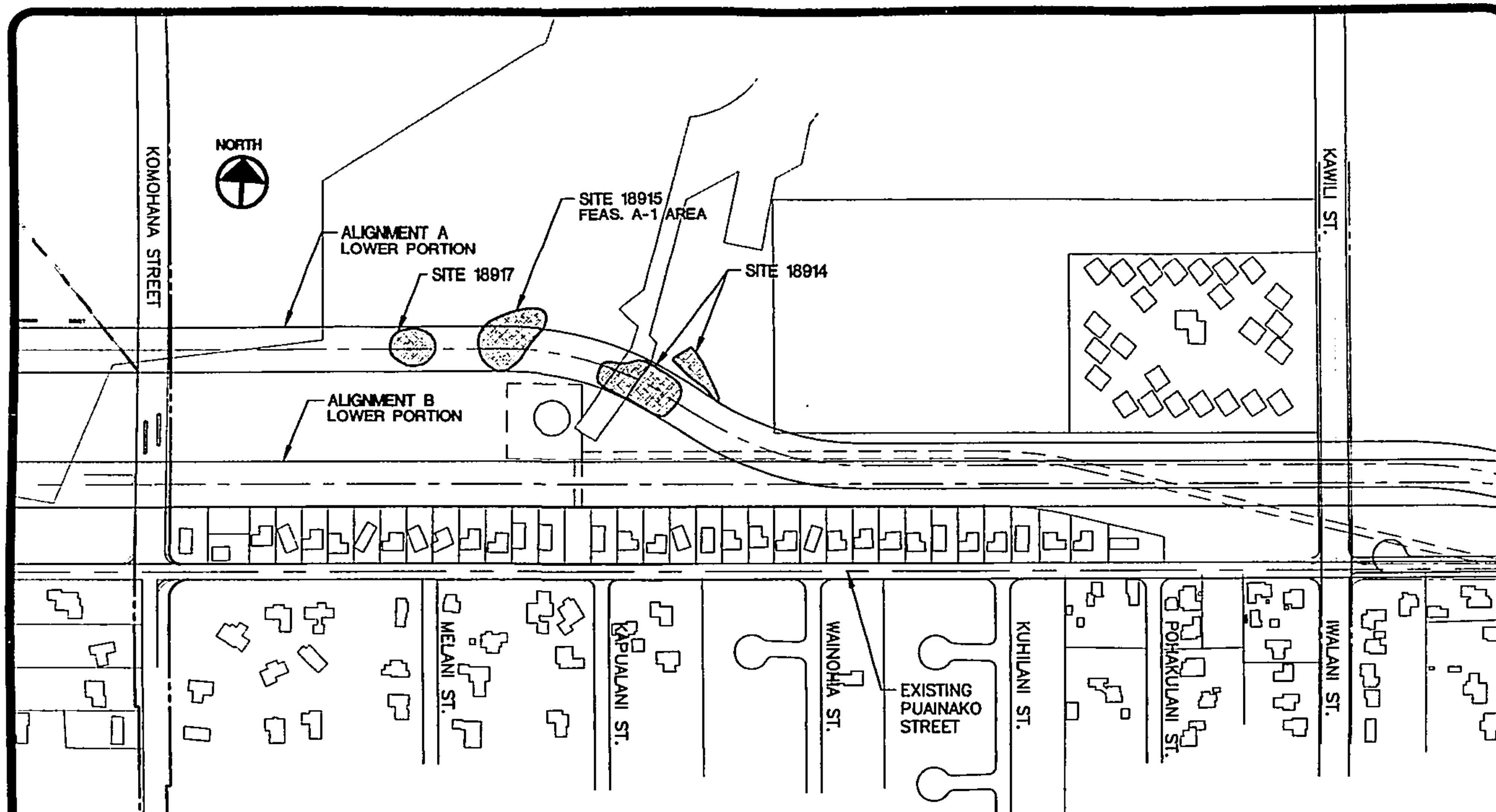
Mitigation Measures

Alignment B would effectively avoid impacts to archaeological sites requiring preservation in place. Since selection of Alignment B avoids the archaeological sites deemed important for preservation in place and is both prudent and feasible, Section 4(f) requires that it be selected.

5.2.2 Site 50-10-35-18915

Resource Description

Site 18915 is a complex of nine features consisting of an enclosure, four mounds, and three platforms, all of which are concentrated in an area measuring roughly 3,500 m^2 (38,150 ft.^{2}). Elevation at the site is approximately 92 m (300 ft.) above mean sea level. The site is associated



TITLE	FIGURE
LOCATION OF HISTORIC SITES 18914, 18915 & 18917	5-1
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000

Table 5-1
Archaeological Sites Requiring Preservation

Site No. (50-10-35)	Feat. Name	No. of Feat.	Architectural Type	Size (sq. m.)	Interpreted Function	Significance	Recom-mended
18914	--	12	Complex of Structures	--	Historic Agriculture	C,D	P
	A		Rectangular platform	34	Clearing/Foundation		
	B		Rectangular platform	50	Clear/ramp		
	C		Irregular mound	25	Clearing		
	D		Irregular mound	34.5	Clearing		
	E		Linear terrace	55	Retaining Wall		
	F		Rectangular platform	66	Clear/ramp		
	G		Irregular mod. outcrop	1092	Clearing		
	H		Curvilinear mod. outcrop	62.5	Clearing		
	I		Irregular platform	49.2	Clearing		
	3		Rectangular mound	32.2	Clearing		
	4		Rectangular platform	54.2	Clear/ramp		
	5		Circular mound	0.7	Clearing		
18915	--	9	Complex of Structures	--	Historic Agriculture	C,D	P
	A		Oval enclosure	112.5	Clear/foundation		
	B		Linear terrace-mound	20	Railroad bed		
	C		Rectangular platform	42	Clear/ramp		
	D		Rectangular mound	3.5	Clear/ramp		
	E		Rectangular platform	42	Clear/foundation		
	F		Rectangular platform	46	Clearing		
	G		Rectangular mound	13	Clearing		
	H		Oval platform	45	Clear/foundation		
	I		Irregular mound	29.5	Clearing		
18917	--	3	Complex of Structures	--	Historic Agriculture	C,D	P
	A		Linear Stone Alignment	12.5	Clearing		
	B		Rectangular mound	9.5	Clear/foundation		
	C		Rectangular mound	21.5	Clearing		

Source: Appendix E2

with historic sugar cane cultivation and contains two features (A and B) that are likely related to the railroad once used to haul cane from the fields. Feature B is probably a section of the actual railroad bed as evidenced by the presence of *in situ* railroad ties, its raised, flat surface and the presence of concrete as a foundation for infrastructure associated with the rail. The other site features are believed to be associated with clearing the land for cane cultivation, with subsequent use as landing ramps and foundations for water tanks. The site is located within what was designated a Waiakea Sugar Company cane lot in 1925. Figures 3 and 4 of Appendix E2 show one of the permanent railroad lines that passed through the area.

The site has been evaluated as an excellent site type (Criterion C) in addition to having information potential (Criterion D).

Impact on the Resource

Build Alignment A of the Lower Portion would pass directly through this site complex and would probably necessitate destruction of all features.

Avoidance Alternatives

Avoidance alternative considerations consist of the following:

- Build Alignment B could be selected instead of Build Alignment A.
- For the same reasons described in Section 5.2.1, above, horizontal realignment of Alignment A is not prudent.
- The No-Build Alternative would avoid all disturbance to these and other sugar cane-related archaeological sites. However, this alternative would not accomplish the project purpose and need.

Mitigation Measures

The selection of Alignment B would effectively avoid impacts to archaeological sites requiring preservation.

5.2.3 Site 50-10-35-18917

Resource Description

Site 18917 is a complex of three features consisting of a linear alignment and two roughly rectangular mounds, all constructed of stacked and piled boulders and cobbles. They are contained in an area of roughly 405 m^2 (4350 $ft.^2$). Elevation at the site is approximately 92 m (300 ft.) above mean sea level. The site is associated with historic sugar cane cultivation. The site is located in what is likely the floodplain of the former Waiakea Stream (now a flood control channel). All features are interpreted as stone field-clearing mounds associated with sugar cane cultivation.

The site has been evaluated as an excellent site type (Criterion C) in addition to having information potential (Criterion D).

Impact on the Resource

Build Alignment A of the Lower Portion would pass directly through this site complex and would probably necessitate destruction of all features.

Avoidance Alternatives

Avoidance alternative considerations consist of the following:

- o Build Alignment B could be selected instead of Build Alignment A.
- o For the same reasons described in Section 5.2.1 and 5.2.2, above, horizontal realignment of Alignment A is not prudent.
- o The No-Build Alternative would avoid all disturbance to these and other sugar cane-related archaeological sites. However, this alternative would not accomplish the project purpose and need.

Mitigation Measures

The selection of Alignment B would effectively avoid impacts to archaeological sites requiring preservation.

5.3 Section 4(f) Conclusions

Alignment B would effectively avoid impacts to archaeological sites requiring preservation in place. Since Alignment B avoids the archaeological sites deemed important for preservation in place and is both prudent and feasible, Section 4(f) requires that it be selected.

The Federal Highway Administration (FHWA) will continue to coordinate Section 4(f) efforts with the State Historic Preservation Division and other agencies that have an interest in or jurisdiction over Section 4(f) resources.

After the final selection of an avoidance Alternative, a preservation ~~detailed mitigation~~ plan will be developed by FHWA and DPW in consultation with the SHPO, as specified in the SHPO's letter of 15 July 1996 (see Appendix A1). This preservation ~~detailed mitigation~~ plan would establish procedures that ensure adequate protection of the sites' resources and monitoring of the area during construction. The preservation ~~detailed mitigation~~ plan will be included in the Special Contract Requirements for the project.

6 RELATIONSHIP TO OTHER POLICIES AND LAND USE PLANS

6.1 Hawaii State Plan

The *Hawaii State Plan* was adopted in 1978, was revised in 1986, and again in 1991 (Hawaii Revised Statutes, Chapter 226, as amended). The Plan establishes a set of goals, objectives and policies that are meant to guide the State's long-run growth and development activities. The proposed project is consistent with State goals and objectives that call for increases in employment, income and job choices, and a growing, diversified economic base extending to the neighbor islands.

The sections of the *Hawaii State Plan* most relevant to the proposed project are centered on the theme of facility systems. The following objectives and policies are taken from the section dealing with transportation (Section 226-17 as amended, HRS).

1. Objective a1: An integrated multi-modal transportation system that services statewide needs and promotes the efficient, economical, safe, and convenient movement of people and goods.
2. Objective a2: A statewide transportation system consistent with planned growth objectives throughout the State.
3. Policy b1: Design, program, and develop a multi-modal system in conformance with desired growth and physical development as stated in this chapter.
4. Policy b6: Encourage transportation systems that serve to accommodate present and future development needs of communities.
5. Policy b9: Encourage the development of transportation systems and programs which would assist statewide economic growth and diversification.
6. Policy b10: Encourage the design and development of transportation systems sensitive to the needs of affected communities and the quality of Hawaii's natural environment.

Discussion:

The proposed project closely matches the specific intent of these policies. The highway is meant to accommodate present needs while anticipating future needs, and it would help in the ultimate connection of East and West Hawaii. The balance between such goals and environmental and community costs and benefits is considered in the EIS.

6.2 Hawaii State Functional Plans

The *Hawaii State Plan* contains 12 separate Functional Plans which deal with specific areas of concern. The 1991 revision of the *Functional Plan for Transportation* has several objectives, policies, and implementing actions which are relevant to the project.

1. Objective 1.A: Expansion of Transportation System
2. Implementing Action I.A.1.aaa: Improve regional mobility in areas of the state experiencing rapid urban growth and road congestion.
3. Objective 1.C: Management of existing transportation systems through a program of transportation system management.
4. Policy 1.G.2: Conduct maintenance work to minimize disruption to the general public.

Discussion:

The proposed project clearly fulfills the goal of increasing mobility in areas experiencing growth and congestion. The Puainako Street Extension and Widening Project has been identified in many county and state planning documents as a vital link. The proposed Project does not fulfill Objective 1.C, although it does not preclude other actions that might fulfill the objective. Restrictions on construction schedules including avoiding peak hours and construction during the school year near the Waiakea School Complex will minimize disruption to the public, per Policy 1.G.2.

6.3 State Land Use Districts

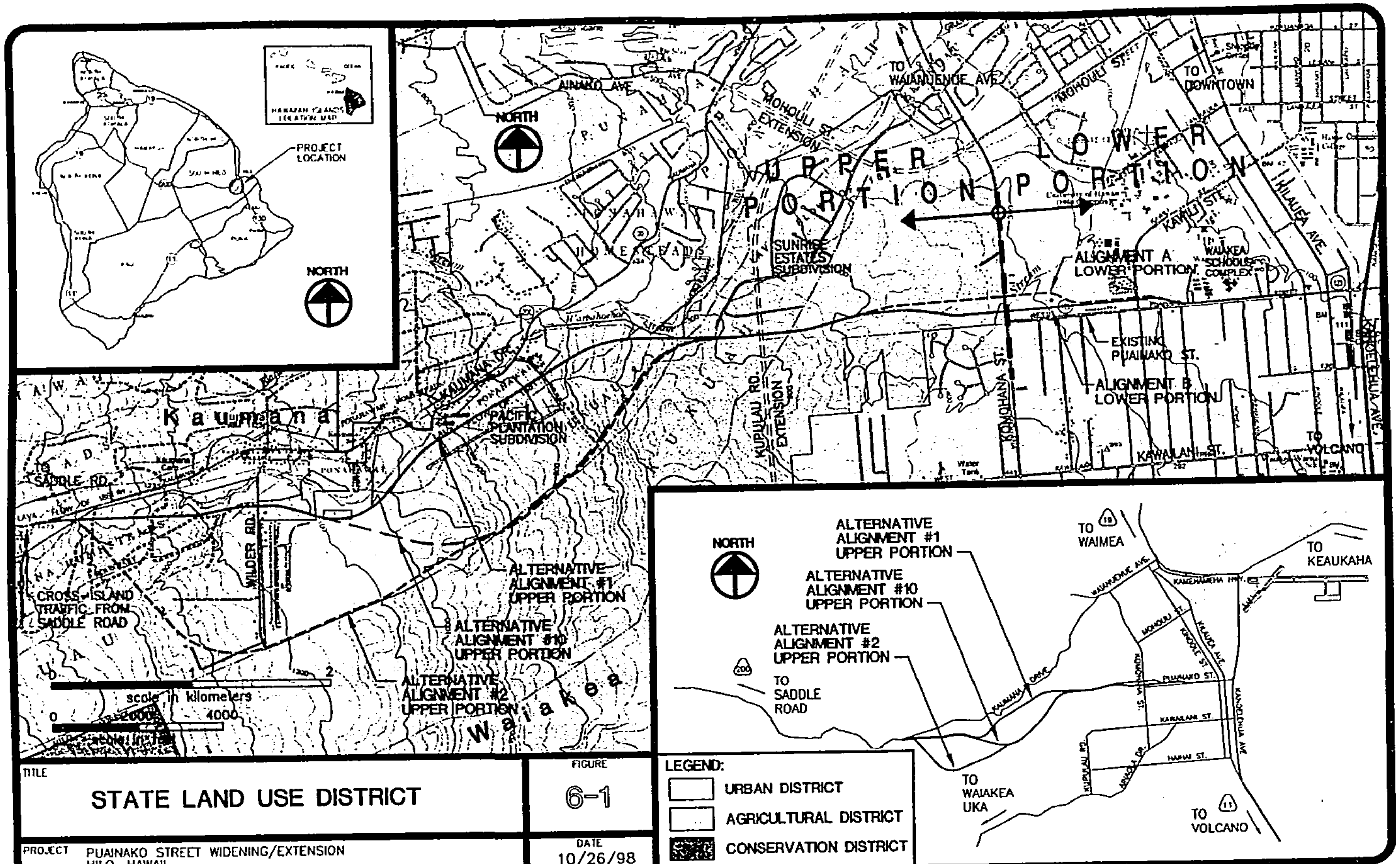
All land in the State of Hawaii is classified into one of four land use categories--Urban, Rural, Agricultural, or Conservation--by the State Land Use Commission (Fig. 6-1). The Lower Portion of the project is entirely Urban. West (mauka) of Komohana Street, the designation is Agricultural. No Petition to Amend State Land Use District Boundaries is anticipated or necessary for the Project.

6.4 Hawaii County General Plan

The *Hawaii County General Plan* is a policy document expressing the broad goals and policies for the long-range development of the Island of Hawaii. The plan was adopted by ordinance in 1989. The *General Plan* is organized into thirteen elements, with policies, objectives, standards, and principles for each. There are also discussions of the specific applicability of each element to the nine judicial districts comprising the County of Hawaii. The section most relevant to the proposed project deals with transportation.

Transportation Goals:

1. Provide a transportation system whereby people and goods can move efficiently, safely, comfortably and economically.
2. Make available a variety of modes of transportation which best meets the needs of the County.


PROJECT LOCATION
NORTH
AINAKO AVE.
TO WAIANUENUE AVE.
MOHOULI ST. EXTENSION
MOHOULI STREET
TO DOWNTOWN
UPPER PORTION
LOWER PORTION
KAWILI ST.
KILAUEA AVE.
SUNRISE ESTATES SUBDIVISION
ALIGNMENT A LOWER PORTION
WAIAKEA SCHOOLS COMPLEX
EXISTING PUAINAKO ST.
ALIGNMENT B LOWER PORTION
KUPULAU RD. EXTENSION
KOMOHANA ST.
KAWAILANI ST.
TO VOLCANO
KANOELEHUA AVE.
Kaumana
PACIFIC PLANTATION SUBDIVISION
TO SADDLE RD.
WILDER RD.
CROSS-ISLAND TRAFFIC FROM SADDLE ROAD
ALTERNATIVE ALIGNMENT #1 UPPER PORTION
ALTERNATIVE ALIGNMENT #10 UPPER PORTION
ALTERNATIVE ALIGNMENT #2 UPPER PORTION
Waiakea
scale in kilometers
0 2000 4000
TO WAIMEA
TO KEAUKAHA
TO SADDLE ROAD
TO WAIAKEA UKA
TO VOLCANO
LEGEND:
URBAN DISTRICT
AGRICULTURAL DISTRICT
CONSERVATION DISTRICT
TITLE
STATE LAND USE DISTRICT
FIGURE
6-1
PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII
DATE
10/26/98

3. Provide a system of thoroughfares and streets for the safe, efficient and comfortable movement of people and goods between and within the various sections of the County.
4. Provide an integrated State and County system so that new major routes would complement and encourage proposed land uses.

Transportation Policies:

1. A framework of transportation facilities which would promote and influence desired land use shall be established by concerned agencies.
2. The agencies concerned with transportation systems should provide for present traffic and future demands, including mass transit programs for high growth areas.
3. The improvement of transportation service shall be encouraged.

Specific Course of Action

1. A realignment of the Saddle Road from the Forest Reserve boundary on the south side of Kaumana Drive and along the north side of Puainako Street, intersecting the present Puainako alignment at Kinoole Street and continuing to the intersection of Kanoelehua Avenue should be constructed. Limited access control is recommended with intersections at the major cross arterials serving the various areas of the city.

Discussion:

The proposed Project is consistent with the *Hawaii County General Plan* and Zoning Map. Consequently, the roadway would not prematurely encourage development of areas not presently anticipated for development. However, the Project would support the ongoing development activities both in the Waiakea and Kaumana areas as circulation patterns improve.

6.5 General Plan Land Use Pattern Allocation Guide Maps and Facilities Map

County Planning Designations

The *Hawaii County General Plan* is a policy document expressing the broad goals and policies for the long-range development of the Island of Hawaii. The plan was adopted by ordinance in 1989. The Land Use Pattern Allocation Guide (LUPAG) map component of the *General Plan* is a graphic representation of the Plan's goals and policies. The Facilities Map of the *General Plan* identifies existing and proposed roads and existing facilities. These Maps 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 Puainako Road Extension links areas identified as High- and Medium-Density Urban in the lowland (makai) portion to areas identified as Medium- and Low-Density Urban at higher elevations, as well as land slated for Urban Expansion. The proposed project is thus an appropriate corridor for traffic between areas designated as urban. The Facilities Map (effective date 14 November 1989) explicitly identifies the Lower Portion of Puainako Street as a primary arterial to be improved. The Upper Portion of the proposed project is designated as a planned primary arterial.

6.6 Hawaii County Comprehensive Zoning Ordinance

The *Hawaii County General Plan* is the basis for Ordinance No. 63, the County Comprehensive Zoning Ordinance, which was adopted in 1967. Zoning maps (portion duplicated in Figure 6-~~2~~1) show the project as a secondary arterial street of a 37-meter (120-foot) wide right-of-way. Note that the roadway indicated on the map is only an approximation of the path of the Puainako Extension, the ultimate alignment of which can only be determined through considerations of design, environmental impact, and land ownership.

The zoning of areas crossed by the proposed project is either Residential (RS-15) or Agricultural (A-1a, A-3a, A-10a, and A-20a). Nearly all of this land would ultimately be developed as either urban or agricultural/residential lots, for which the proposed project would be both appropriate and convenient.

6.7 Hilo Community Development Plan

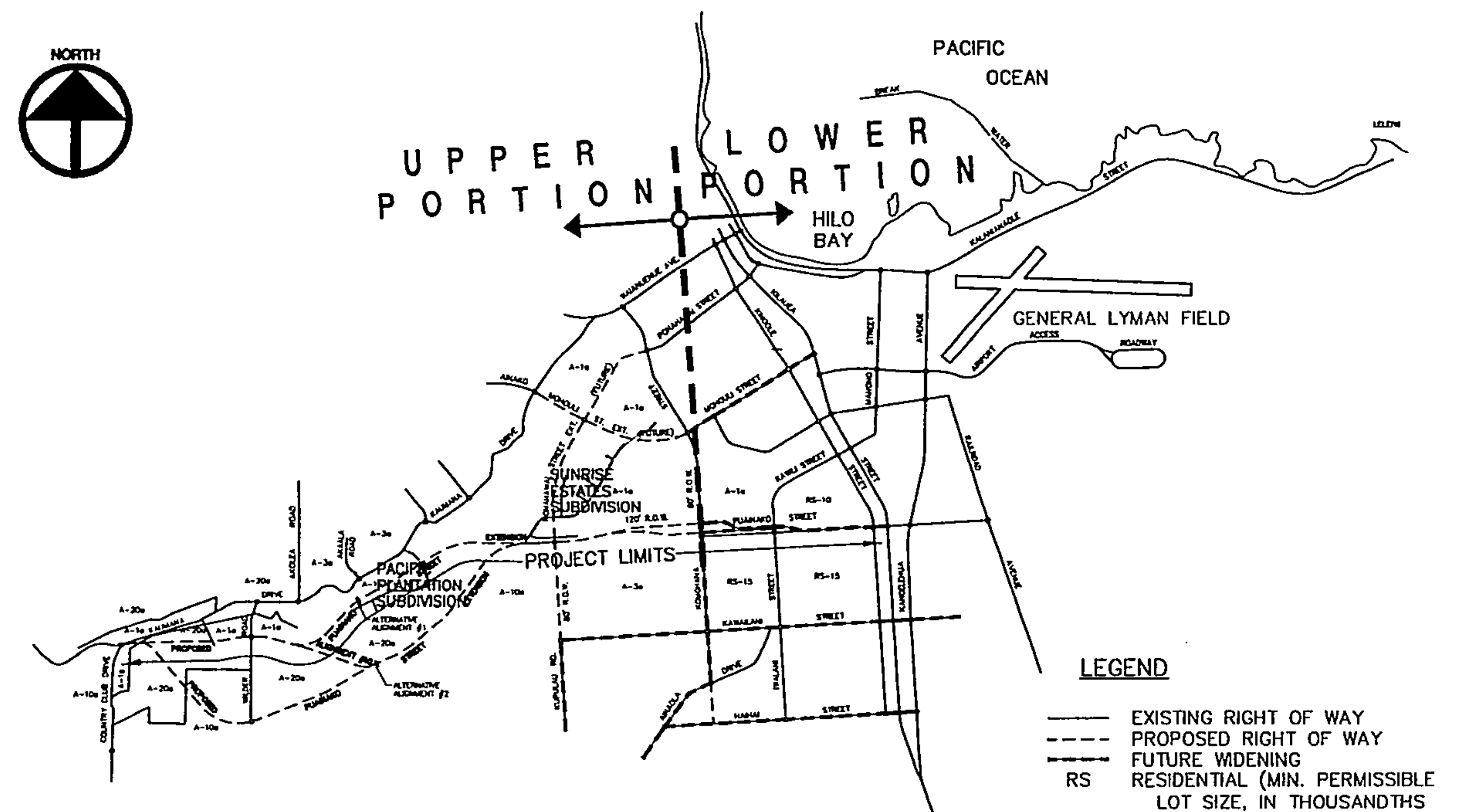
The Hilo Community Development Plan, developed by the County Planning Department in 1975 and still in effect, identifies planning priorities for the Hilo area (Belt, Collins and Assoc. 1975). The Puainako Road Extension is explicitly identified as an integral part of the Transportation Plan of Hilo (Ibid:90).

6.8 Island of Hawaii Long-Range Highway Transportation Plan

The *Island of Hawaii Long Range Highway Transportation Plan* (IHLRHP) was prepared in 1991 (and updated in 1998, renamed the *Hawaii Long Range Land Transportation Plan*) for the State Department of Transportation, in cooperation with the County of Hawaii Departments of Public Works and Planning and the U.S. Department of Transportation, Federal Highway Administration. The purpose of the study was to identify major highway corridors that are required to accommodate traffic demands projected for the Year 2010. The widening of Puainako Street, between Kilauea Avenue and Komohana Street, and the extension of Puainako Street, from Komohana Street to Kaumana Drive, are included as Tier 1 Priorities. Tier 1 Priorities are those projects that are recommended to be initiated by 2005 to address immediate highway capacity enhancement needs. This plan is currently under review by the State DOT.

6.9 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 the State



TITLE **RIGHTS-OF-WAY AND ZONING**	FIGURE **6-2**
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000

Coastal Zone Management 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 prehistoric resources in the CZM 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; and

Managing Development: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

The Project does not impact these coastal zone resources and appears to be consistent with the objectives of the program. In accordance with consultation with the State Coastal Zone Management Program, this Draft EIS was provided ~~will be included~~ as part of the materials submitted by the Hawaii State Department of Transportation to the Hawaii Coastal Zone Management Program (HCZMP) for CZMA consistency review. In a letter of January 22, 2000, the HZCMP concurred that the project was consistent with the Hawaii CZM objectives. CZM regulations require a separate review associated with the Section 404 permit phase of the project, which has been requested by the Hawaii County DPW (see letter of 9 February 2000, in App. A-5) and is currently underway.

6.10 Required Permits and Approvals

Several permits and approvals would be required to implement the Project. They are listed here under their granting agencies:

United States Department of the Army

a. Section 404 Permit (see Section 4.2.2)

Hawaii Coastal Zone Management Program

a. Coastal Zone Management Program Consistency Review (see Section 6.9)

State Department of Health

a. National Pollutant Discharge Elimination System Permit (see Section 4.4.1)
b. Section 401 Water Quality Certification

State Department of Land and Natural Resources

a. Stream Channel Alteration Permit (see Section 4.1.3)

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

7 CHAPTER 343, HRS FINDINGS

7.1 Probable Unavoidable Adverse Environmental Effects

Chapter 343 of the Hawaii Revised Statutes (HRS) is the basis for the environmental impact process in the State of Hawaii. The implementing regulations for this law, Title 11, Chapter 200 of the Hawaii Administrative Rules (HAR), contains the following requirements:

> §11-200-17(j): The draft EIS shall include in a separate and distinct section a description of the relationship between local short-term uses of humanity's environment and the maintenance and enhancement of long-term productivity.
>
> §11-200-17(k): The draft EIS shall include in a separate and distinct section a description of all irreversible and irretrievable commitments of resources....
>
> §11-200-17(n): The draft EIS shall include a separate and distinct section that summarizes unresolved issues....

This chapter addresses these requirements of the State of Hawaii EIS law.

If a Build Alternative is selected, the project would create limited adverse environmental impacts which cannot be fully mitigated by the measures planned to be implemented at the site. The following two lists include those short-term and long-term impacts that are expected to be unavoidable. Refer to Chapter 4 for full explanation of impacts, mitigation measures and comparison among alternatives.

7.1.1 Unavoidable Adverse Short-Term Impacts

1. Negligible temporary increases in soil erosion would result from construction operations, and a negligible amount of soil would be carried off-site in surface runoff water.
2. Operation of construction equipment, trucks, and worker vehicles may temporarily impede traffic in the area during the construction period.
3. Negligible release of air contaminants would occur from construction equipment. Small amounts of dust may be generated during dry periods as a result of construction operation.
4. The visual character of the area would be affected by construction activities and by the presence of construction equipment.
5. Noise levels would increase during construction activities.

7.1.2 Unavoidable Adverse Long-Term Impacts

1. Soils would be disturbed by grading, excavation, and mounding activities at the site during construction. Since soil cover on the site is very sparse, soil would be imported

to cover cleared and graded land for planting landscaping materials, except for areas left in natural vegetation.

2. Modifications to the current topography would be made at the site to accommodate Project development.
3. Approximately 3.0 to 4.5 ha (7.4 to 11.1 ac.) of early successional native scrub forest along the proposed roadway from Komohana Street to Country Club Drive will be destroyed by the project.
4. Noise levels would increase in the Upper Portion and in the Lower Portion between Kawili Street and Kilauea Avenue. Depending on the success of mitigation efforts and the exact route of the final alignment, noise levels might actually decrease along Puainako Street between Kawili and Komohana Streets.
5. Archaeological sites associated with sugar cane cultivation would be destroyed. If Alignment B is selected for the Lower Portion, no sites considered for preservation would be destroyed.
6. Approximately 3.2 ha (7.9 ac.) of Prime Farmland would be converted.
7. Depending on the Alignment chosen, wetlands with a total area of between 1,669 m^2 (17,630 $ft.^2$) and 32,570 m^2 (344,020 $ft.^2$) would be filled. Onsite and offsite mitigation would compensate.

7.2 Relationship Between Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

No short-term exploitation of resources that would entail negative long-term consequences has been identified for a Build Alternative. All substantial adverse impacts resulting from the project are capable of mitigation to minor levels using reasonable measures. The principal long-term benefit is the decrease in traffic congestion and increase in safety and efficient travel that would be made possible by the proposed Project. Air quality would also improve relative to the No-Build Alternative.

7.3 Irreversible and Irretrievable Commitments of Resources

The construction and operation of the proposed roadway system would involve the irretrievable commitment of certain natural, social and fiscal resources. Major resource commitments include land, money, construction materials, labor and energy. In addition, approximately 32 ha (79 ac.) of natural or semi-natural vegetation would be lost, along with 2.9 ha (7.2 ac.) of wetlands, 3.2 ha (7.9 ac.) of Prime Farmland. At least 8 archaeological sites would be impacted, and 5 dwelling units would be displaced. Wetlands with a total area of between 1,669 m^2 (17,630 $ft.^2$) and 32,570 m^2 (344,020 $ft.^2$) would be filled. The impact of using these resources should, however, be weighed against the economic benefits to the residents of the County and State and the consequences resulting from taking no action.

The commitment of resources required to accomplish the project includes labor and materials which are primarily nonrenewable and irretrievable. The operation of the project would also include the consumption of petroleum-derived fuels, which also represents an irretrievable commitment of resources.

7.4 Unresolved Issues

There are no unresolved issues. ~~Project was granted a provisional Department of the Army Nationwide Permit for Dredge and Fill in the Waters of the U.S on September 10, 1996. This permit lapsed on January 21, 1997. An updated application for a Department of the Army Permit is being prepared concurrently with the EIS If Alignment 1 is selected, a Nationwide Permit is expected to be issued, with mitigation consisting principally of Best Management Practices. Alignment 2 would require an individual permit, and mitigation is not yet specified.~~

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9 CONSULTATION AND COORDINATION

9.1 Project Organization

The Federal Highway Administration and the State Department of Transportation are serving as joint lead agencies to prepare an EIS in compliance with both NEPA and State requirements. This document is being prepared in cooperation with Hawaii County.

9.2 Agencies Contacted

The following list includes governmental agencies that have been contacted as part of the planning and analysis process for the preparation of the Draft EIS.

Federal Agencies

Department of the Army
Pohakuloa Training Area Headquarters
U.S. Department of Interior, Fish and Wildlife Service
U.S. Geological Survey
U.S. Army Corps of Engineers
Department of Agriculture, Natural Resources Conservation Service

State Agencies

Department of Land and Natural Resources, Division of Water and Land Development
Department of Health
Department of Human Services
Department of Education
Department of Agriculture

County Agencies

Planning Department
Department of Water Supply
Fire Department
Police Department
Department of Parks and Recreation
County Council

An extensive list of these agencies as well as other organizations and individuals received the federal Notice of Intent (NOI) (copy included in Appendix A1) and the State Notice of Preparation of Environmental Impact Statement.

9.3 Public Involvement

The coordination efforts leading to this document began with the preparation of a State Environmental Impacts Statement consistent with Chapter 343, Hawaii Revised Statues, relating to Environmental Impact Statements. Subsequent to the acceptance of this EIS by the Governor of the State of Hawaii in December 1993, the County of Hawaii, in consultation with the State Department of Transportation and the Federal Highway Administration determined that federal funding may be appropriate for this project; accordingly, an EIS consistent with the National Environmental Policy Act (NEPA) was required. At the same time, the State EIS was proposed to be revised to ensure it was consistent with certain adjustments to the project alignment.

Accordingly, the coordination efforts for this project began in 1992 with the publication of the EIS Preparation Notice (EISPN) in the Office of Environmental Quality Control (OEQC) *Bulletin*.

The following is a chronology of the formal coordination events which have been conducted as part of the preparation of this document:

- An EISPN was published in the *OEQC Bulletin* on 23 February 1992 to announce the intent to prepare an EIS and provide a description of the project, potential impacts, and description of the alternatives being considered.
- The EISPN was mailed to responsible agencies, including federal, State and County agencies having jurisdiction over or information or expertise relevant to the contents of the study. A 30-day comment period was provided to agencies to submit comments on the scope of the EIS. The EISPN was also mailed to key community organizations, environmental groups and other individuals with an identified interest in the Project.

  A total of eight responses were received. These comments were noted and addressed in the preparation of the State EIS.

- As part of the initial scoping effort, a public meeting on this project was conducted on 20 July 1992. Over eighty (80) people attended this meeting with approximately seventeen (17) people providing written or oral comments on the proposed Project. A copy of the transcript of this scoping meeting is attached as Appendix A.
- Distribution of the draft State EIS began on 29 May 1992, with publication of its availability on the *OEQC Bulletin*. This document was distributed to key federal, State, and County agencies as well as to interested individuals and groups. Comments were received from the following:

Federal Agencies

U.S. Army Corps of Engineers
Department of the Navy
U.S. Department of the Interior, Geological Survey (USGS)

State Agencies

Office of Environmental Quality Control
Housing Finance and Development Corporation
State Department of Transportation
Department of Business, Economic Development & Tourism
State Department of Health
State Department of Defense
Department of Accounting and General Services
State Historic Preservation Division, Department of Land and Natural Resources
State Land Use Commission
Office of State Planning

County Agencies

Planning Department

Individuals/Organizations

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Environmental Center, University of Hawaii at Manoa
David Paul, Student Naturalist, University of Hawaii at Hilo (UHH)
Joseph Valente, University of Hawaii at Hilo graduate
William H. Wilson, Chair, Hawaiian Studies Program, UHH
Michael Larrish, Ho'oikaika Research Committee

- In December 1993, Governor Waihee accepted the State EIS, complying with the requirements of Chapter 343, H.R.S., relating to Environmental Impact Statements.
- Publication of a Notice of Intent in the *Federal Register* on 12 January 1995 to announce the intent to prepare an EIS in accordance with the stipulations of the Federal Highway Administration environmental requirements and the National Environmental Policy Act.
- An EISPN was published in the *OEQC Bulletin* on 8 August 1995 to announce the intent to prepare an EIS consistent with the proposed Federal EIS and to provide a description of the project, potential impacts, and alternatives under consideration.
- The EISPN was mailed to responsible agencies, including Federal, State and County agencies having jurisdiction over or information or expertise relevant to the contents of the study. A 30-day comment period was provided to agencies to submit comments on the scope of the EIS. The EISPN was also mailed to key community organizations, environmental groups and other individuals with an identified interest in the project.

Ten responses were received. These comments were noted and addressed in the preparation of the EIS. Copies of the comments and responses to the Preparation Notice for the Revised EIS is attached as Appendix A1.

In addition to the formal coordination, a variety of public participation activities have been conducted over the course of the engineering and environmental studies. This included meetings with community organizations, Waiakea Elementary and Intermediate School and University of Hawaii at Hilo officials, environmental groups, and impacted residents, business owners and church members.

Furthermore, as part of the research for this Project, meetings were conducted with residents and interested individuals within the Waiakea (Lower Portion) and Kaumana (Upper Portion) areas. Parents and students of Waiakea Elementary and Intermediate Schools were also contacted to determine their concerns on and thoughts about the Project.

9.4 Chronology of Consultation and Coordination Pre-Draft EIS

The following is a list of the key consultation and coordination events conducted over the course of the studies leading to this document. These are in addition to the formal agency coordination correspondence listed above.

- A Public Information Meeting held on the project at Waiakea Intermediate School Cafetorium, with approximately 80 attendees and representatives of the County. 20 July 1992.
- Series of mail-out surveys and focus group meetings with Waiakea residents, parents of children attending Waiakea Intermediate and Elementary Schools, and Kaumana residents. Autumn 1992.
- Field trip to area of project corridor near University of Hawaii at Hilo with Ho'oikaika Hawaiian Awareness Club, to view archaeological features and discuss treatment and mitigation. 29 July 1993.
- Coordination meeting with the Chancellor of the University of Hawaii at Hilo. 29 July 1993.
- Meeting with members of Ho'oikaika at the University of Hawaii at Hilo Campus Center to take input and answer questions about the project's potential impact on historic sites. 3 August 1993.
- Kaumana Community Council sponsored a meeting on the project, at Kaumana Elementary School. 8 September 1993.
- Second field trip with Ho'oikaika and other interested parties to archaeological sites near University of Hawaii at Hilo. 8 November 1993.
- Field visit to archaeological sites with members of the State Historic Preservation Division. 28 November 1993.
- Town meeting conducted by State Representative Jerry Chang at Hilo High School Cafetorium to cover transportation issues in Hawaii, focussing on the Puainako Extension and Widening Project. 10 November 1993.
- Meeting with University of Hawaii at Hilo administration officials regarding archaeological sites and land issues. 8 June 1994.

- Town meeting on the Project conducted by Councilman James Arakaki. 14 December 1994.
- Field visit to Kaumana Cave with Dr. Fred Stone of Hawaii Community College. 29 April 1995.
- Meeting with nearby businesses concerning relocation and right-of-way acquisition at Okahara & Associates conference room. 11 September 1995.
- Meeting with Board of Directors of Kinoole Baptist Church on right-of-way taking. 11 September 1995.
- Meeting with potential displaced residents at the University of Hawaii at Hilo Campus Center. 11 September 1995.
- Meeting with the Principals of Waiakea Elementary and Waiakea Intermediate Schools. 25 September 1995.
- Meeting with U.S. Army Corps of Engineers, Pacific Operation Division, to coordinate on wetland issues. 12 November 1995.
- Meeting of Upper Kaumana Community Council on Puainako Extension and Saddle Road projects, Kaumana Elementary School. 15 January 1996.
- Meeting of Waiakea Elementary School PTA on Puainako Extension at Waikea Elementary School on 20 February 1996.
- Presentation to Upper Kaumana Council. 13 May 1997.
- Presentation to Hawaii Island Chamber of Commerce. 2 July 1997.
- Community meeting at Kaumana School. 20 November 1997.
- Community meeting at Hilo High School. 25 November 1997.

9.5 Chronology of Consultation and Coordination Post-Draft EIS

Availability of the Draft EIS was announced in the *Federal Register* on 24 December 1998, and in the Hawaii State Office of Environmental Quality Control (OEQC) Environmental Notice on 23 December 1998. This initiated a 45-day comment period that was originally scheduled to end on 8 February 1999, but was extended to 23 February 1999. Several commenters requested additional extensions to 15 March 1999, which were granted by FHWA. A total of 61 letters were received before the deadlines. Each letter is duplicated in Appendix A3, along with the response letter from the Chief Engineer of the Hawaii County Department of Public Works, the applicant agency under the Hawaii Environmental Policy Act.

A public hearing was held at the University of Hawaii at Hilo on 19 January 1999. Ten comment letters (listed in App. A3) were received at the hearing. Appendix A4 presents the public hearing publicity, the materials that were available for review at the hearing, and the transcript of the hearing.

The following is a list of the public and local government agency consultation events that occurred after the publication of the Draft EIS. These are in addition to formal agency coordination correspondence, which is contained in Appendix A5.

- Meeting of consultant representatives with Hawaii Department of Land and Natural Resources Land Division Land Agent Harry Yada, concerning impacts to State parcels. 31 March 1999.
- Meeting with University of Hawaii at Hilo facilities planners. 6 April 1999.
- Meeting of project sponsor agency and consultant representatives with Kinoole Baptist Church Board, at church. 6 April 1999.
- Meeting with Pacific Plantation subdivision residents, Kaumana School. 6 April 1999.
- Meeting of project sponsor agency and consultant representatives with Kinoole Baptist Church Board, at church. 13 January 2000.
- Meeting of project sponsor agency and consultant representatives with Kinoole Baptist Church Board, at church. 23 January 2000.

9.6 Summary of Issues Raised at Public Hearing and in Written Comments

The following summarizes the principal issues raised in comments received at the hearing and also in the written comments that were received during the comment period. The issues are presented in order of the frequency with which the issue was raised, with the most commonly cited issues first.

Noise (and Related Traffic Problems) at Pacific Plantations Subdivision. Although the issue was not raised in testimony at the public hearing, a number of written comments were received on this topic. Most stated support for the Project but opposition to the selection of Alignment 1, and preference for Alignment 2. The primary objection was noise, as the Draft EIS stated that although many homes would be impacted by a noise increase of 15 L_{eq} or more, feasible and reasonable mitigation was not possible. The lead agencies attempted to resolve this (and other problems) by designing a hybrid alignment of 1 and 2 (named Alignment 10) that would retain the best features of both and minimize adverse impacts. This route, which eliminated noise impacts to Pacific Plantations Subdivision and caused no additional noise impacts, has been advanced as the Preferred Alternative in the Final EIS.

Noise, Loss of Right-of-Way and Access Restrictions at Kinoole Baptist Church. Testifiers at the public hearing and a number of comment letters objected to the project's impacts on the church. One of the major objections was the finding that because noise mitigation walls that could reduce sound levels by at least 5.0 L_{eq} were judged to cost greater than $35,000 (and were in any case infeasible because of access considerations), no noise mitigation measures would be offered to the church. Additionally, they expressed concern that the combination of loss of parking, decrease in access and internal circulation efficiency, and noise impacts would combine to render the church unusable. In response to these concerns, the project sponsor agencies attempted to reduce impacts to the greatest extent practicable and explore alternative mitigation. The first effort led to a reduction in the right-of-way between Kinoole Street and Kilauea Avenue of about 2 m (6 ft.), which combined with a redesign of the sidewalk shifted the traffic lane nearest the church about 3 m (10 ft.) away from the church. This redesign reduced the level of noise to 66.4 L_{eq} at the main chapel and to 66.5 L_{eq} at the side building. However, because this level approaches or exceeds the 67 L_{eq} criterion, a noise impact still occurs. Therefore, alternative mitigation was explored, using a model that has been adopted by FHWA and HDOT for determining whether the cost level at which mitigation for noise impacts is considered reasonable for non-profit institutional structures. This model has been applied to Kinoole Baptist Church, with results that noise reduction measures costing more than $35,000 (up to a ceiling of $290,500), such as sound-proofing and air-conditioning, may be considered reasonable. Although the actual cost of sound-proofing and air-conditioning has not been calculated, these measures are estimated to cost far less than the specified ceiling. Therefore, based on cost, sound reduction and other factors, noise mitigation measures for the Kinoole Baptist Church would appear to be reasonable and feasible, and they are expected to be built, or to be considered as part of damages to the church as part of the right-of-way acquisition procedure, if a Build Alternative is selected.

Impact to Caves. In written comments, two members of speleological organizations raised concerns about impacts to caves in general and, in particular, to Kaumana Cave (the main opening of which is a County Park) and a newly discovered cave in the Sunrise Estates subdivision. The commenters stated that insufficient consideration was given to the value of lava tube caves in the EIS, that the mapping of Kaumana Cave was inaccurate, and that other caves would be adversely impacted by the Project and were not receiving adequate consideration. The lead agencies and consultants met with the Hawaii Speleological Survey to gain more information on these concerns. They then consulted with the U.S. Geological Survey and the U.S. Fish and Wildlife Service to get their recommendations about assessing the value of caves, impacts to them, and mitigation, if necessary. The result of the coordination has been to determine that lava tube caves have been adequately considered (with the addition of the discussion of the cave in Sunrise Estates to the Final EIS), that Kaumana Cave was accurately mapped, and that, in most cases, impacts to caves would be very minor, because they are widespread in the pahoehoe flows of the island of Hawaii and are only rarely *uniquely* valuable. Mitigation measures related to caves presented in the Draft EIS have been refined. These state that if a lava tube cave is encountered, all construction with the potential to impact the lava tube will immediately cease, and appropriate personnel in the Hawaii County Department of Public Works will be contacted. These personnel will contact State Historic Preservation Division, the USGS and the USFWS to determine whether historic sites or burials are present, and whether the lava tube has special geological, biological or other value that merits investigation and data collection. Organizations with an interest in lava tube caves will also be consulted.

Coordination with Public Schools and the University of Hawaii. Several agencies requested additional coordination with these schools in order to ensure that the final roadway design satisfies the schools' requirements for access and parking and causes minimum inconvenience during construction. The project representatives met with the affected schools and agencies and have scheduled further coordination during final design in order to meet these goals.

Access to Nearby Properties. Several commenters had questions concerning whether the Project could provide better access to their properties, which were near, but did not border any alignment of the project. They were informed via letter that, in general, only properties that actually border the alignment or would have their access to the property interfered with by the Project in some way would be potentially provided access directly on the highway. Such properties may be allowed by the Hawaii State Department of Transportation to access the road directly, depending on the particular situation.

Insufficient Information Concerning Wetlands. The U.S. Environmental Protection Agency expressed concerns in written comments that the wetlands in the project area were discounted in the Draft EIS because they are not unique, harbor invasive alien species, and are often the result of human interference with topography and/or drainage systems. Furthermore, they requested additional information on the hydrologic functions and values of the wetlands, and a discussion of cumulative impacts of wetlands loss. These concerns have been fully addressed through expansion of consideration of wetlands in the Final EIS, including a program of compensatory mitigation

Impacts to State of Hawaii Land Parcels. The Hawaii State Department of Land and Natural Resources (DLNR) expressed concerns regarding impacts to State properties that might be deprived of useful function or experience restricted access. Project representatives met with DLNR to discuss the properties on a case-by-case basis.

Address Cultural Impacts of Project. The Office of Hawaiian Affairs requested that cultural impacts be addressed. This agency, and other Native Hawaiian Organizations that it has identified in subsequent meetings, has been re-consulted as part of expanded Section 106 consultation.

10 DEIS/FEIS DISTRIBUTION LIST

Note: This list has been revised from the list printed in the Draft EIS (DEIS) to supply a complete account of parties receiving the DEIS, to update the list for parties receiving the Final EIS, and to supply addresses. Lead agencies and sub-agencies are not listed. * Denotes received only Draft EIS

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11 INDEX

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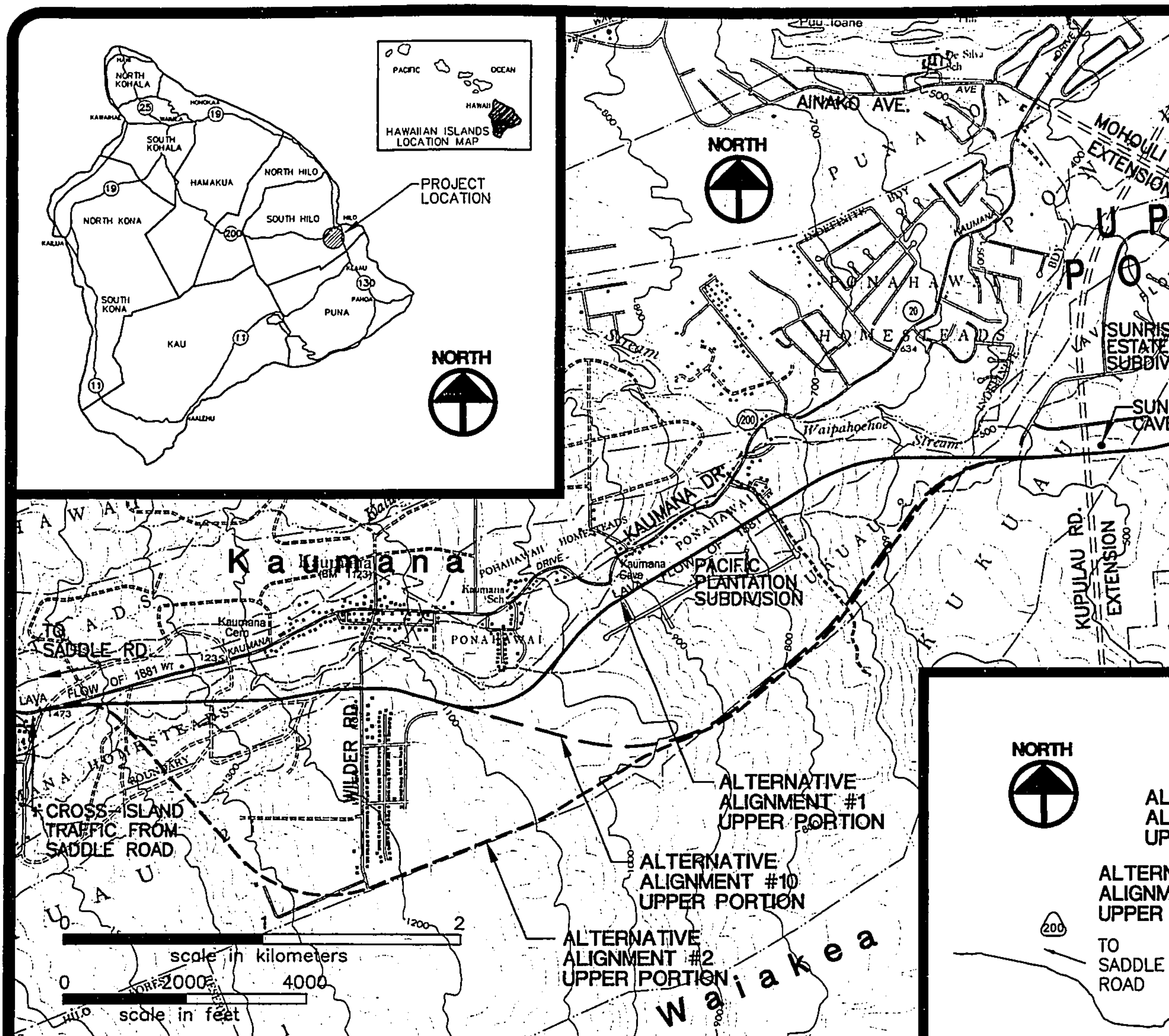

TITLE

PUAINAKO WIDENING/EXTENSION PROJECT LOCATION

FIGURE S-1

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 10/26/98

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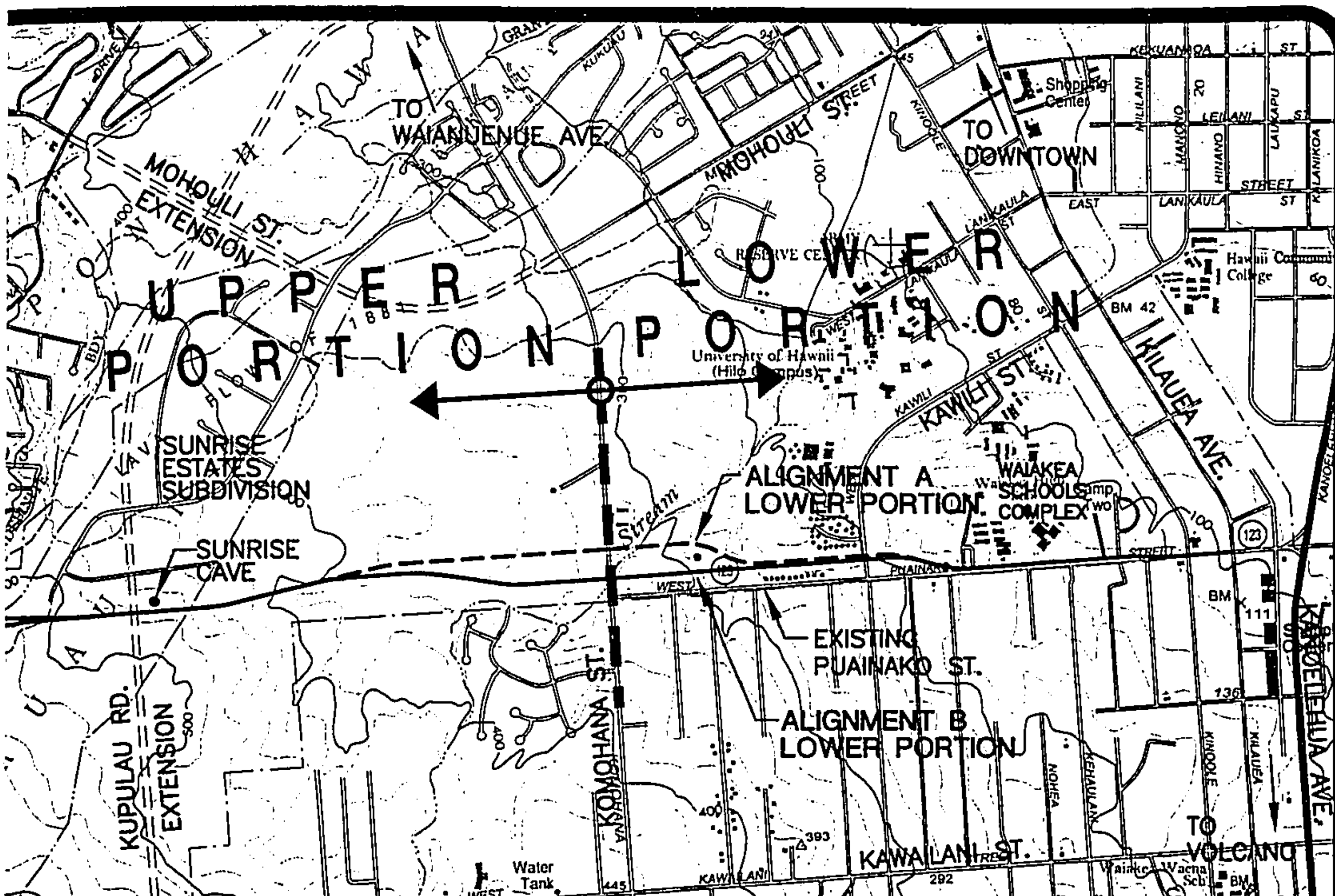
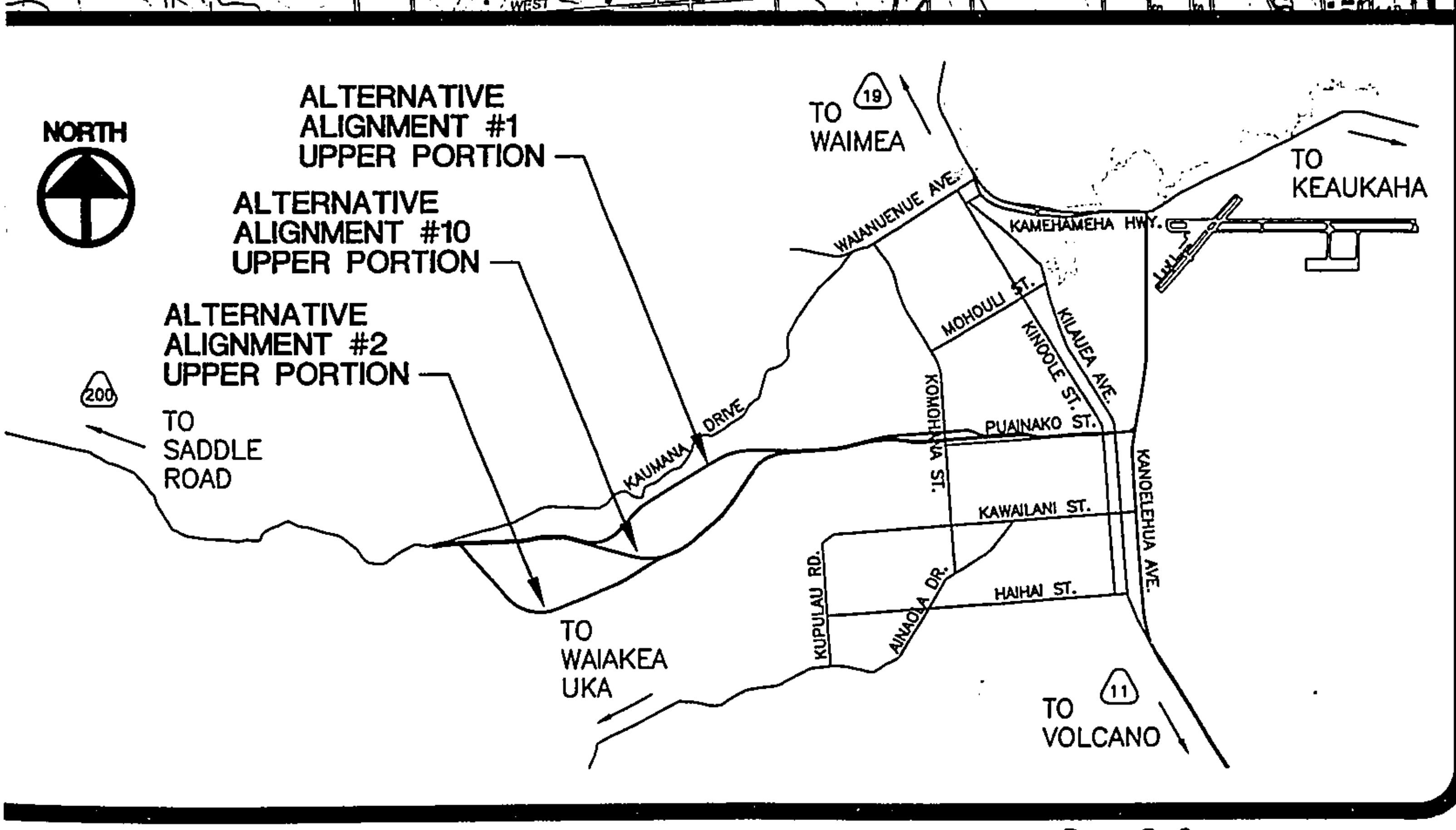
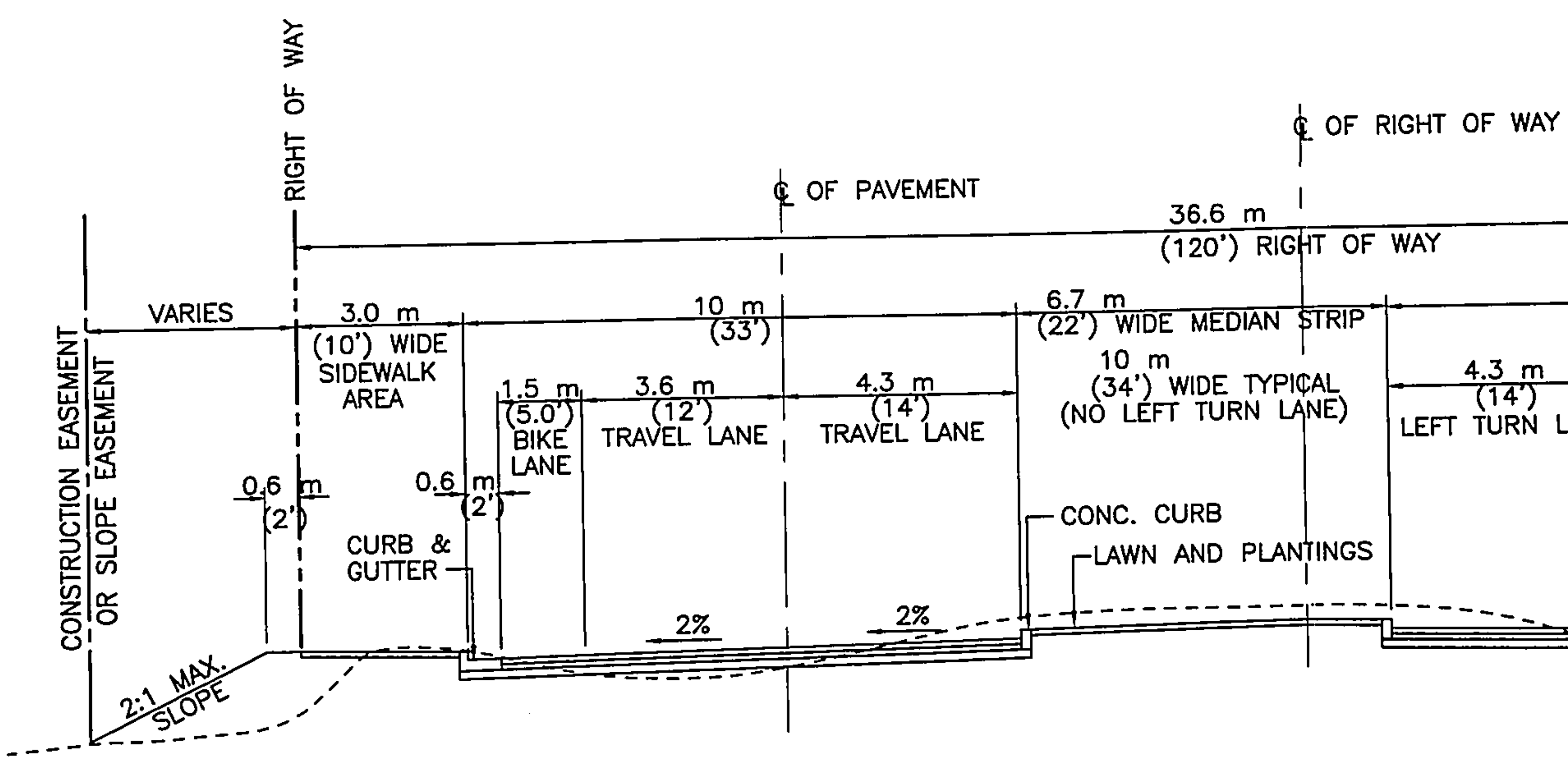


UPPER PORTION
LOWER PORTION
TO WAIANUENUE AVE.
TO DOWNTOWN
MOHOULI ST. EXTENSION
MOHOULI STREET
SUNRISE ESTATES SUBDIVISION
SUNRISE CAVE
ALIGNMENT A LOWER PORTION
WAIAKEA SCHOOLS COMPLEX
EXISTING PUAINAKO ST.
ALIGNMENT B LOWER PORTION
KUPULAU RD. EXTENSION
KOMOHANA ST.
KAWAILANI ST.
KILAUEA AVE.
KANOELEHUA AVE.
TO VOLCANO
University of Hawaii (Hilo Campus)



NORTH
ALTERNATIVE ALIGNMENT #1 UPPER PORTION
ALTERNATIVE ALIGNMENT #10 UPPER PORTION
ALTERNATIVE ALIGNMENT #2 UPPER PORTION
200
TO SADDLE ROAD
19
TO WAIMEA
TO KEAUKAHA
WAIANUENUE AVE.
KAMEHAMEHA HWY.
MOHOULI ST.
KINOOLE ST.
KILAUEA AVE.
KAUMANA DRIVE
PUAINAKO ST.
KOMOHANA ST.
KANOELEHUA AVE.
KAWAILANI ST.
KUPULAU RD.
AINAOLA DR.
HAIHAI ST.
TO WAIAKEA UKA
11
TO VOLCANO



TITLE

TYPICAL SECTION
LOWER PUAINAKO

KOMOHANA STREET TO KILAUEA AVENUE

FIGURE

S-2

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE
2/03/2000

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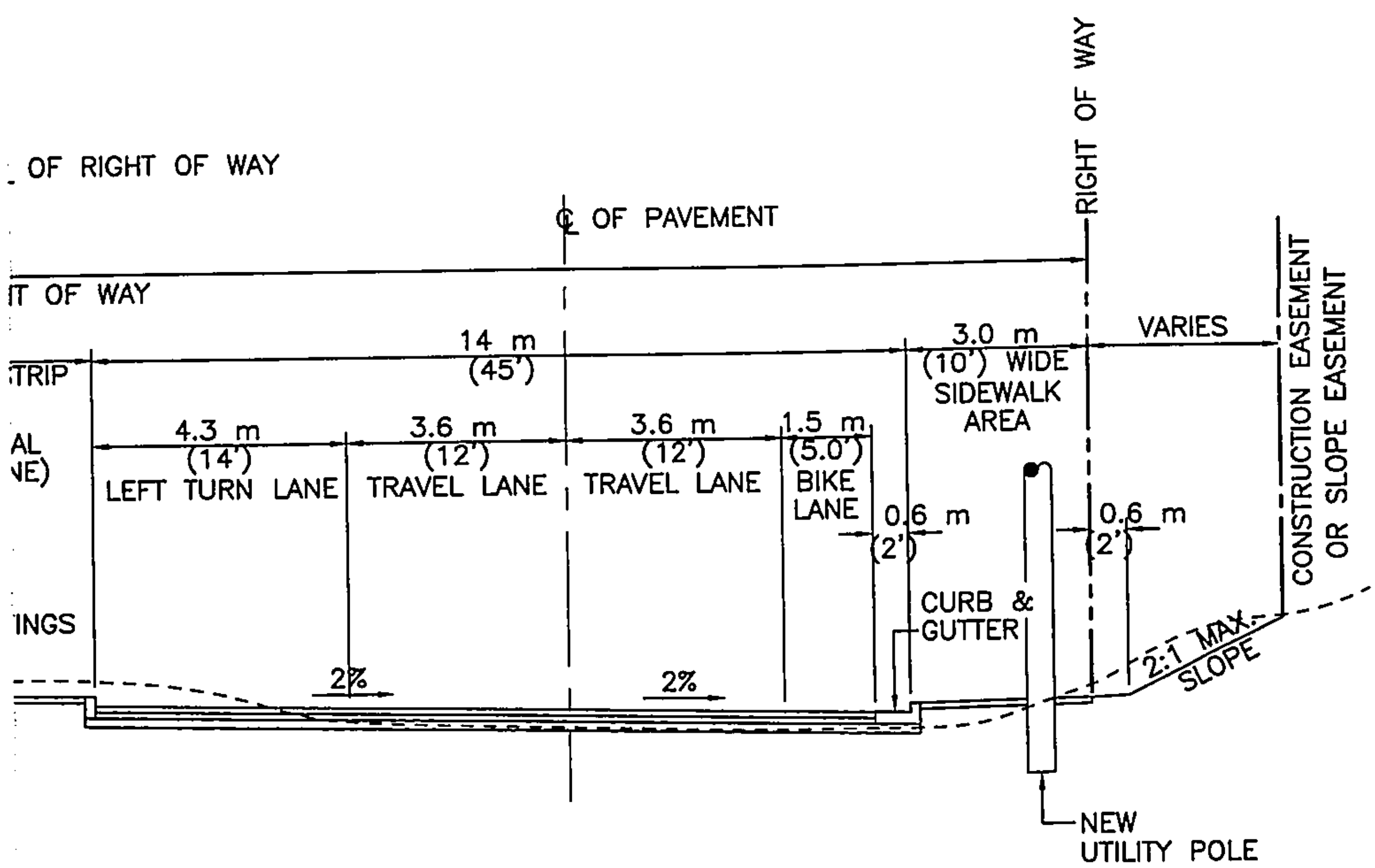
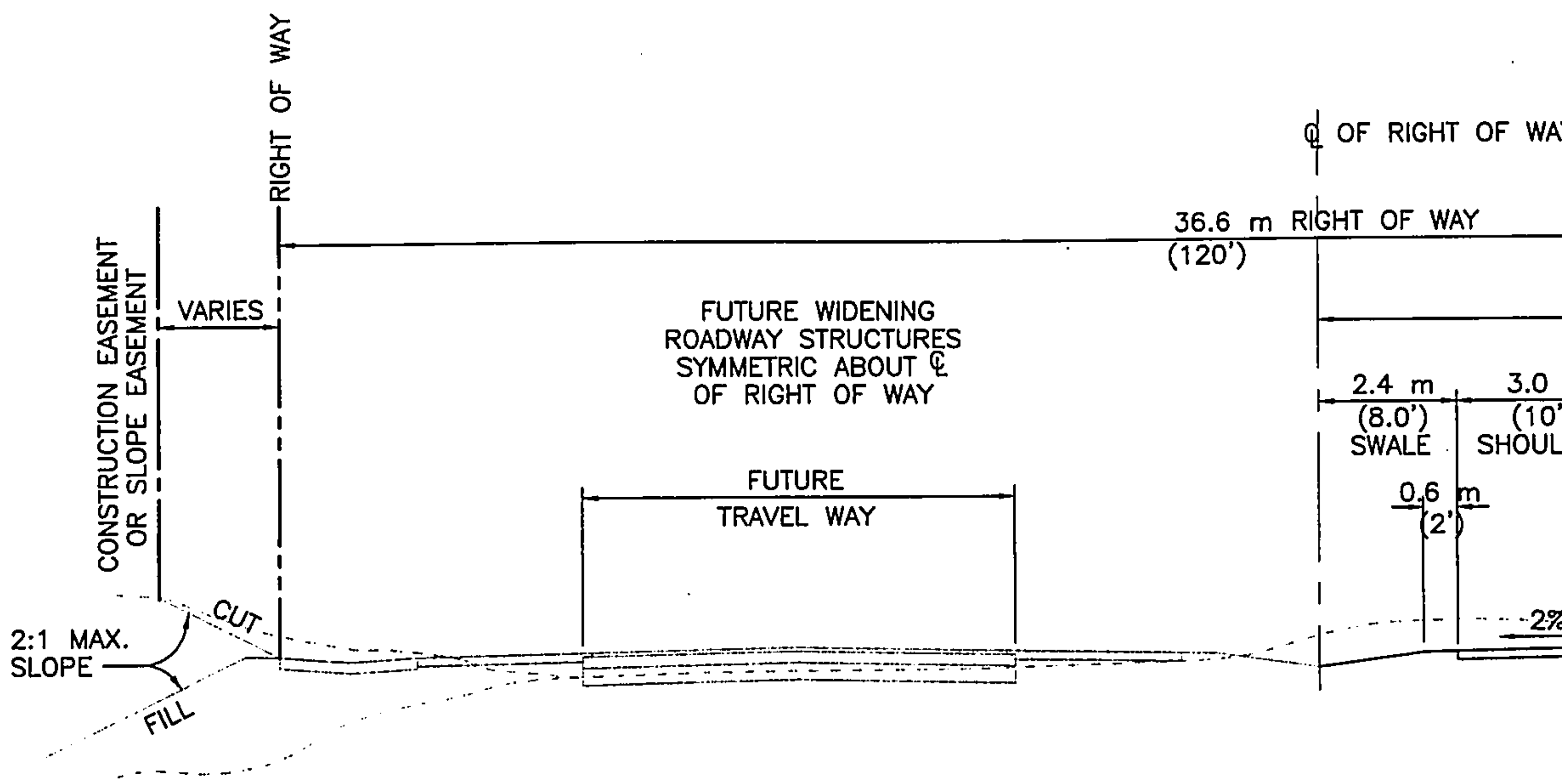


NOTES:

1. MAXIMUM SIDESLOPE SHALL BE 2:1.
2. UTILITIES WITHIN ROADWAY NOT SHOWN.



TITLE

TYPICAL SECTION UPPER PUAINAKO

KAUMANA DRIVE TO KOMOHANA STREET

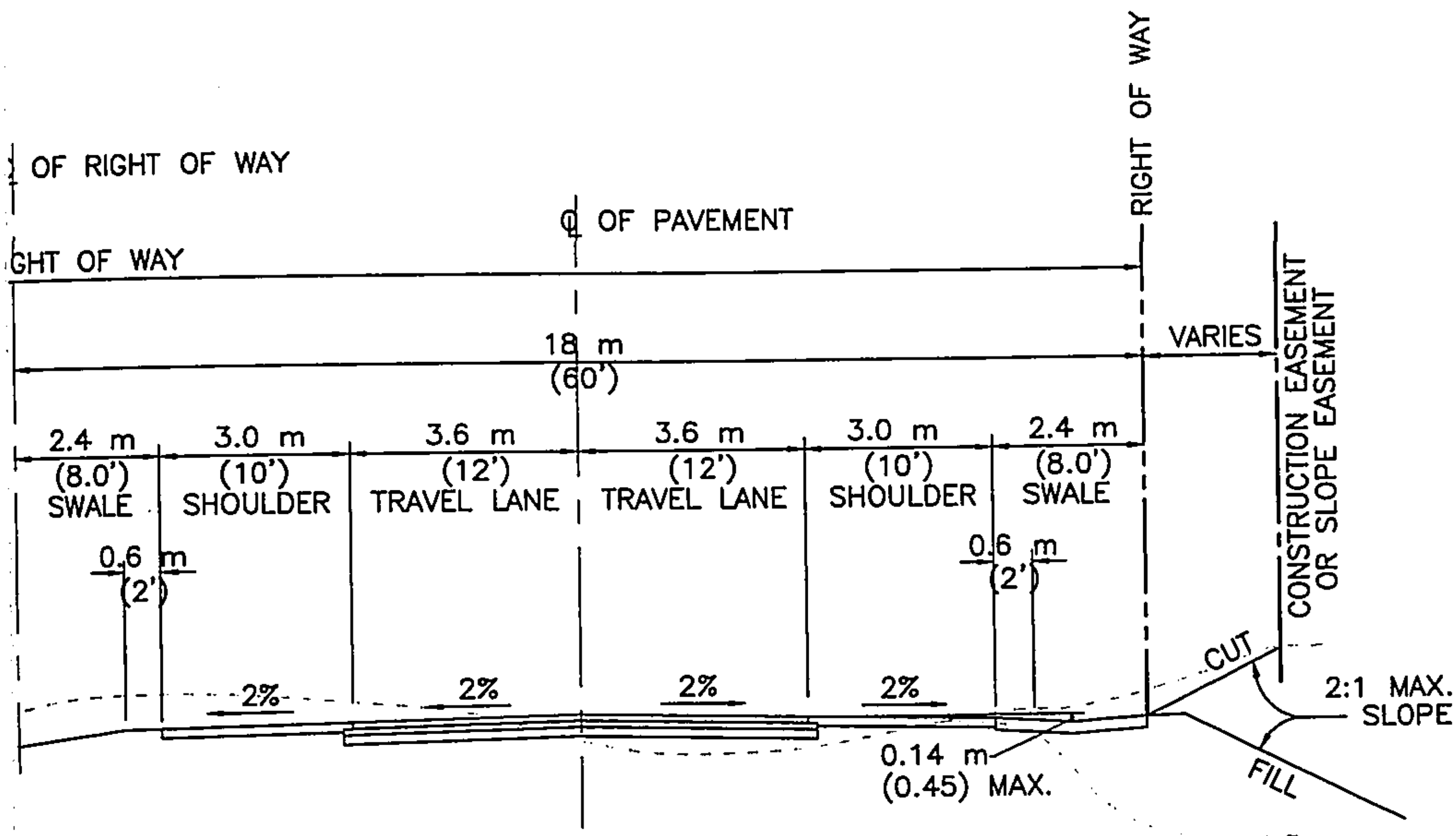
FIGURE

S-3

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE
2/03/2000

92014/M:/...EIS/ALT-10/FS-3.DWG/SCALE:1=1



NOTE:

1. MAXIMUM SIDESLOPE SHALL BE 2:1.

design. In that the County had initiated the efforts, it was agreed that the County should continue to organize preparation of the EIS and Project design. During the planning stages of the Project, it was subsequently determined that federal funding under the Intermodal Surface Transportation Efficiency Act (ISTEA) would be utilized, which required the involvement of FHWA.

ALTERNATIVES UNDER CONSIDERATION

Alternative 1: The No-Build Alternative. The No-Build Alternative provides for very limited improvements to Puainako Street, including widening shoulders and consideration of traffic signals at Komohana Street and the Waiakea School Complex.

Alternative 2: The Build Alternatives. The project corridor consists of a Lower Portion, along Puainako Street between Kilauea Avenue and Komohana Street; and an Upper Portion, between Komohana Street and Kaumana Drive near the Country Club Drive Intersection. Each portion contains a set of alternative alignments. The Lower Portion has two: Alignments A and B, and the Upper Portion has three: Alignments 1, 2 and 10. Six distinct combinations of these alignments are possible (see Fig. S-1).

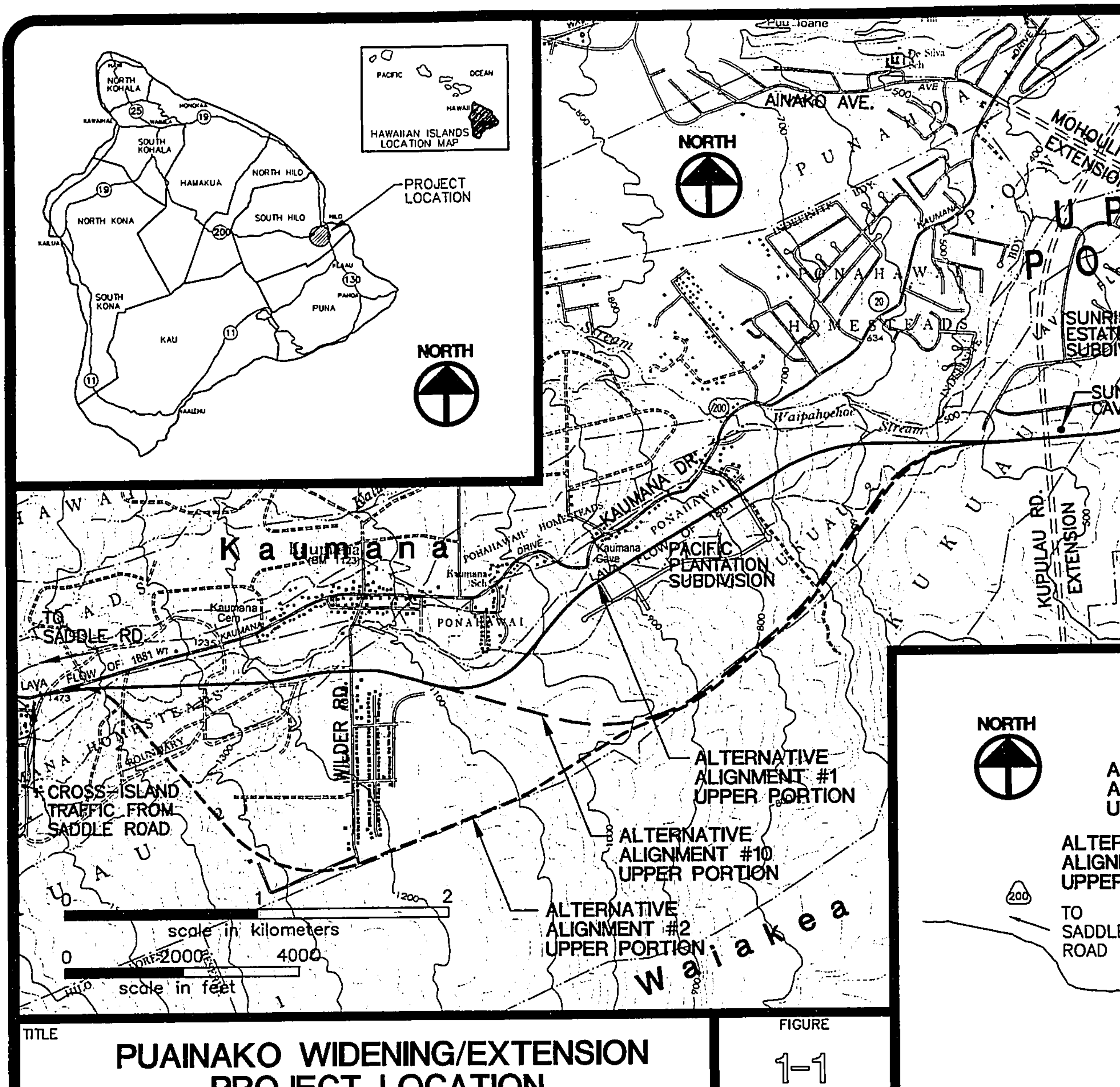
In the Lower Portion, Puainako Street would be widened to four lanes by acquiring right-of-way on primarily the north side of Puainako Street between Kilauea Avenue and the Waiakea School Complex and widening within the new right-of-way ~~northward from the existing road~~. Most existing intersections would be altered through some combination of widening, turning movement restrictions and signalization.

Between the Waiakea School Complex and Komohana Street, Puainako Street would be realigned north of the existing housing on Puainako Street and a new four-lane road would be created. Two alternative alignments were developed for the section west (mauka) of Kawili Street. Alignment A is farther from existing houses, minimizes encroachment on the Waiakea flood control channel, and avoids crossing of Komohana Street at the flood control channel. Alignment B runs directly behind a row of 33 houses and occupies a corridor that has been identified for several decades as the ultimate location of Puainako Street.

In the Upper Portion, Puainako Street would be extended as a new two-lane road within a 37-meter (120-ft.) right-of-way from Komohana Street to Kaumana Drive near Country Club Drive. West (mauka) of Sunrise Estates the project area divides into first two and then three branches. Alignment 1 provides a more direct route and passes between Kaumana Drive and several existing and planned subdivisions to the south. Alignment 2 passes to the south of these subdivisions along a more circuitous route. Alignment 10 is a hybrid of Alignments 1 and 2 with one unique segment. For purposes of comparison, each alignment is considered to begin at Komohana Street and end on Kaumana Drive.

ALTERNATIVES CONSIDERED AND WITHDRAWN

Alternatives considered and withdrawn from further consideration include Transportation Systems Management strategies, mass transit, four alternative alignments for the Upper Portion, and widening of Kaumana Drive. Chapter 2 discusses these and why they were withdrawn.



TITLE

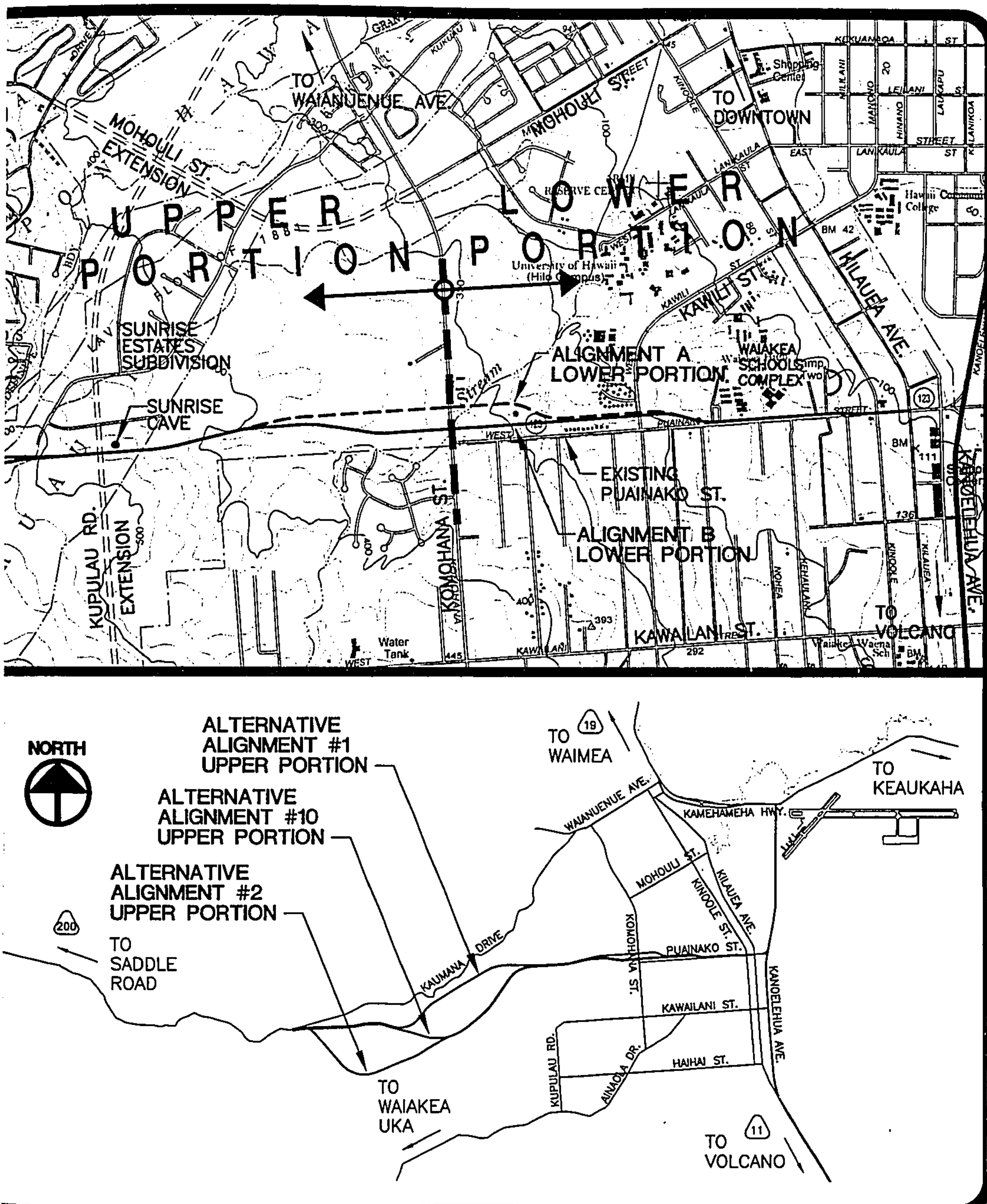
PUAINAKO WIDENING/EXTENSION PROJECT LOCATION

FIGURE 1-1

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 10/26/98

92014/M:/...DIS/ALT-10/F1-1.DWG/SCALE:1=1



TO WAIANUENUE AVE.
TO DOWNTOWN
MOHOULI ST. EXTENSION
MOHOULI STREET
UPPER PORTION
LOWER PORTION
University of Hawaii (Hilo Campus)
KAWILI ST.
KILAUEA AVE.
SUNRISE ESTATES SUBDIVISION
SUNRISE CAVE
ALIGNMENT A LOWER PORTION
WAIAKEA SCHOOLS COMPLEX
EXISTING PUAINAKO ST.
ALIGNMENT B LOWER PORTION
KUPULAU RD.
EXTENSION
KOMOHANA ST.
KAWAILANI ST.
TO VOLCANO
KANOELEHUA AVE.
Water Tank
NORTH
ALTERNATIVE ALIGNMENT #1 UPPER PORTION
ALTERNATIVE ALIGNMENT #10 UPPER PORTION
ALTERNATIVE ALIGNMENT #2 UPPER PORTION
TO WAIMEA
TO KEAUKAHA
WAIANUENUE AVE.
KAMEHAMEHA HWY.
MOHOULI ST.
KINOOLE ST.
KILAUEA AVE.
200
TO SADDLE ROAD
KAUMANA DRIVE
PUAINAKO ST.
KOMOHANA ST.
KAWAILANI ST.
KANOELEHUA AVE.
KUPULAU RD.
AINAOLA DR.
HAIHAI ST.
TO WAIAKEA UKA
TO VOLCANO

1 PURPOSE, NEED AND PROJECT DESCRIPTION

1.1 Background

The Federal Highways Administration (FHWA) and the Hawaii State Department of Transportation (HDOT) are serving as joint lead agencies to prepare an Environmental Impact Statement (EIS) in compliance with federal and State of Hawaii requirements, with the assistance of the Hawaii County Department of Public Works. The approving official for the EIS under the National Environmental Policy Act is the Hawaii Division Administrator of FHWA. The Governor of the State of Hawaii is the accepting authority for the EIS, under Chapter 343 HRS, related to Environmental Impact Statements.

The Project developed out of separate efforts to extend the County's portion of the roadway and to widen the State's portion. These projects were then integrated to optimize planning and design. Because the County had initiated the efforts, it was agreed that the County should continue to organize preparation of the EIS and Project design. During the planning stages of the Project, it was subsequently determined that federal funding under the Intermodal Surface Transportation Efficiency Act (ISTEA – since reauthorized as TEA-2000) would be utilized, which required the involvement of FHWA.

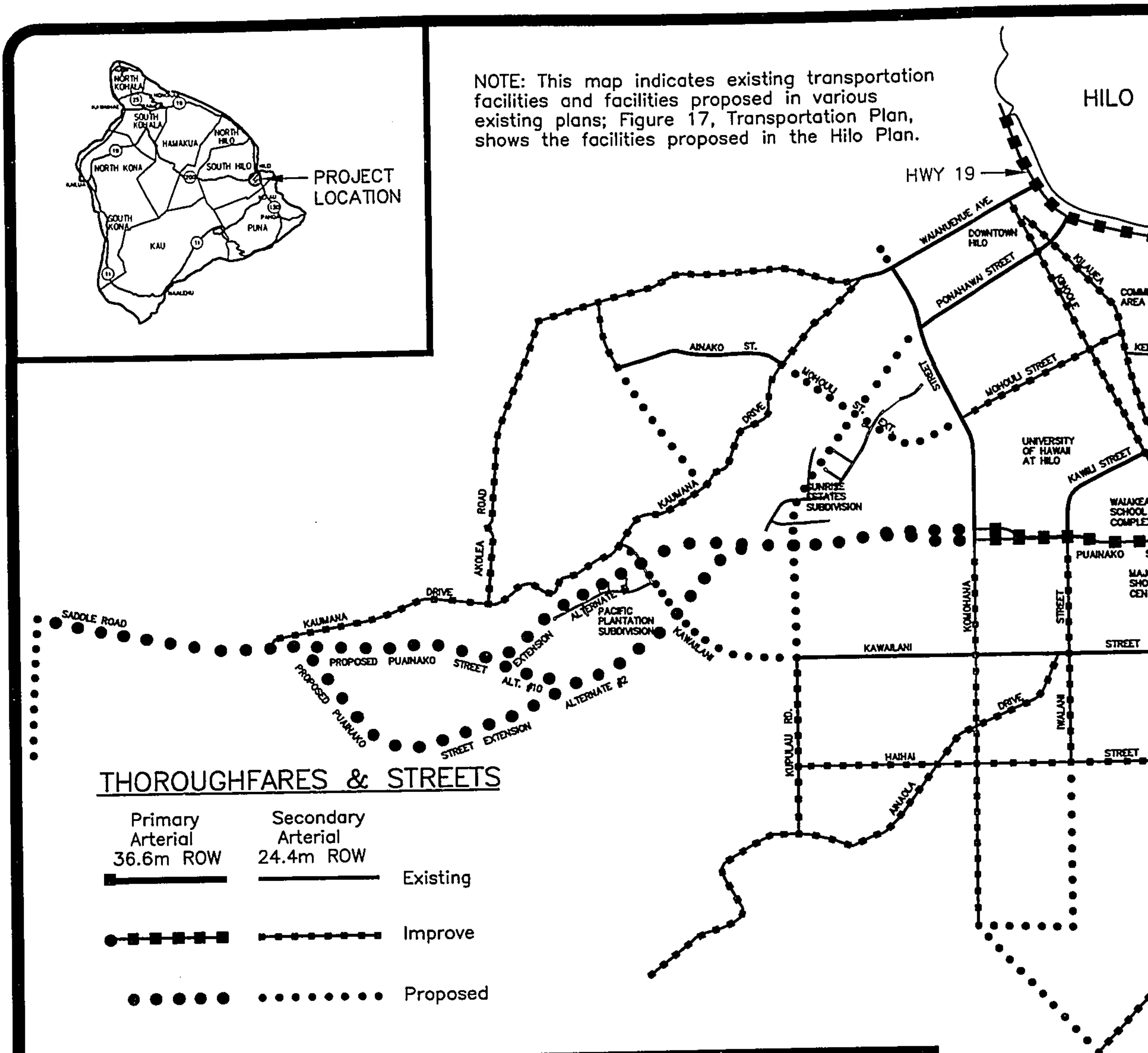
This EIS is prepared in compliance with federal law, including the National Environmental Policy Act (NEPA), as well as State of Hawaii law (Chapter 343, HRS)[1]. The purpose of this EIS is to investigate the impacts to the physical, biological and social environments that would result from construction of the proposed Project and to devise mitigation measures to minimize potential adverse impacts. This EIS is a joint Federal-State document fulfilling both State of Hawaii and federal environmental protection laws.

The EIS revises and replaces a State of Hawaii EIS prepared for the Project in 1993 by the County of Hawaii (original EIS). In addition to the inclusion of federal involvement in the Project, several design changes in the Project have been implemented, including intersection improvement and widening and realignment of corridors in certain areas.

1.2 Project Location and Purpose

The proposed Project involves roadways in the town of Hilo, in Hawaii County (Fig. 1-1). The purposes of this Project are: 1) to improve arterial traffic flow of the State Highway system by providing a direct link between the existing Puainako Street (Highway 2000) and the Saddle Road (Highway 200; designated as Kaumana Drive below Country Club Drive); and 2) to alleviate congested and unsafe traffic conditions on Puainako Street and Kaumana Drive. Figure 1-2 depicts the State and County Highway system within Hilo.

[1] *Chapter 343, Hawaii Revised Statutes, and Hawaii Administrative Rules, Chapter 200, §11; 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; Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (40 CFR 1500-1508); and Federal Highway Administration's Environmental Impact and Related Procedures (23 CFR 771).*



TITLE

STATE & COUNTY HIGHWAY SYSTEM

FIGURE 1-2

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

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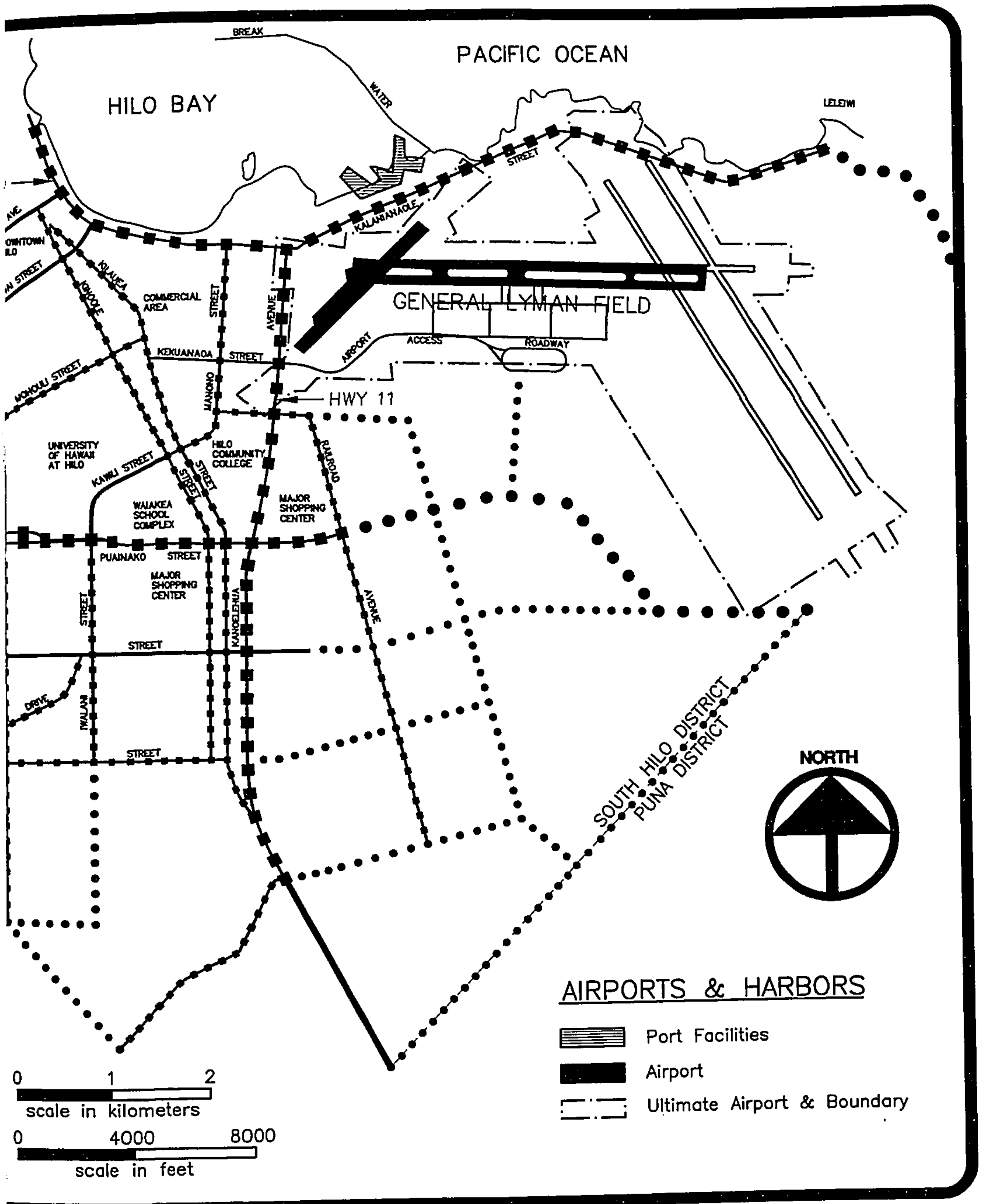

PACIFIC OCEAN
HILO BAY
BREAK
WATER
KALANIANAOLE
STREET
GENERAL LYMAN FIELD
AIRPORT
ACCESS
ROADWAY
HWY 11
COMMERCIAL AREA
KILAUEA
KINOOLE
KEKUANAOA
STREET
MANONO
AVENUE
UNIVERSITY OF HAWAII AT HILO
HILO COMMUNITY COLLEGE
KAWILI STREET
WAIAKEA SCHOOL COMPLEX
MAJOR SHOPPING CENTER
RAILROAD
PUAINAKO
KANOELEHUA
IWALANI
DRIVE
SOUTH HILO DISTRICT
PUNA DISTRICT
NORTH
AIRPORTS & HARBORS
Port Facilities
Airport
Ultimate Airport & Boundary
0
1
2
scale in kilometers
0
4000
8000
scale in feet

1.3 Project Description, Cost and Schedule

Puainako Street would be widened from two to four lanes. Other proposed improvements would include dual sidewalks and bicycle lanes, improvements to intersections, and two new traffic signals (see typical cross-section of Lower Puainako, Figure 1-3).

Puainako Street would be extended as a two-lane road with a 37-meter (120-ft.) right-of-way approximately 7.3 km (4.5 mi.) between Komohana Street and the Saddle Road (see Fig. 1-4, typical cross-section of Upper Puainako). The eastern project terminus is at the intersection of Puainako Street and Kilauea Avenue and the western terminus at approximately the 10 km (6 mi.) marker on the Saddle Road (detailed descriptions of proposed improvements are contained in Section 2.3, *Alternatives*).

This Project is included in the current approved federally required State Transportation Improvement program (STIP). The Project would cost an estimated $56.651 to $61.471 million ~~$62.650 to $67.234 million~~ , depending on the combination of alignments chosen, with the State and/or County responsible for 20 percent of funding and the federal government funding the remaining 80 percent. This total includes right-of-way acquisition, design and construction. If approvals are obtained in a timely manner, project design will be completed in 2000 ~~1999~~. Construction would begin in 2000 ~~1999~~ and would be finished in the year 2002 ~~2001~~.

1.4 Need for Project

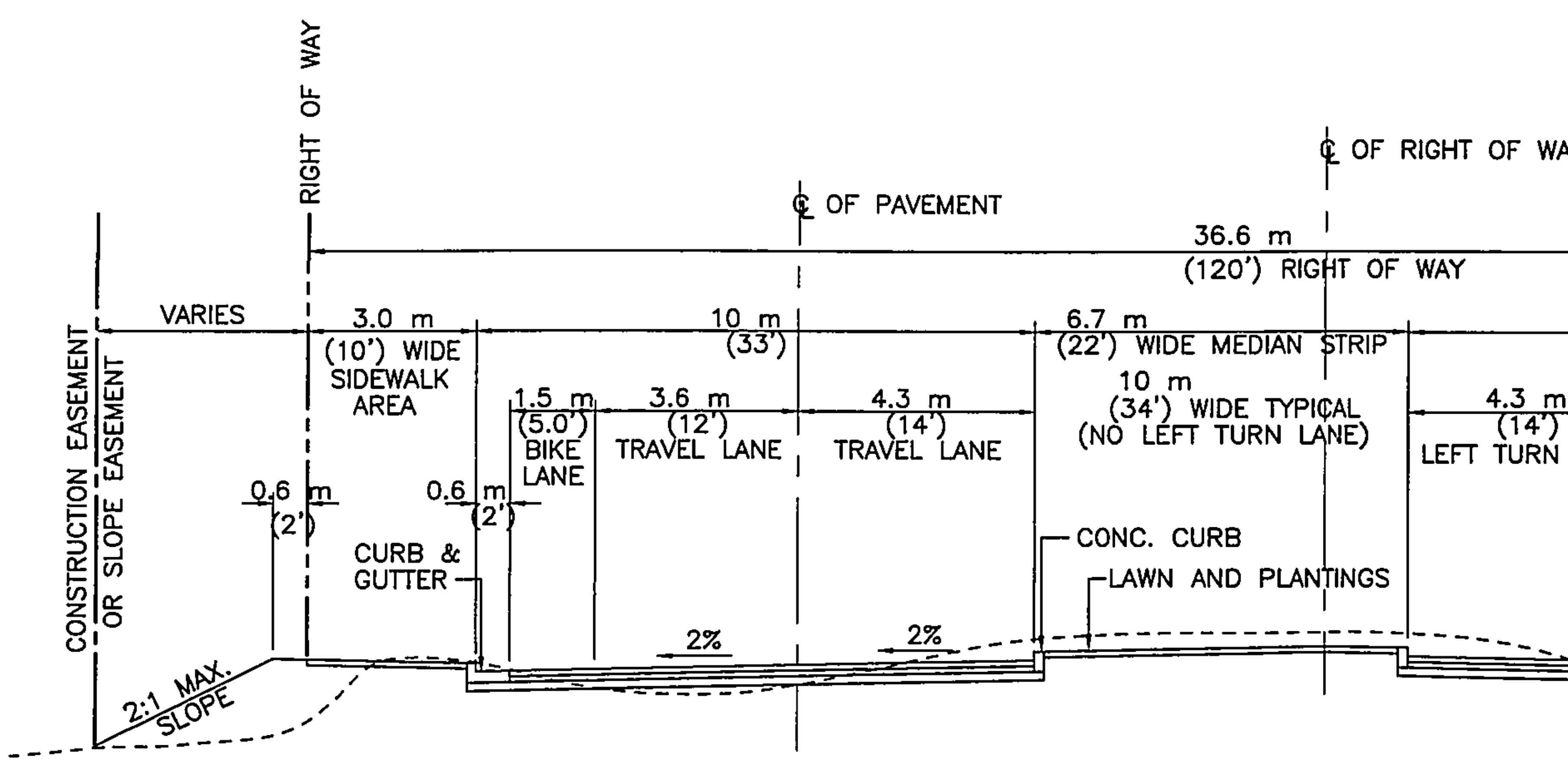
1.4.1 System Linkage

Puainako Street is currently a two-lane roadway extending from Railroad Avenue to Komohana Street, in Waiakea. The existing right-of-way has a minimum of 38 m (125 ft.) between Kanoelehua Avenue and Kilauea Avenue. At that point, the right-of-way narrows to 12 m (40 ft.) up to its intersection with Komohana.

According to the *Hawaii County General Plan* Facilities Map, Puainako Street is intended to link the Saddle Road with a future coastal road serving the Puna District (see Figure 1-2). The Zoning Map calls for a 37-meter (120-ft.) right-of-way along the entire length of the roadway.

The State Highway system provides inter-regional connections between communities. The system presently extends along Puainako Street between Kanoelehua Avenue and Komohana Street. A gap in the system occurs between Komohana Street and the Saddle Road, which begins at approximately the 10-km (6-mi.) marker above the residential area of Kaumana. The Saddle Road provides a cross-island link with Mauna Kea, Pohakuloa Training Area and on to West Hawaii. There is currently no convenient connection between Komohana Street and the Saddle Road. The proposed Project would provide that important link in the State Highway system by directly connecting the existing Puainako Street with Saddle Road.[1]

[1] Although it is part of the State Highway System, the Saddle Road is currently owned and maintained by the County of Hawaii. The State has reached an agreement with the County to take over responsibility for the Saddle Road, subject to improvements of the roadway.



TITLE

TYPICAL SECTION
LOWER PUAINAKO

KOMOHANA STREET TO KILAUEA AVENUE

FIGURE

1-3

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE
2/03/2000

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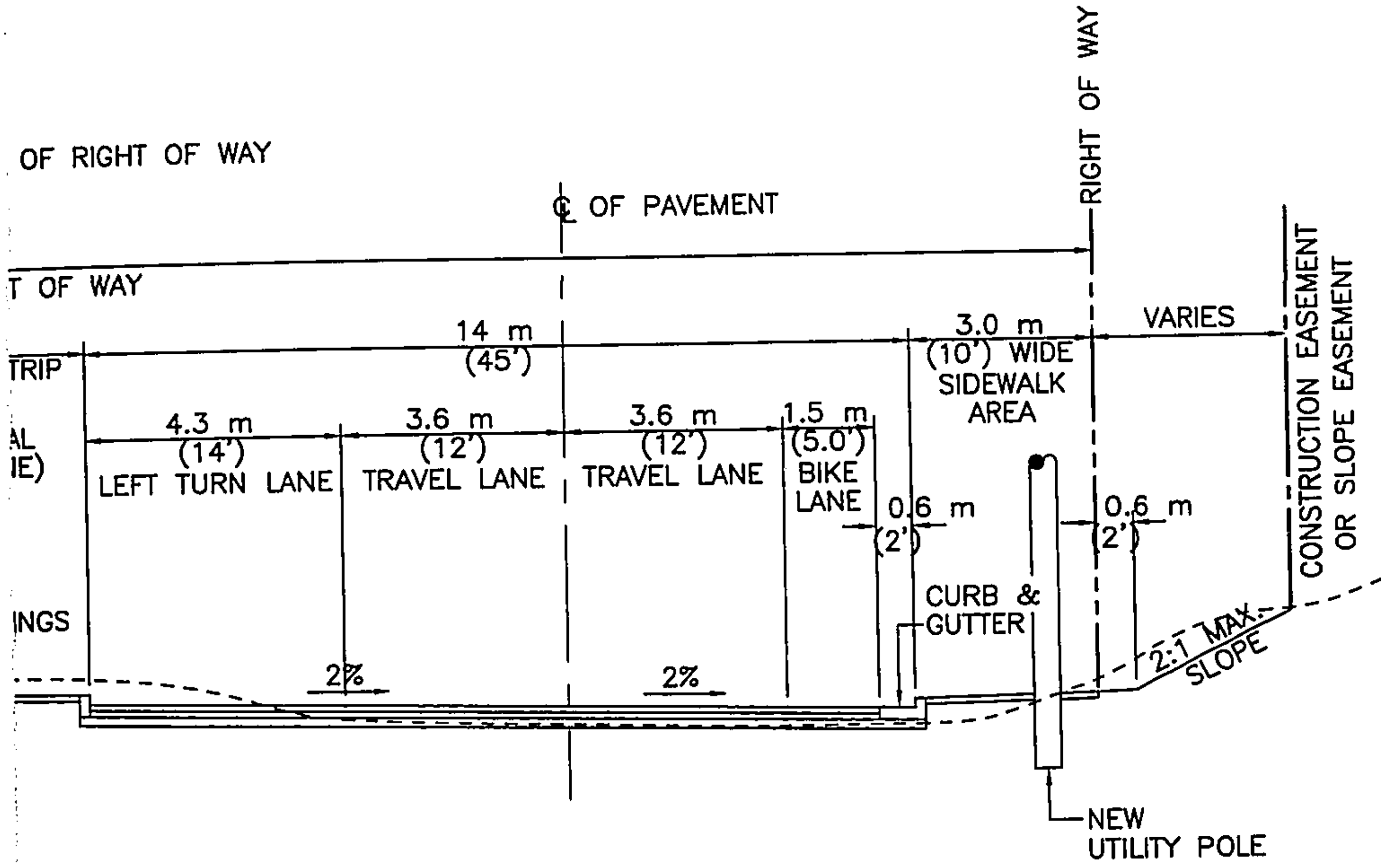
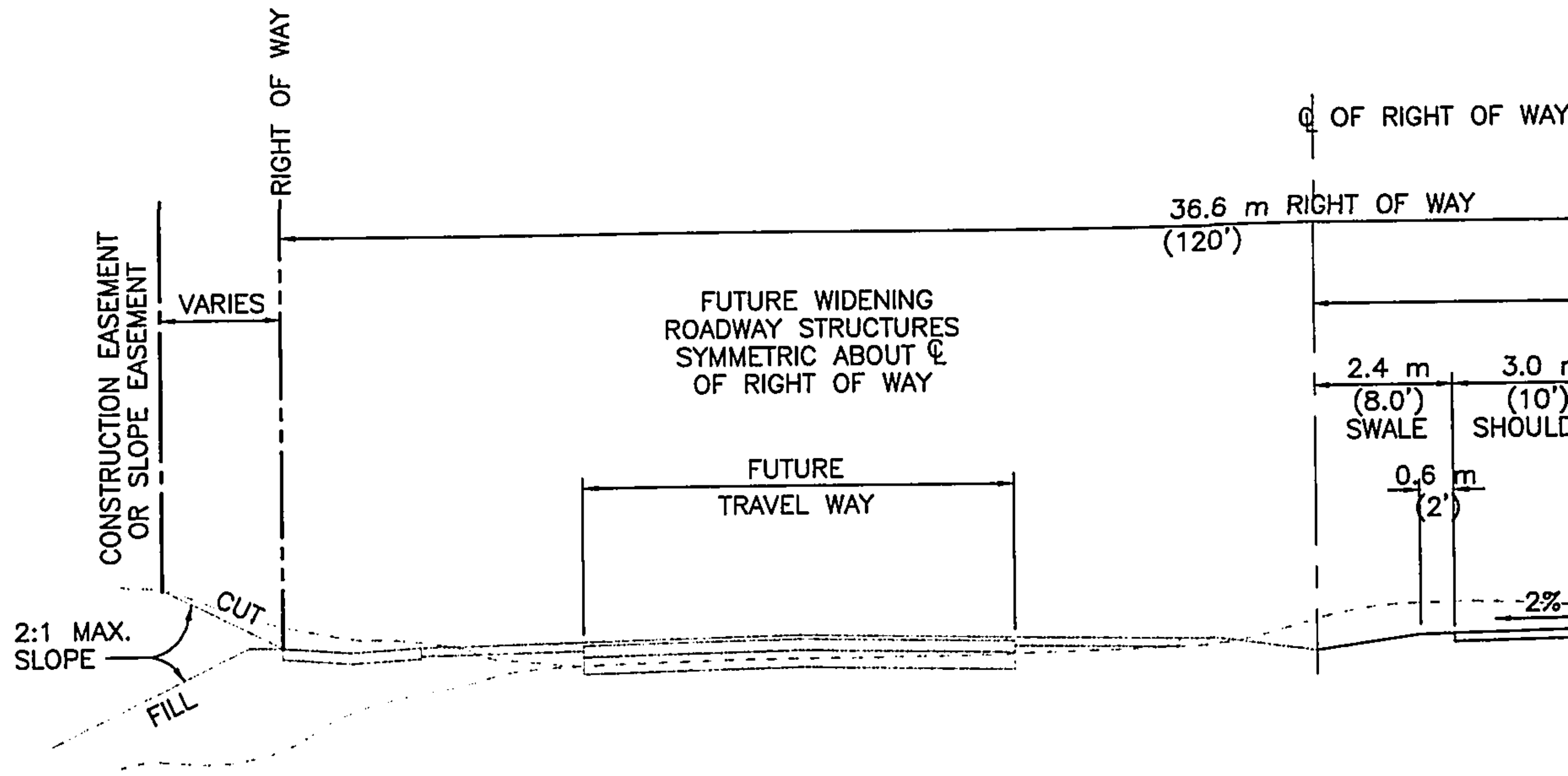


NOTES:

1. MAXIMUM SIDESLOPE SHALL BE 2:1.
2. UTILITIES WITHIN ROADWAY NOT SHOWN.



TITLE

TYPICAL SECTION
UPPER PUAINAKO

KAUMANA DRIVE TO KOMOHANA STREET

FIGURE

1-4

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE
2/03/2000

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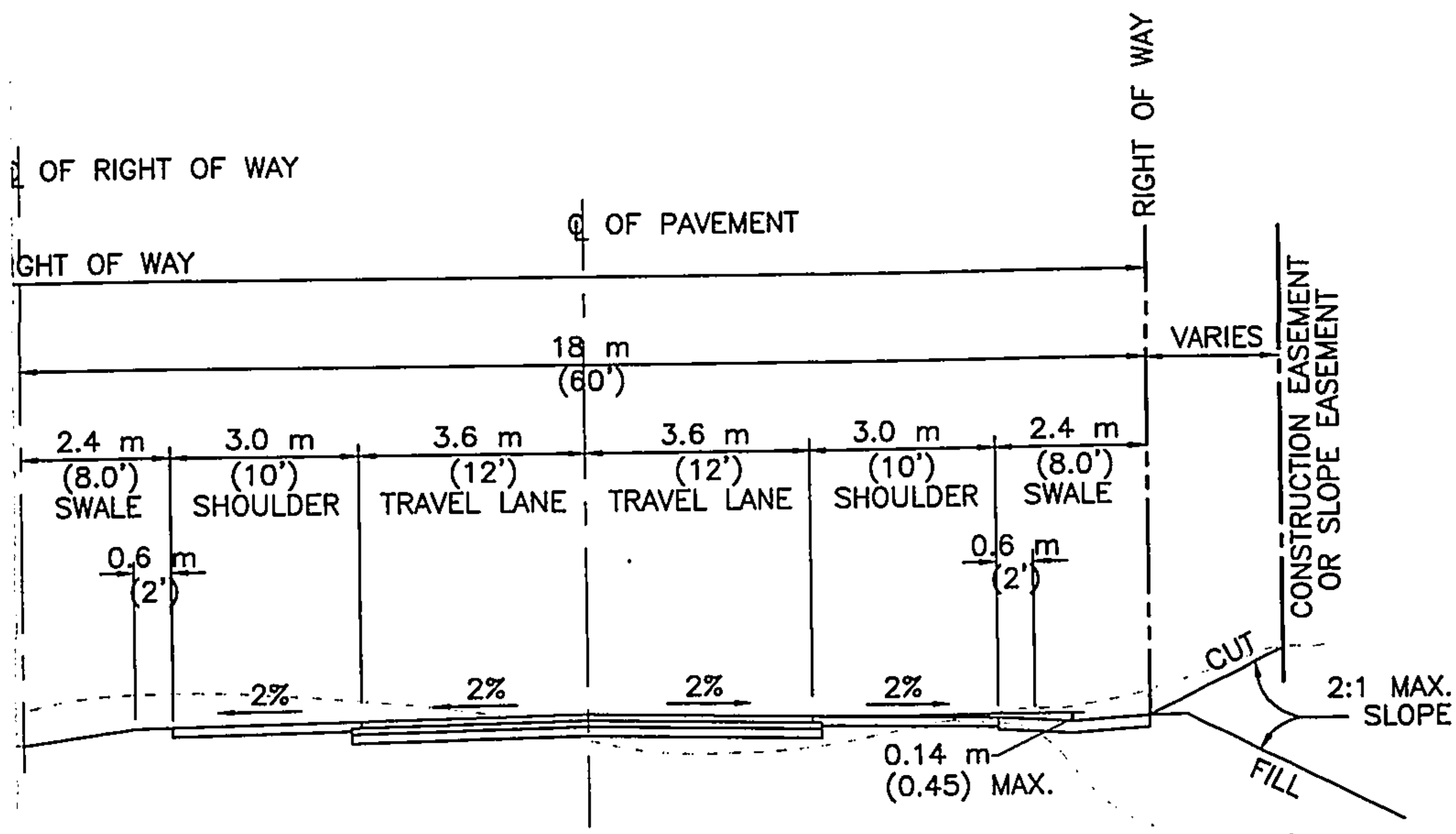


NOTE:

1. MAXIMUM SIDESLOPE SHALL BE 2:1.

2 ALTERNATIVES

2.1 Introduction

The County of Hawaii developed for consideration a wide range of alternatives to address the Project objectives of developing a State Highway connection linking lower Puainako Street with Saddle Road, in Upper Kaumana. These included a Build Alternative with two alternative alignments in the Lower Portion and six alternative alignments in the Upper Portion. Other Project alternatives considered included widening of the existing Kaumana Drive and substitution of the Mohouli Street extension for a portion of the project area. Transportation Systems Management and Mass Transit were also considered. All alternatives were evaluated for environmental and engineering feasibility and fulfillment of Project objectives.

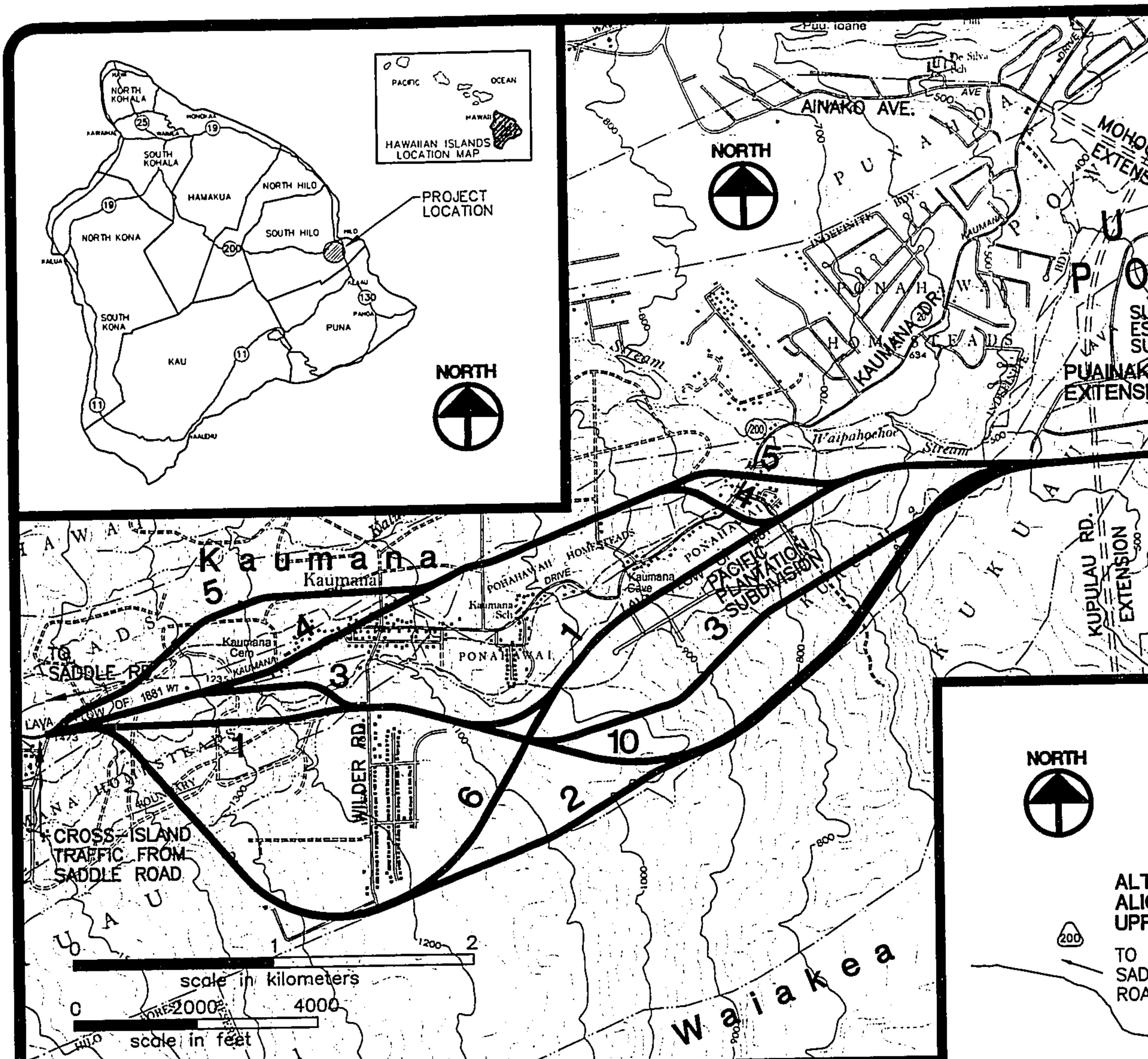
In accordance with a Memorandum of Understanding (MOU) to implement jointly the NEPA and Section 404 of the Clean Water Act, the signatory agencies, including FHWA, HDOT, U.S. Fish and Wildlife Service, the U.S. Environmental Protection Agency, and the U.S. Army Corps of Engineers reviewed the alternatives. Based on this review, one No-Build Alternative and one Build Alternative with four alternative alignments were advanced for detailed engineering and environmental studies (illustrated previously in Figure 1-1). (See App. A1 and A5 for correspondence.)

This chapter first discusses the process by which alternatives were evaluated and briefly explains why some alternatives were withdrawn from further consideration. This is followed by a detailed description of the alternatives that were retained. In response to community concerns expressed during the review period for the Draft EIS, a hybrid of the two Alignments for the Upper Portion was developed. This alternative is explained in Section 2.3.2.2.3. The costs of all alternatives are compared in the next section. Next, ~~Finally,~~ a detailed discussion of the alternatives withdrawn from further consideration and the rationale for eliminating them from further study are presented in Section 2.5. Finally, Section 2.6 identifies the Preferred Alternative and explains why it was chosen.

2.2 Evaluation and Screening of Alternatives

The screening process consisted of first reducing the number of Build Alternative Alignments to those which met the Project need, conformed with State and County plans regarding land use and road networks, had the potential to satisfy the design standards, did not involve major disruption of existing or planned residential areas, and did not require extensive flood zone crossings. The alignments considered are illustrated in Figure 2-1.

Table 2-1 presents the criteria and scores of this initial screening process. Most of the potential build alignments failed to satisfy most of the screening criteria. Both alignments in the Lower Portion were acceptable. In the Upper Portion, only Alignments 1 and 2 (Alignment 10 had not yet been developed) reasonably satisfied the evaluation criteria (refer to Section 2.5 for detailed discussion of withdrawn alternatives).



TITLE

ALTERNATIVE ALIGNMENTS CONSIDERED DURING SCOPING

FIGURE

2-1

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE
10/26/98

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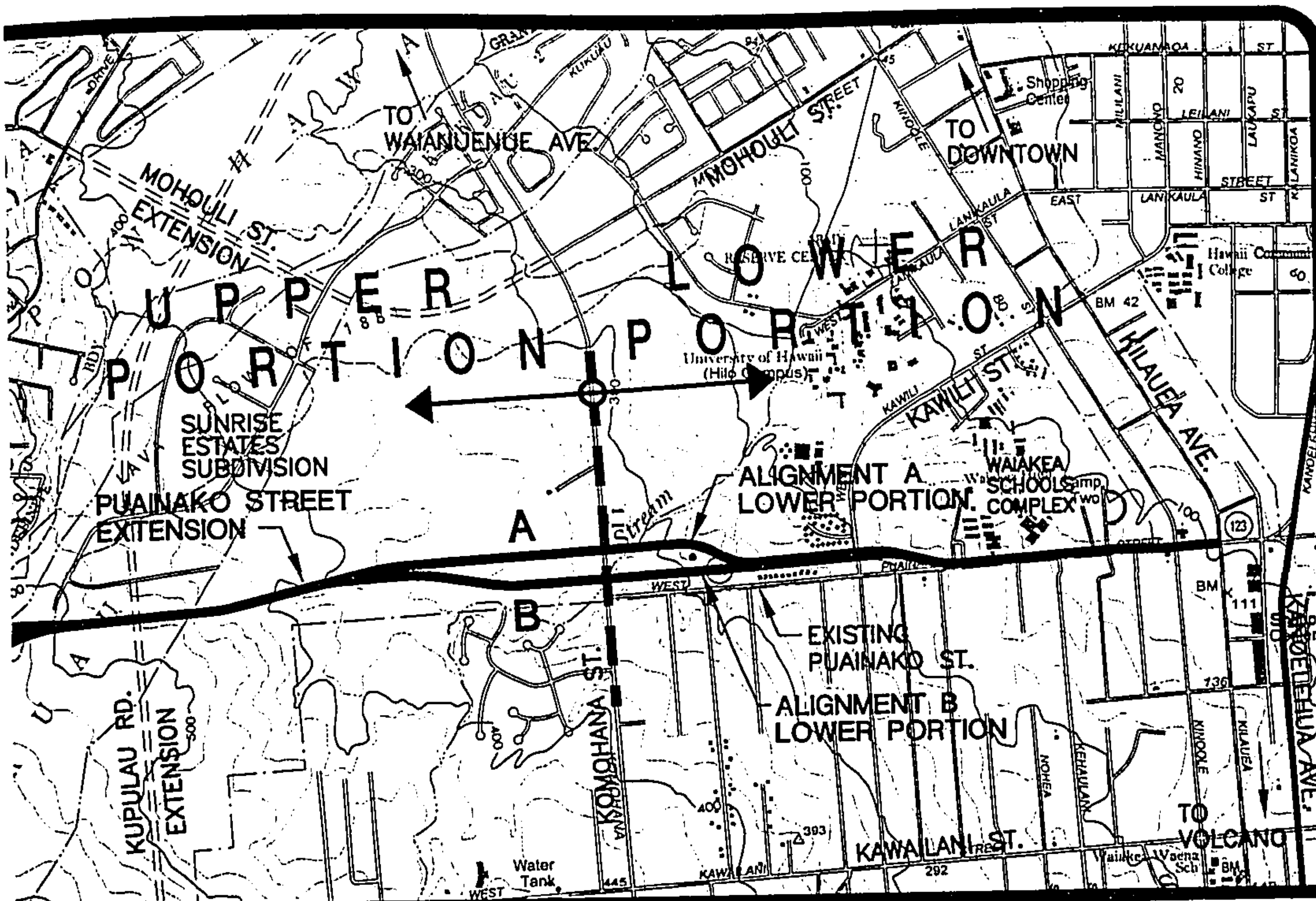
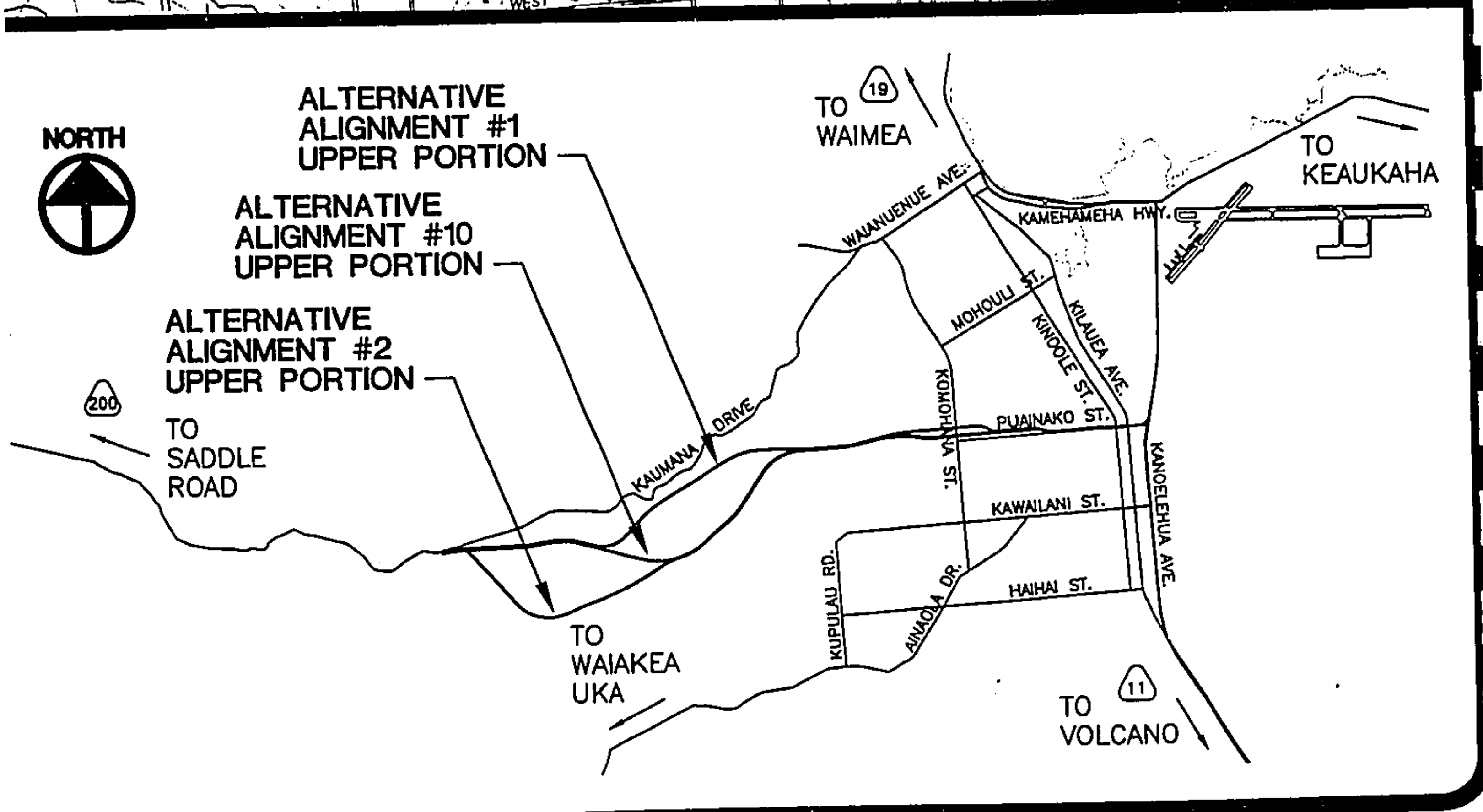
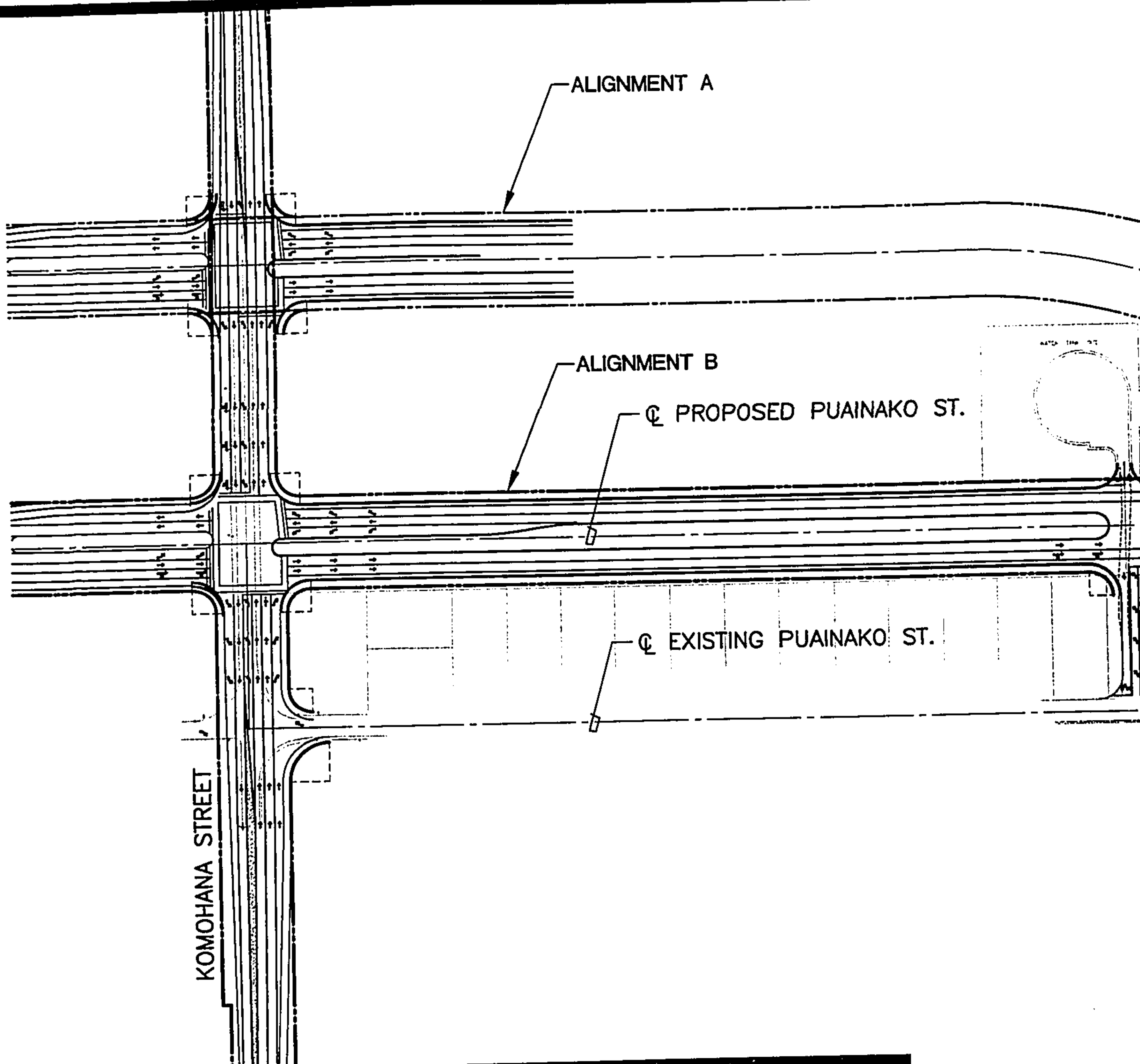


TO WAIANUENUE AVE.
TO DOWNTOWN
MOHOULI ST. EXTENSION
MOHOULI STREET
UPPER PORTION
LOWER PORTION
University of Hawaii (Hilo Campus)
KAWILI ST.
KILAUEA AVE.
SUNRISE ESTATES SUBDIVISION
PUAINAKO STREET EXTENSION
ALIGNMENT A LOWER PORTION
WAIAKEA SCHOOLS COMPLEX
A
B
EXISTING PUAINAKO ST.
ALIGNMENT B LOWER PORTION
KUPULAU RD. EXTENSION
KOMOHANA ST.
KAWAILANI ST.
TO VOLCANO
KANOELEHUA AVE.



NORTH
ALTERNATIVE ALIGNMENT #1 UPPER PORTION
ALTERNATIVE ALIGNMENT #10 UPPER PORTION
ALTERNATIVE ALIGNMENT #2 UPPER PORTION
200
TO SADDLE ROAD
19
TO WAIMEA
TO KEAUKAHA
WAIANUENUE AVE.
KAMEHAMEHA HWY.
MOHOULI ST.
KINOOLE ST.
KILAUEA AVE.
KOMOHANA ST.
PUAINAKO ST.
KAUMANA DRIVE
KANOELEHUA AVE.
KAWAILANI ST.
HAIHAI ST.
KUPULAU RD.
AINAOLA DR.
TO WAIAKEA UKA
11
TO VOLCANO



TITLE

LOWER PUAINAKO:

LANES, TURNING MOVEMENTS, & TRAFFIC PATTERNS

FIGURE 2-2a

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

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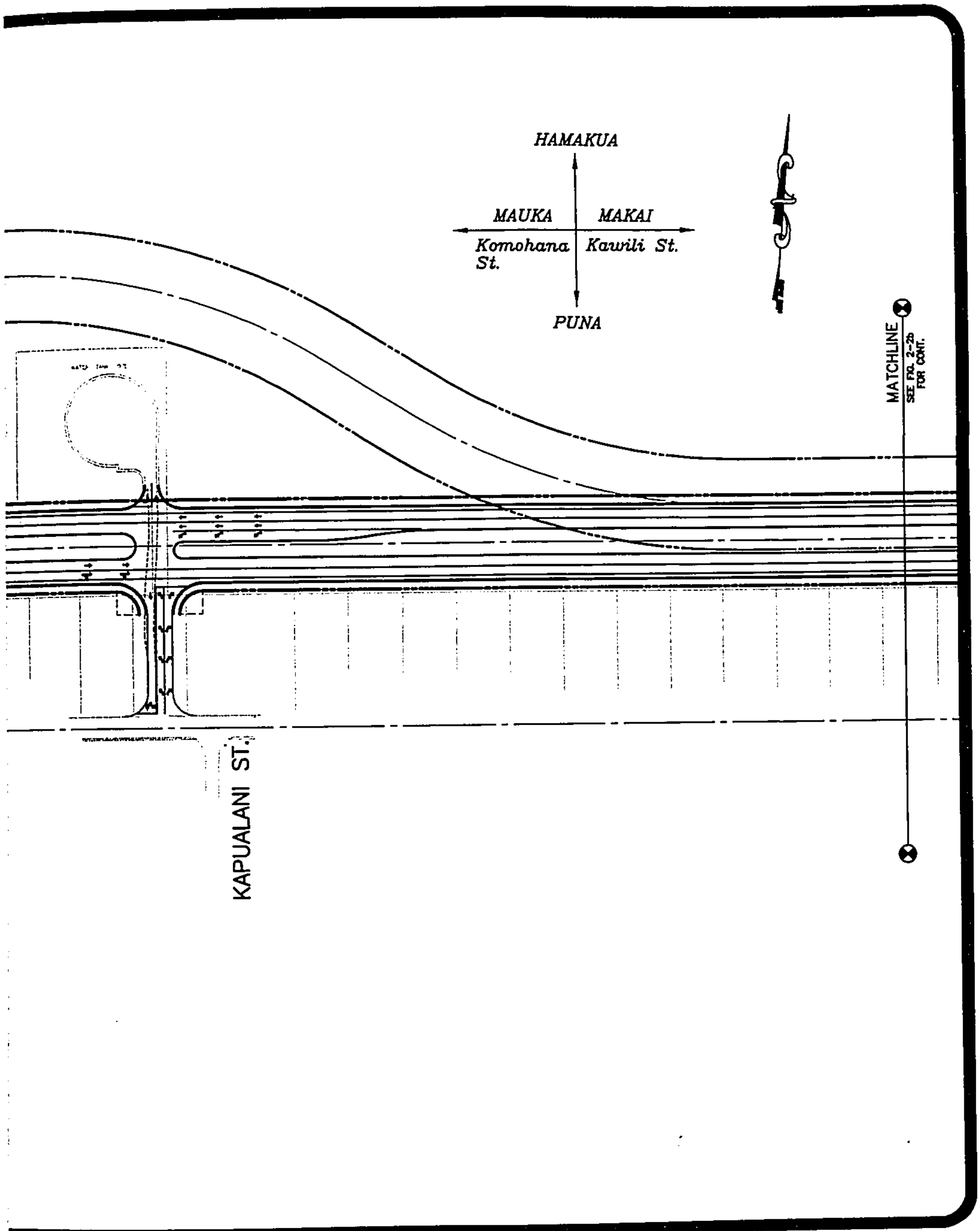
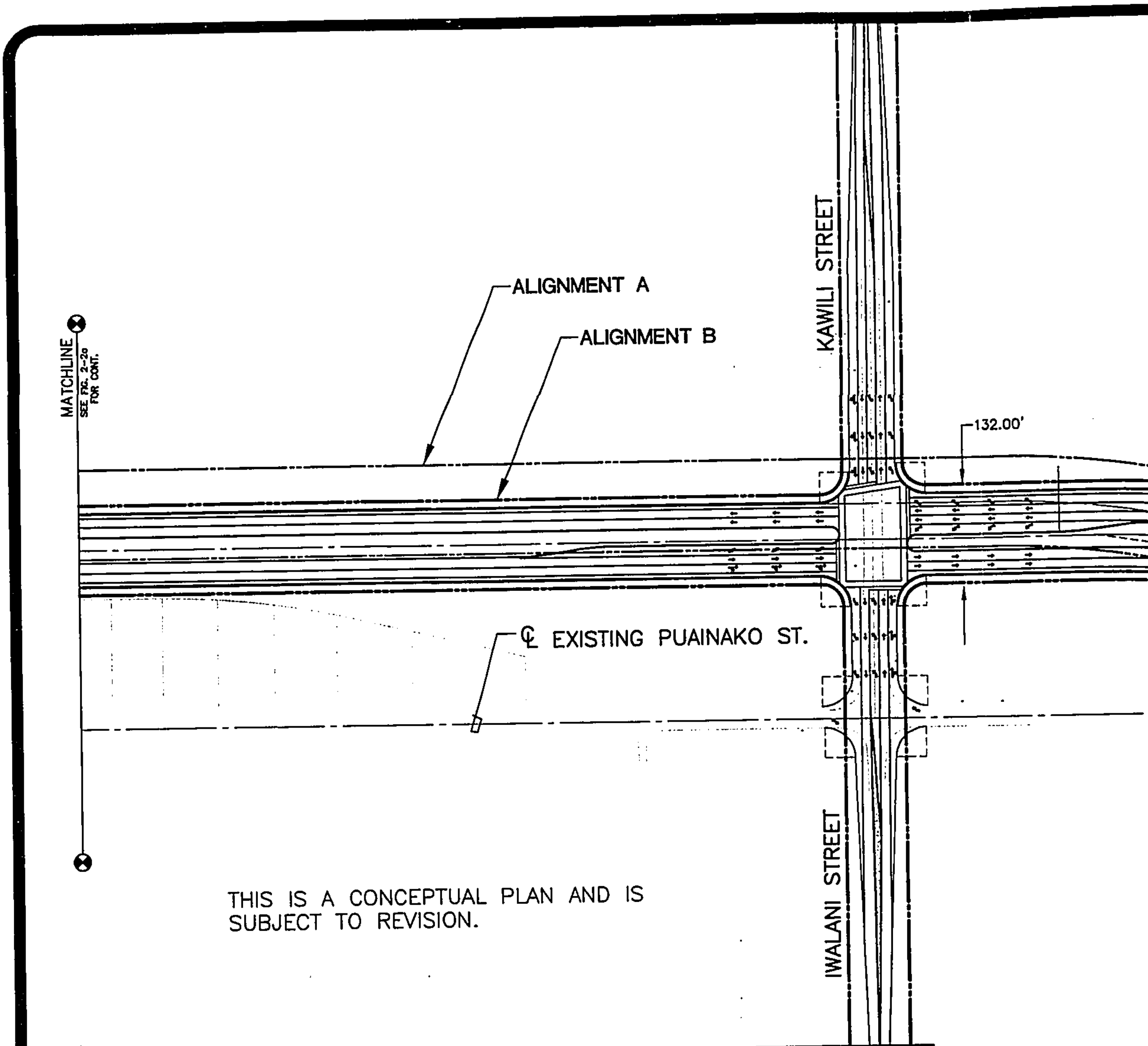

HAMAKUA
MAUKA
MAKAI
Komohana St.
Kawili St.
PUNA
MATCHLINE
SEE FIG. 2-2b FOR CONT.
KAPUALANI ST.



TITLE

LOWER PUAINAKO: (CONT.)

LANES, TURNING MOVEMENTS, & TRAFFIC PATTERNS

FIGURE

2-2b

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE
2/03/2000

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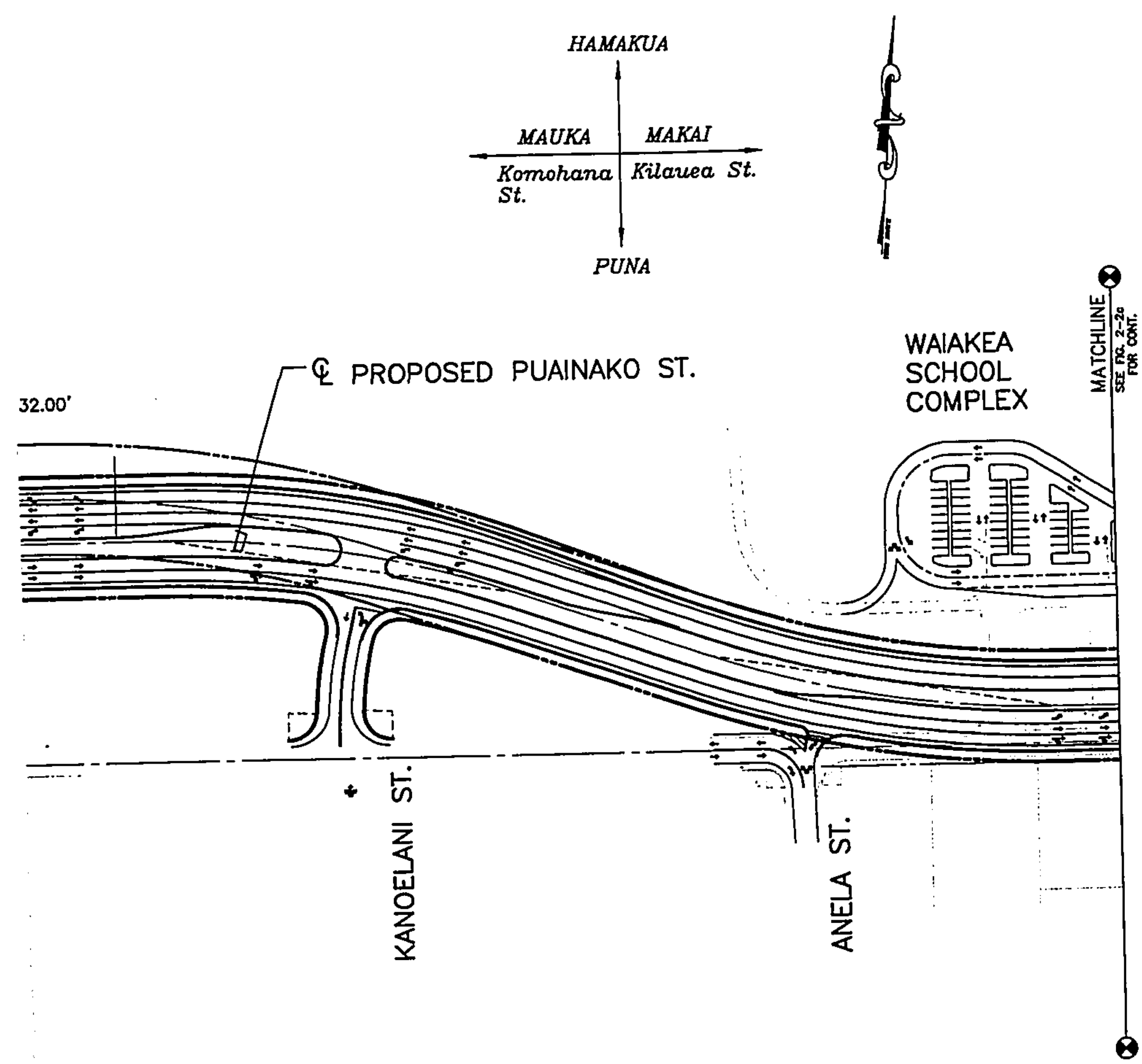
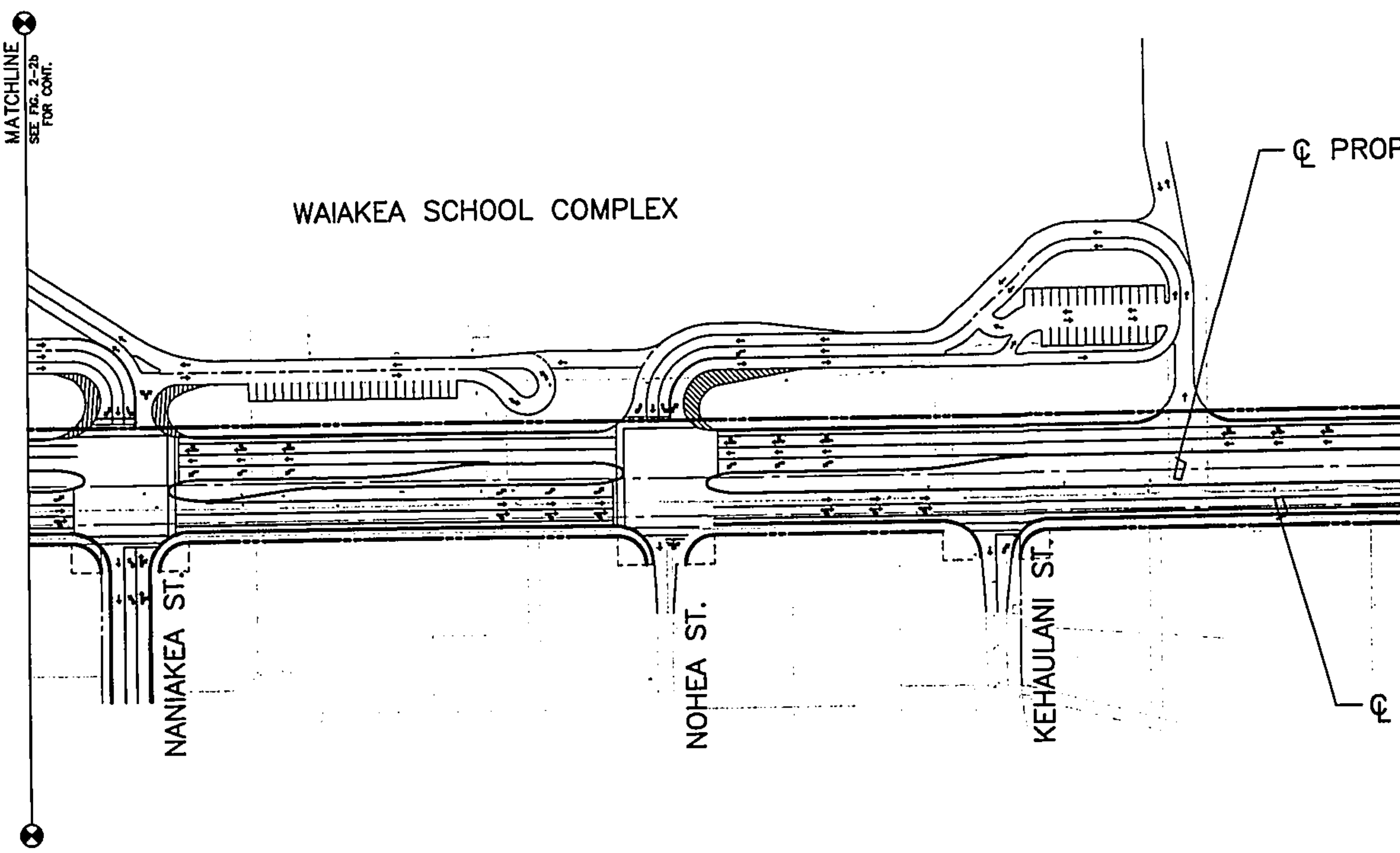


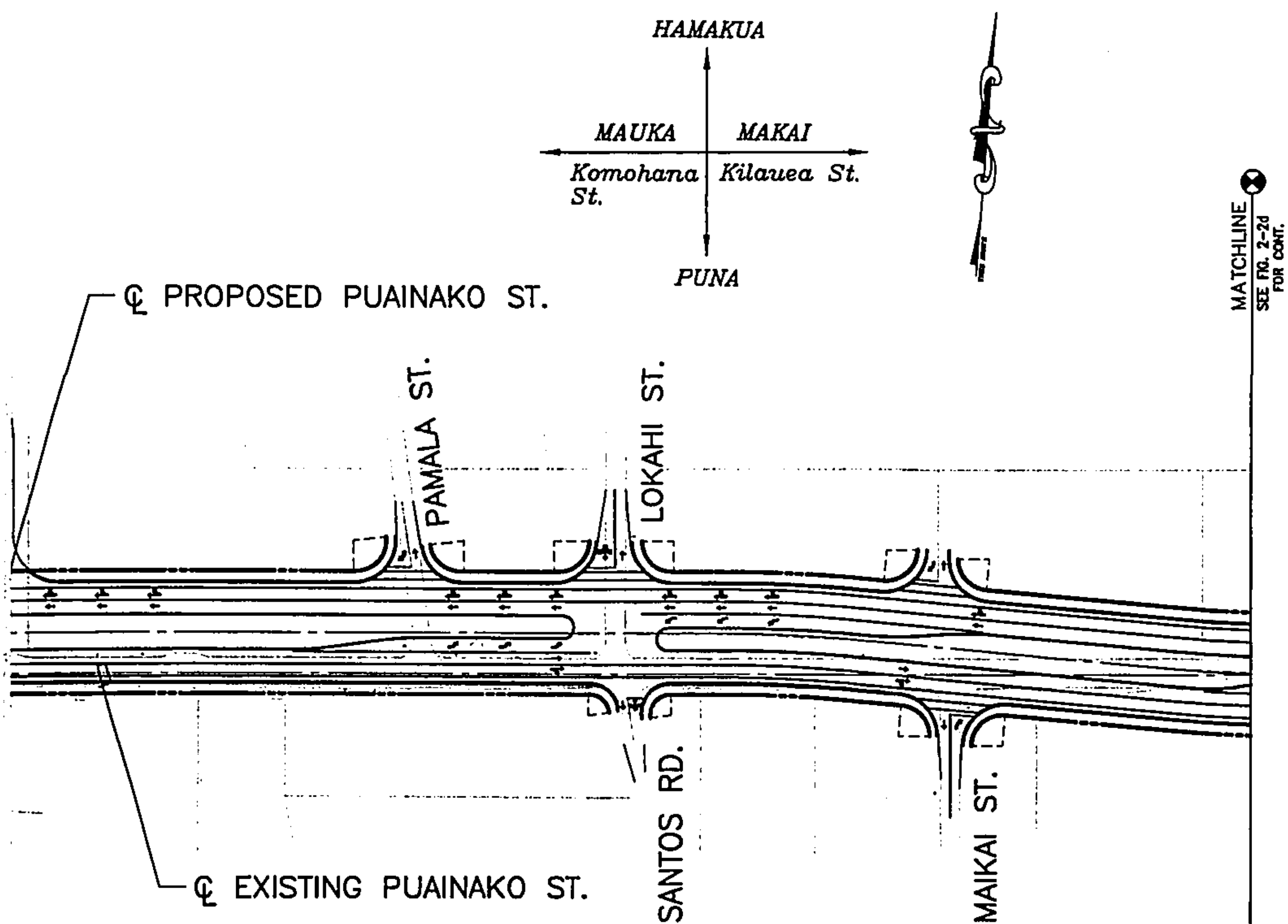
LANES, TURNING MOVEMENTS AND TRAFFIC PATTERNS FOR ALIGNMENTS A AND B ARE SIMILAR.



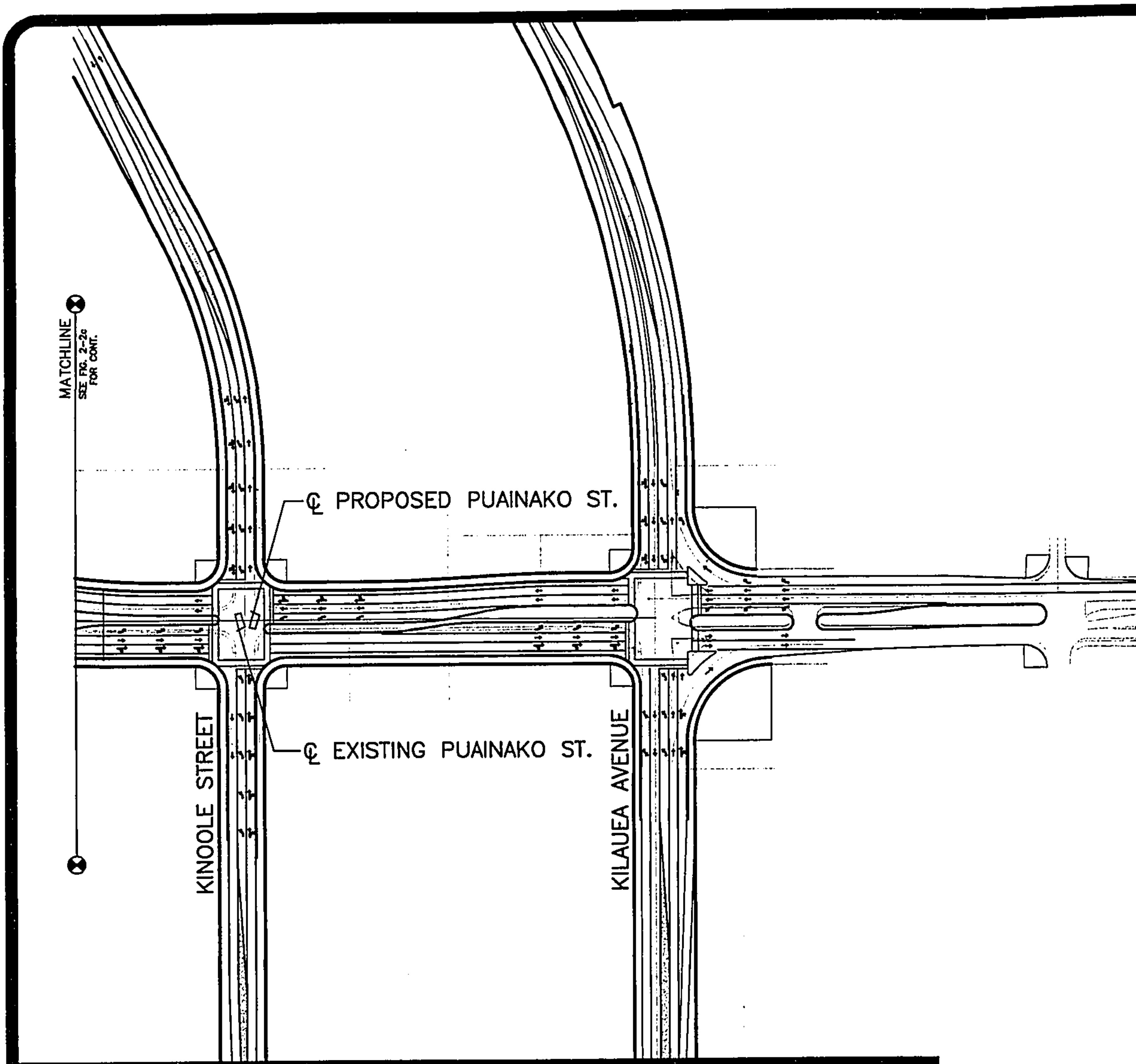
THIS IS A CONCEPTUAL PLAN AND IS SUBJECT TO REVISION.

TITLE **LOWER PUAINAKO:** (CONT.) LANES, TURNING MOVEMENTS, & TRAFFIC PATTERNS	FIGURE 2-2c
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000

92014/M:/...EIS/ALT-10/F2-2C.DWG/SCALE:1=2



LANES, TURNING MOVEMENTS AND TRAFFIC PATTERNS FOR ALIGNMENTS A AND B ARE SIMILAR.



TITLE

LOWER PUAINAKO: (CONT.)

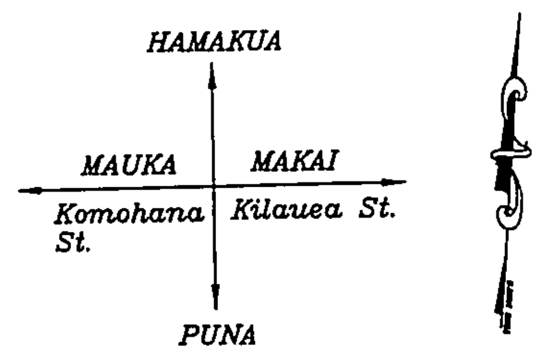
LANES, TURNING MOVEMENTS, & TRAFFIC PATTERNS

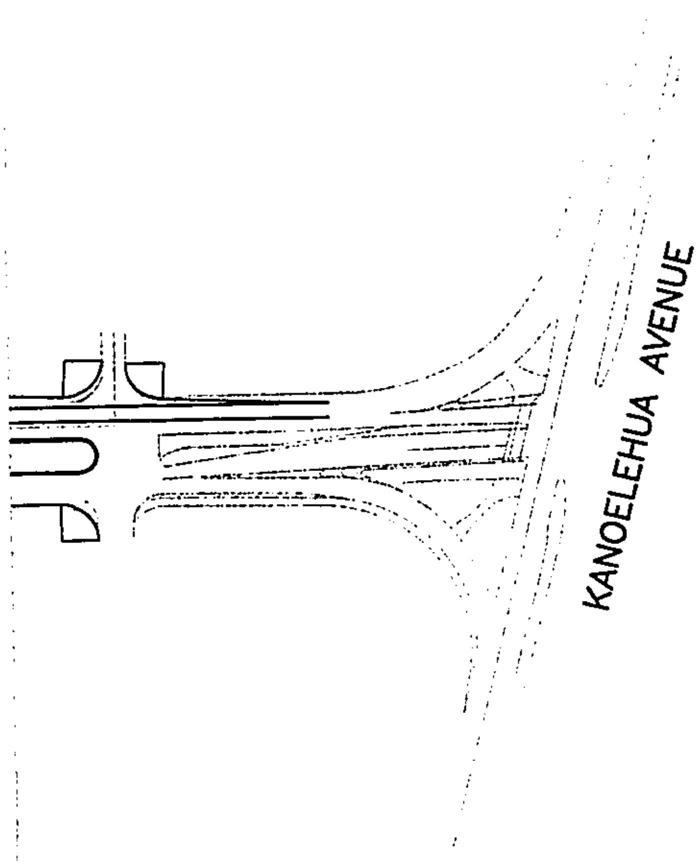
FIGURE
2-2d

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE
2/03/2000

92014/M:/...EIS/ALT-10/F2-2D.DWG/SCALE:1=2





LANES, TURNING MOVEMENTS AND TRAFFIC PATTERNS FOR ALIGNMENTS A AND B ARE SIMILAR.

During field investigations near the time of publication of the Draft EIS, a bulldozer grading private property in Sunrise Estates inadvertently created an opening to a cave ("Sunrise Estates Cave") that passes under the shared section of the Upper Portion (see Fig. 1-1). The cave appears to belong to an approximately 1,000 year-old lava flow that covers a large area in mauka Hilo. The portion of the cave accessible from the entry (which is located on private property) is a segment about 100 m (330 ft.) long blocked by a collapse upslope. The collapse was likely caused by construction of the drainage canal that runs parallel and directly adjacent to the proposed alignment. The downslope end of this segment also appears to be blocked. This portion of the Sunrise Estates Cave does not appear to have ever been accessible and contains no cultural material, burials or bones of any type. The area overlying the cave is occupied by streets, residential lots, and a drainage canal.

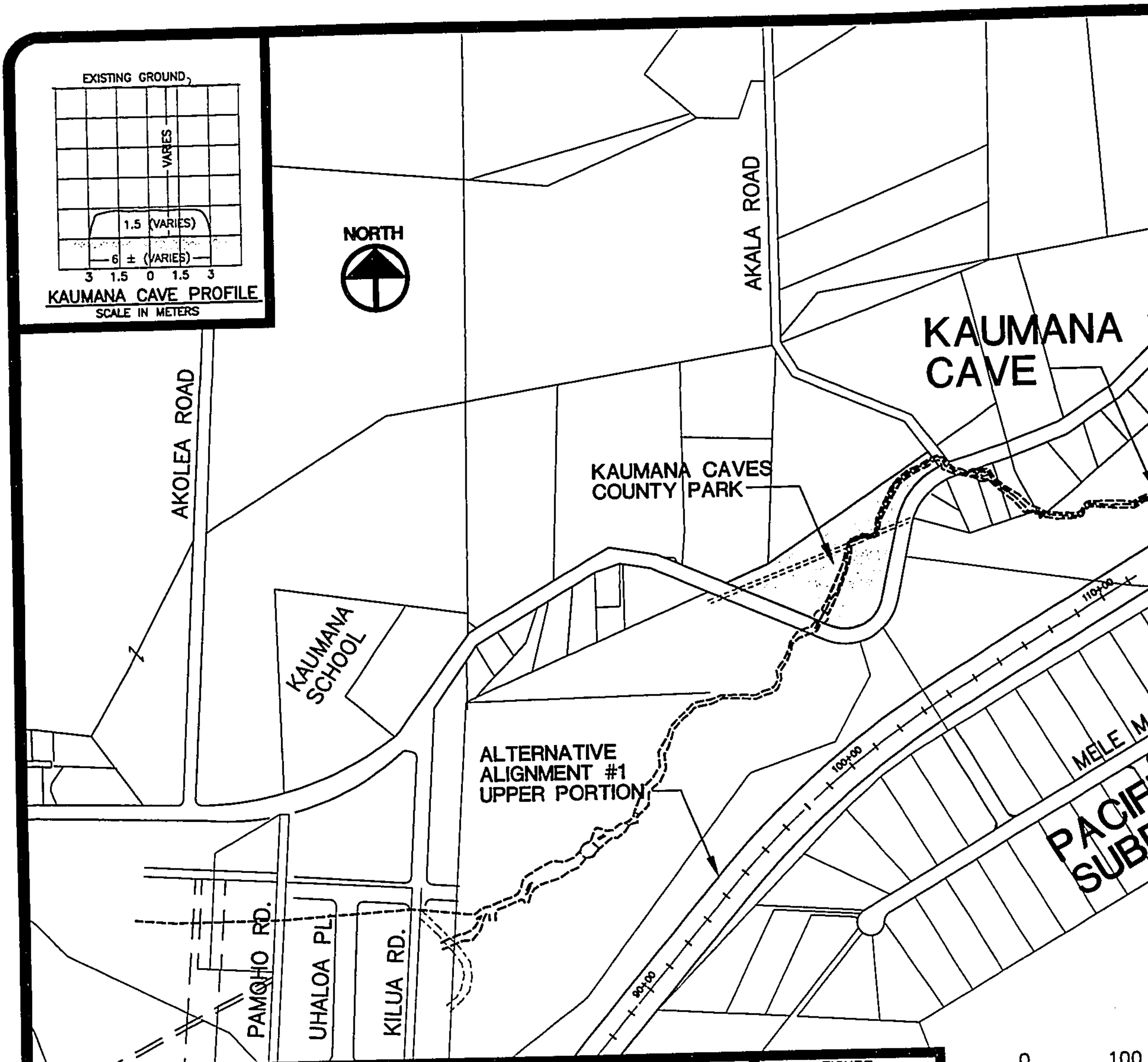
The County of Hawaii and its consultants have investigated the resources offered by Sunrise Estates Cave based on a field visit, a description of the cave provided by the U.S. Geological Survey (USGS), and additional information from the (private) Hawaii Speleological Survey. Further investigation of the cave has been prevented by the owner's refusal to allow further entry. However, sufficient data exist to conclude that the cave does not offer any significant and unique value for geology, recreation, drainage/hydrology, historic sites, or biology. This conclusion has been supported by discussions with the USGS, and the U.S. Fish and Wildlife Service (see App. A5).

3.1.2 Physiography and Soils

The terrain of the project area is composed principally of the downslope segments of major basalt lava flows from Mauna Loa's northeast rift zone. Slopes range from 1 to 7 degrees and are not anticipated to pose major highway construction problems in themselves. Local relief across this generally uniform slope is minor. A few incipient drainage channels exhibit sharp elevational changes of up to 6 m (20 ft.), and thus would require limited terrain modification, such as grading, filling, and construction of culverts and bridges.

Soil is an important consideration in roadway engineering, biological resources and the agricultural value of the land. The soils along most of the alternative alignments overlie recent lava flows and are thus acidic, poorly developed, shallow, and stony. Permeability and runoff are variable and erodibility minor to moderate. There are several pockets of better-developed, agriculturally useful soils along the upper (mauka) section of both Alignments 1 and 2. These soils, derived from Pahala Ash, possess moderate flood and erodibility potential, particularly where slopes are steeper (U.S. Soil Conservation Service 1973).

The engineering properties (e.g., shrink-swell, bearing strength, and thixotropic characteristics) of the soils present are reasonably adaptable to road construction, and specific solutions are most appropriately addressed in road design and engineering work. The agricultural value of the soil is discussed in Section 3.3.7.



TITLE

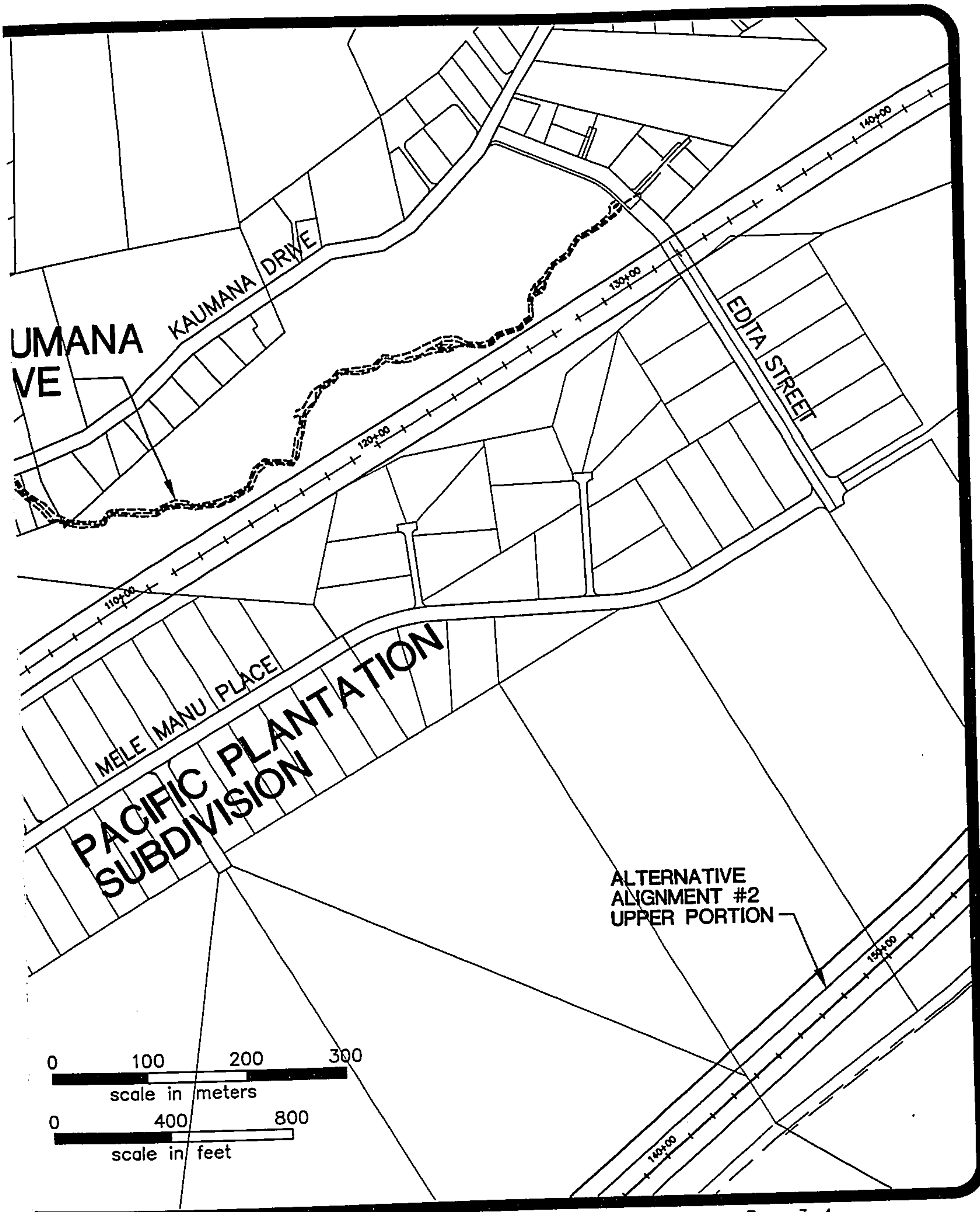
KAUMANA CAVE

FIGURE 3-1

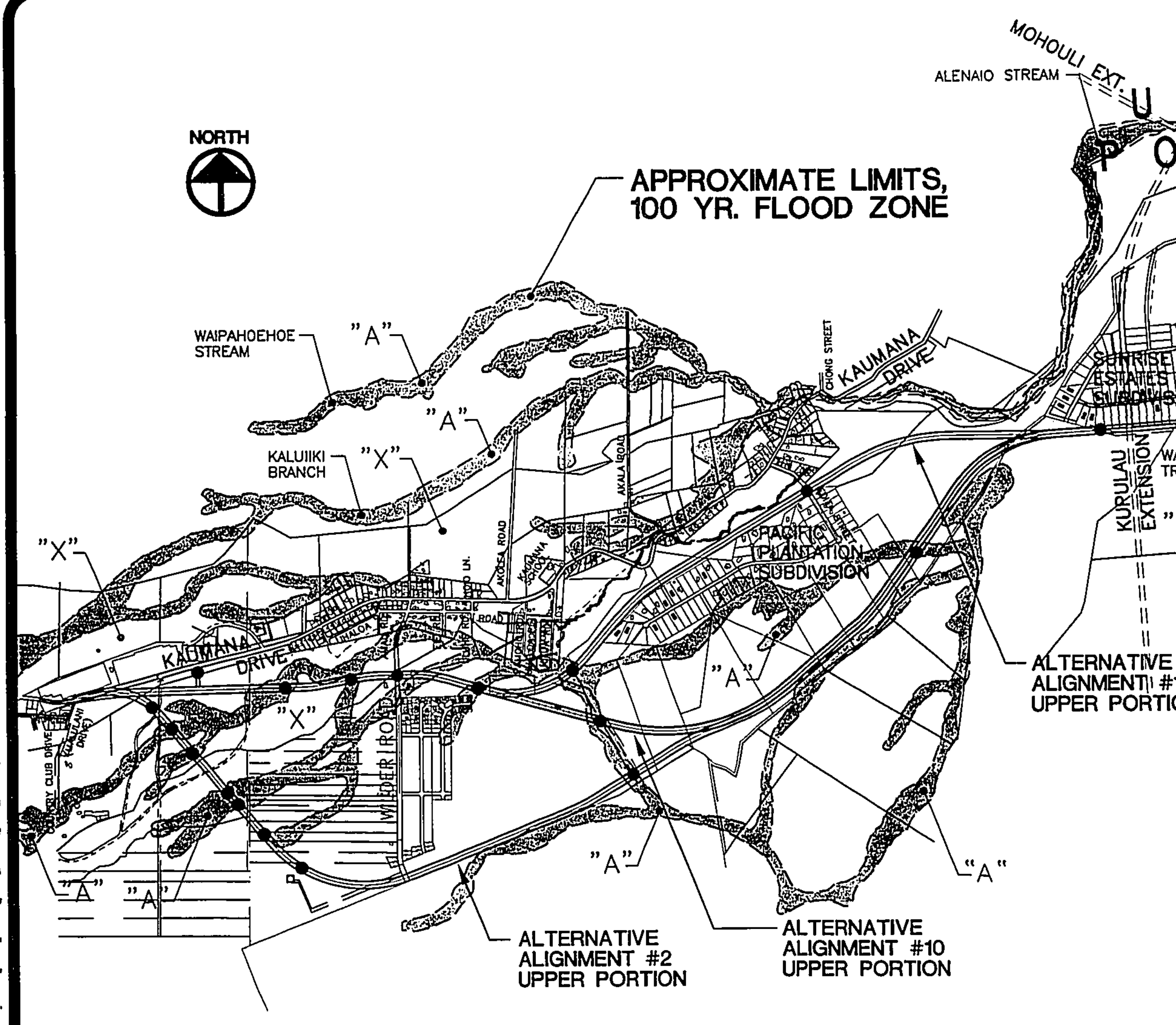
PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

92014/M:/...EIS/ALT-10/F3-1.DWG/SCALE:1=1



UMANA
VE
KAUMANA DRIVE
EDITA STREET
MELE MANU PLACE
PACIFIC PLANTATION SUBDIVISION
ALTERNATIVE ALIGNMENT #2 UPPER PORTION
110+00
120+00
130+00
140+00
150+00
0 100 200 300
scale in meters
0 400 800
scale in feet



TITLE

APPROXIMATE LIMITS, 100 YEAR FLOOD ZONE AND CULVERT LOCATIONS

FIGURE

3-2

0

scale in

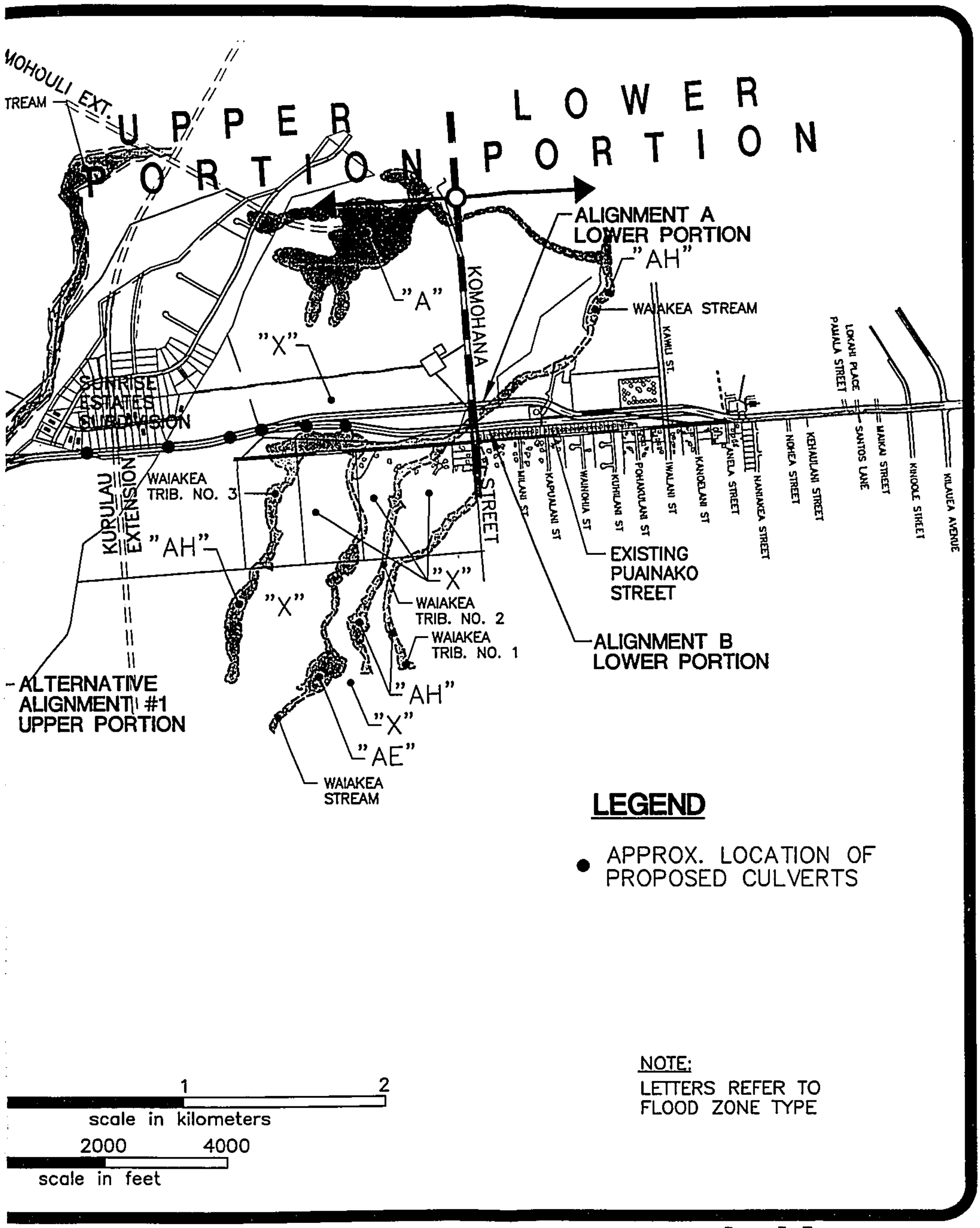
0 2000

scale in feet

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE
2/03/2000

92014/M:/...DS/ALT-10/F3-2.DWG/SCALE:1=1


UPPER PORTION
LOWER PORTION
MOHOULI EXT.
STREAM
ALIGNMENT A LOWER PORTION
"AH"
WAIAKEA STREAM
"A"
"X"
KOMOHANA STREET
SUNRISE ESTATES SUBDIVISION
KURULAU EXTENSION
WAIAKEA TRIB. NO. 3
"AH"
"X"
"X"
WAIAKEA TRIB. NO. 2
WAIAKEA TRIB. NO. 1
"AH"
"X"
"AE"
WAIAKEA STREAM
ALTERNATIVE ALIGNMENT #1 UPPER PORTION
KAWILI ST.
PAUALA STREET
LOKAHI PLACE
SANTOS LANE
MAKAI STREET
KINOOLE STREET
KILAUEA AVENUE
WILANI ST
KAPUALANI ST
WAINOHIA ST
KUHILANI ST
POHAKULANI ST
IWALANI ST
KANOELANI ST
ANELA STREET
NAKIAKEA STREET
NOHEA STREET
KEHAULANI STREET
EXISTING PUAINAKO STREET
ALIGNMENT B LOWER PORTION
LEGEND
APPROX. LOCATION OF PROPOSED CULVERTS
1
2
scale in kilometers
2000
4000
scale in feet
NOTE:
LETTERS REFER TO FLOOD ZONE TYPE

3. Zone AH: SFHAs subject to inundation by 100-year shallow flooding (usually areas of ponding where average depths are between 31 and 92 cm (1 and 3 ft.). Base flood elevations derived from detailed hydraulic analyses are shown in this zone. In this area, there is a base flood elevation of 106 to113 m (348 to 372 ft.) above mean sea level.

4. Zone X: Areas identified in the community flood insurance study as areas of moderate or minimal hazard from the principal source of flood in the area. However, buildings in these zones could be flooded by severe, concentrated rainfall coupled with inadequate local drainage systems. In this area, such a zone may be inundated by the 500 year flood.

Most of the areas upslope of Komohana Street in all projected alignments are classified as Flood Zone X or A. The areas on the eastern (makai) side of Komohana Zone are classified X, AH, or AE.

Several spots within the project area are known as problem areas for minor local flooding. Residents of Wilder Road and Uhaloa Road in Kaumana have reported repeated overtopping at street culverts and subsequent flooding laterally along the road. Minor flooding associated with paved areas with inadequate drainage capacity has occurred on or near Puainako Street near Santos Lane and Kuhilani Street. Flooding in the Lower Portion is not associated with a mapped Flood Zone.

The entire State of Hawaii is part of the Coastal Zone as defined in Coastal Zone Management Act (CZMA) of 1972 (U.S.C. 1451-1464). Section 6.9 contains a discussion of the relationship of the Project to the Hawaii Coastal Zone Management Program objectives.

3.1.5 Water Quality

Precipitation, runoff and groundwater entering the project area exit in one of three ways: into the atmosphere via evapotranspiration, through runoff into streams and flood control channels to Hilo Bay, or via groundwater transport into Hilo Bay. The water transports along with it a proportion of the pollutants derived from many sources, including highway runoff.

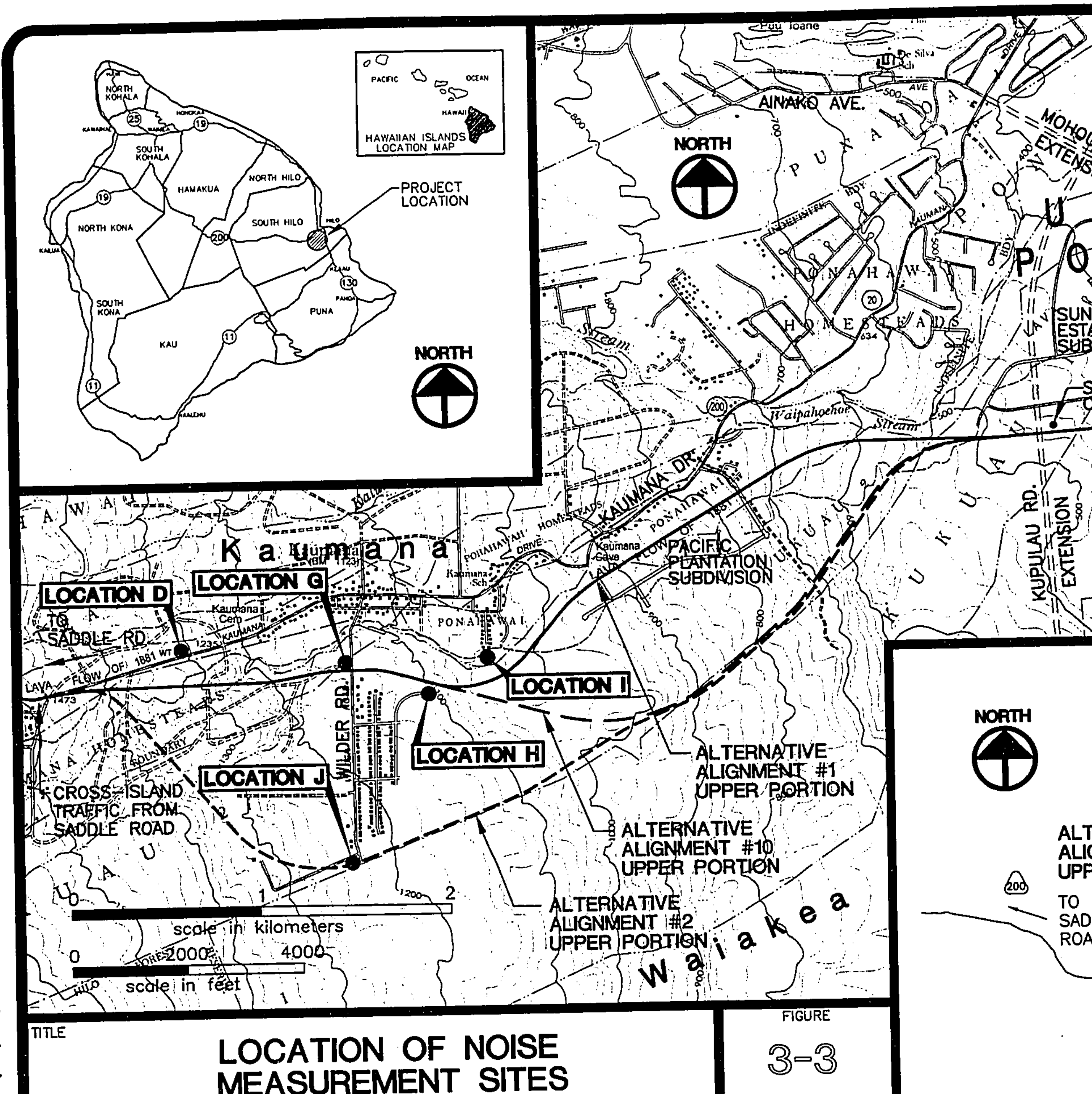
Groundwater

The aquifers underlying the project area consist of basal water floating on salt water, as well as water perched on ash, soil, or alluvium and underlain by basal water (Hawaii Water Resources Regional Study 1979). No aquifers designated as Principal or Sole-Source aquifers are located in or near the project area. There are no State Wellhead Protection Plans in force in or near the project area.

Streams

This discussion concerns water quality, particularly as related to recreation and habitat issues. The floodplain characteristics of project area streams are discussed in Section 3.1.4 above.

Drainage systems in the project area are not well developed because of the relatively recent age and high permeability of the lava. The drainages here are either intermittent or very flashy in discharge, and many disappear underground before reaching the sea. The major stream is the Wailoa River, which forms a broad estuarine pond. Its tributaries include Waiakea and Alenaio Streams, both of which are channelized or modified along much of their lower reaches.



TITLE

LOCATION OF NOISE MEASUREMENT SITES

FIGURE 3-3

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 10/26/98

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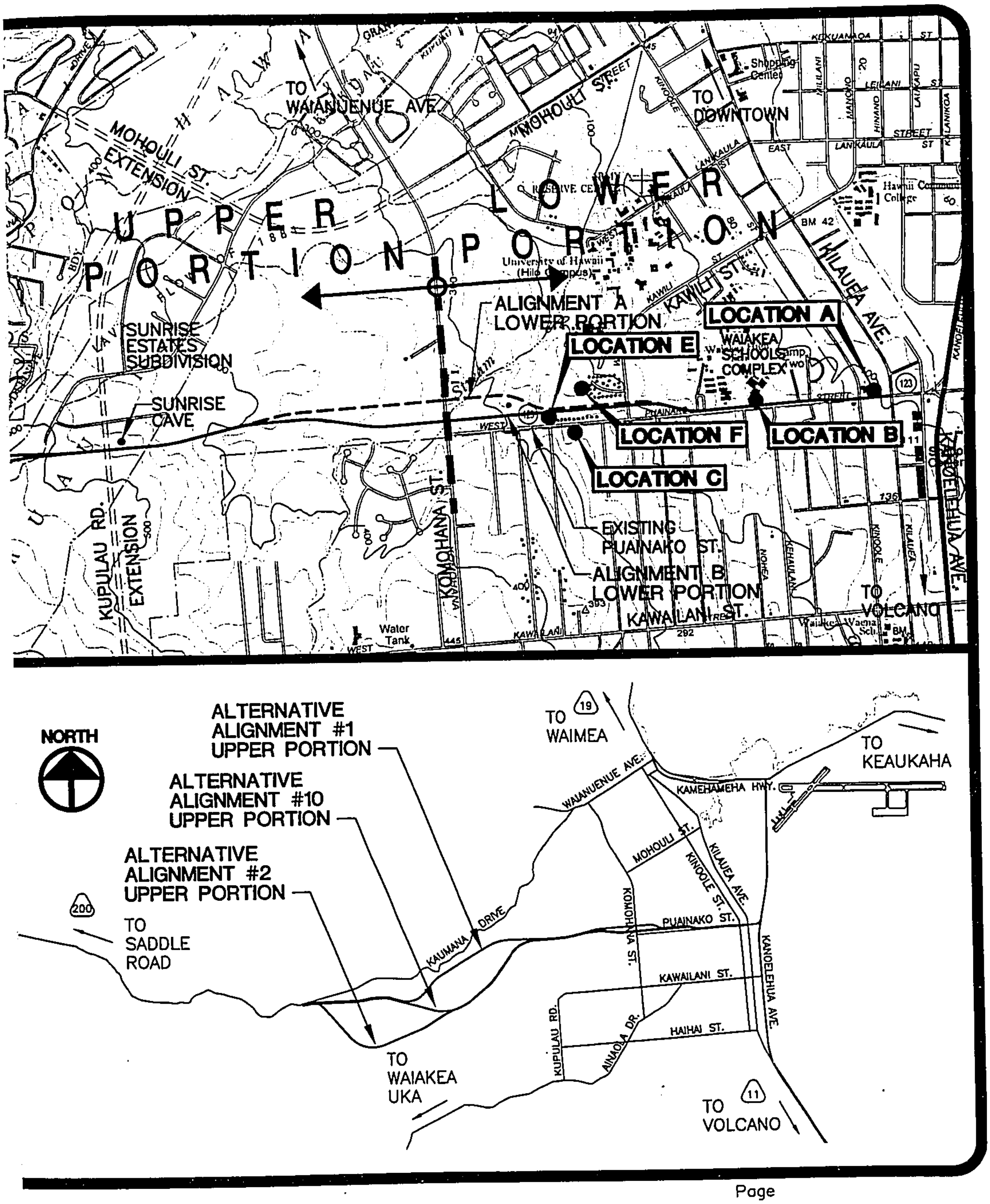

UPPER PORTION
LOWER PORTION
TO WAIANUENUE AVE
TO DOWNTOWN
MOHOULI ST. EXTENSION
MOHOULI STREET
ALIGNMENT A LOWER PORTION
LOCATION A
LOCATION B
LOCATION C
LOCATION E
LOCATION F
WAIAKEA SCHOOLS COMPLEX
SUNRISE ESTATES SUBDIVISION
SUNRISE CAVE
EXISTING PUAINAKO ST.
ALIGNMENT B LOWER PORTION
KAWAILANI ST.
KUPULAU RD. EXTENSION
KOMOHANA ST.
KILAUEA AVE.
KANOELEHUA AVE.
TO VOLCANO
NORTH
ALTERNATIVE ALIGNMENT #1 UPPER PORTION
ALTERNATIVE ALIGNMENT #10 UPPER PORTION
ALTERNATIVE ALIGNMENT #2 UPPER PORTION
TO SADDLE ROAD
TO WAIMEA
TO KEAUKAHA
TO WAIAKEA UKA
TO VOLCANO
WAIANUENUE AVE.
KAMEHAMEHA HWY.
MOHOULI ST.
KINOOLE ST.
KILAUEA AVE.
KAUMANA DRIVE
PUAINAKO ST.
KOMOHANA ST.
KANOELEHUA AVE.
KAWAILANI ST.
HAIHAI ST.
KUPULAU RD.
AINAOLA DR.

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3.2.2.1 Wetland Determination and Delineation Methodology

Analysis of wetland habitats was guided by the *Corps of Engineers Wetlands Delineation Manual* (US-COE 1987) and the *National List of Plant Species That Occur in Wetlands: Hawaii (Region H)* (U.S. Fish and Wildlife Service 1988). The vegetation, soil and hydrological criteria defined in the Delineation Manual were used to determine the parts of the project area that have one or more strong indicators of wetland habitat.

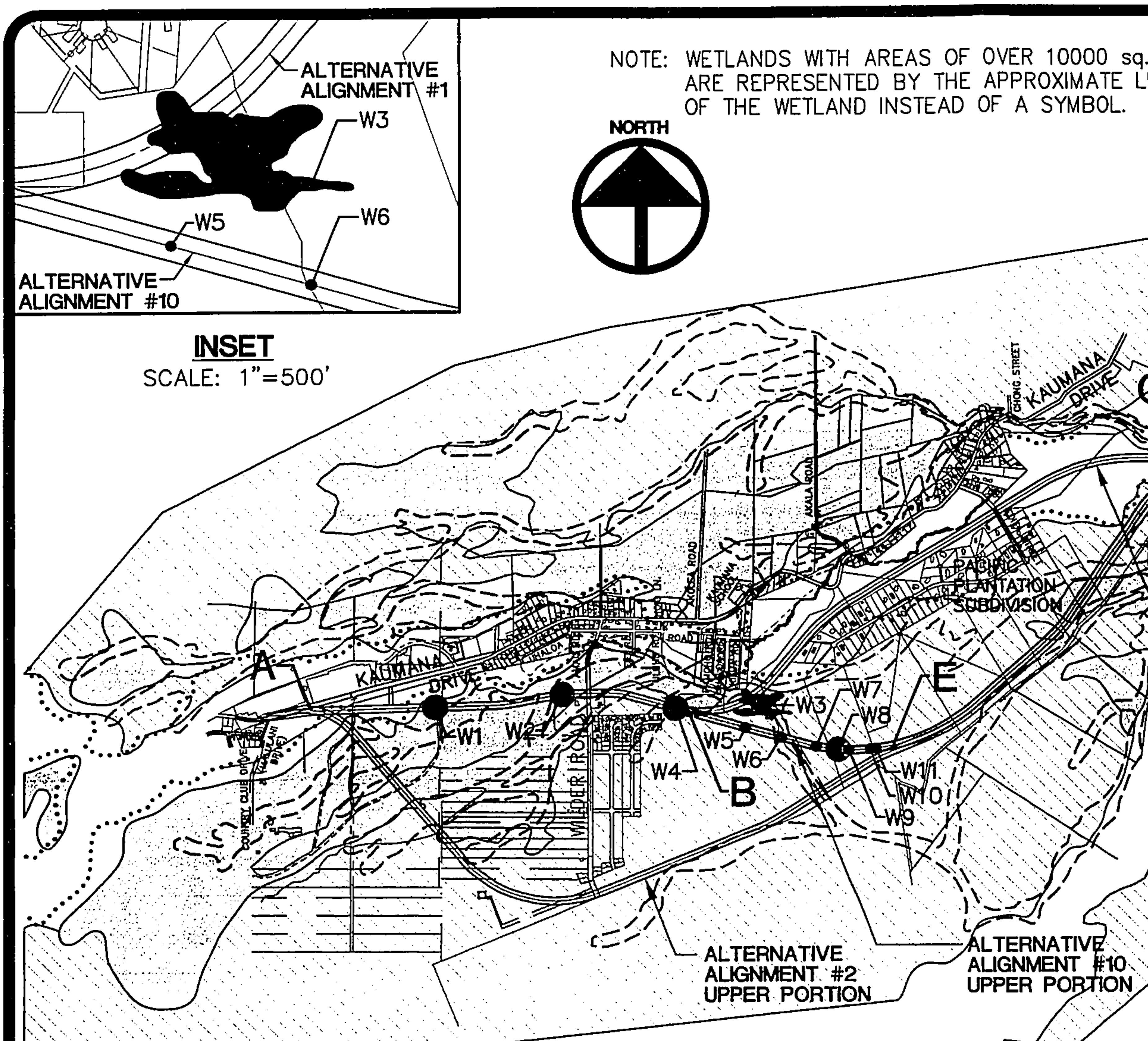
Precise delineation of the extent of wetland habitat in Hawaii on moderate to high slopes in areas of rainforest climate is highly problematic. Quite often, areas with basically upland characteristics contain scattered pockets of tiny "wetlands," often with borderline wetlands indicator characteristics. This is the case for much of the project area.

Therefore, in consultation with the US-COE, Honolulu District, the analysis of wetland habitat was done in two steps. First, in order to generate an estimate of the maximum area that might be wetlands under the jurisdiction of the US-COE (the "worst-case" area of disturbance), all areas that field surveys and map data determined to possess one strong indicator of the presence of at least one of the three required criteria were determined to be jurisdictional wetlands. This determination was made for all alternative alignment segments, and it provided a basis for determining where it would be feasible to conduct a formal delineation to measure the actual wetland areas. Then, delineations were done for Alignments A, 1, 10, and a portion of 2 (Alignment B contained no wetlands). The mauka portions of Alignment 2 contains hundreds of small, poorly drained pockets, mostly less than 5.0 sq. m (55 sq. ft.) in a dominantly upland matrix. This situation precluded actual delineation of individual wetlands. Therefore, the "worst-case" figure was used as the estimate of wetlands for most of Alignment 2. Details of the wetlands determination/delineation process are contained in Appendix B2.

In accordance with 40 CFR 230 Subpart E, the project area was inventoried for special aquatic sites, such as sanctuaries and refuges, mud flats, vegetated shallows, coral reefs, and riffle and pool complexes. No such sites are present or would be affected by the Project.

3.2.2.2 General Distribution of Wetlands

Figure 3-4 illustrates the wetlands and Tropofolist soils of the project area. Table 3-6 summarizes the locations and areal extent of all wetlands on an alignment by alignment basis. The calculated area of wetlands assumes a 60 m (200 ft.) corridor width, which provides a generous estimate of wetlands, as no more than 45 m (160 ft.) would likely be disturbed under any circumstances.



TITLE	FIGURE
DELINEATED WETLANDS	3-4
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000

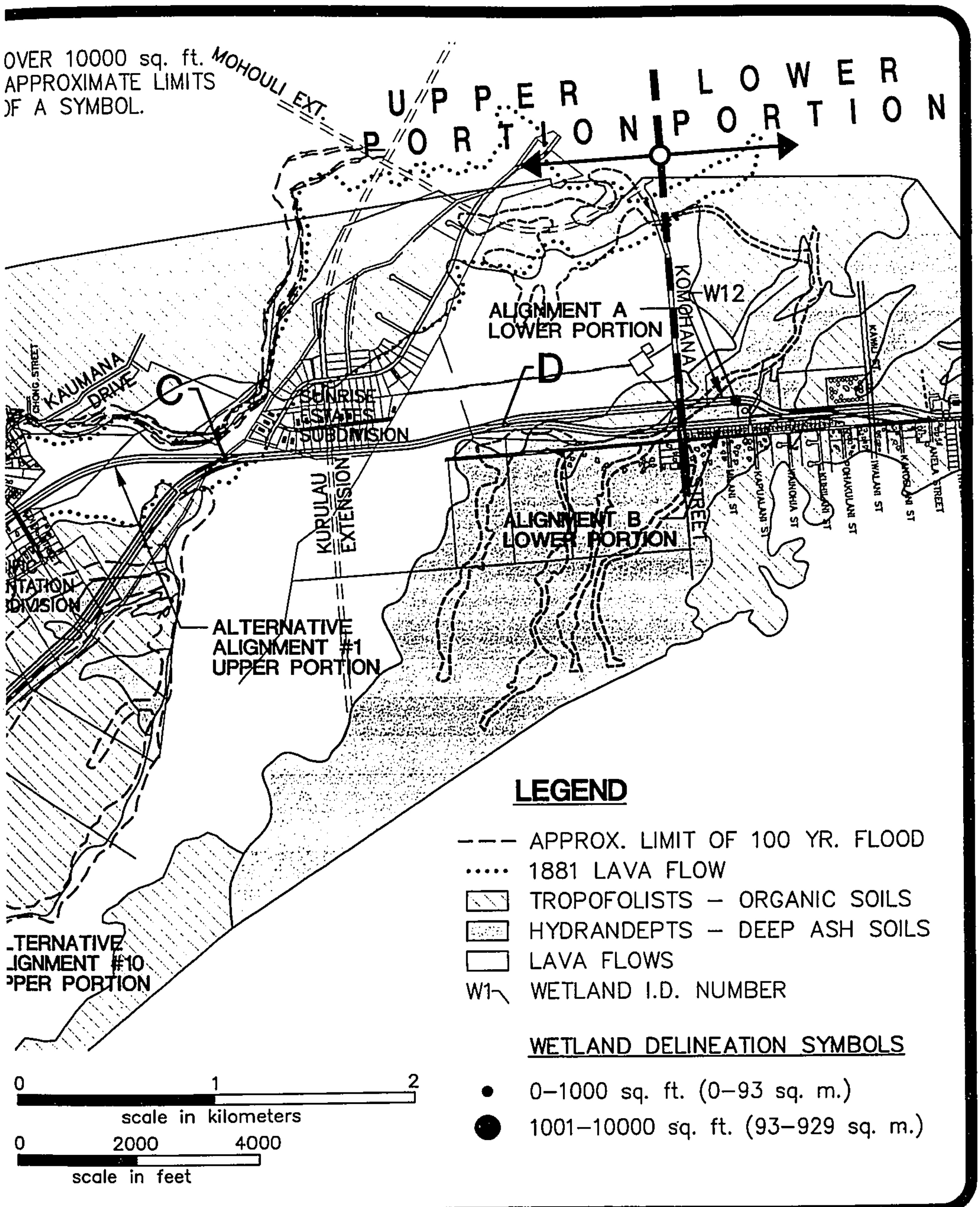
0

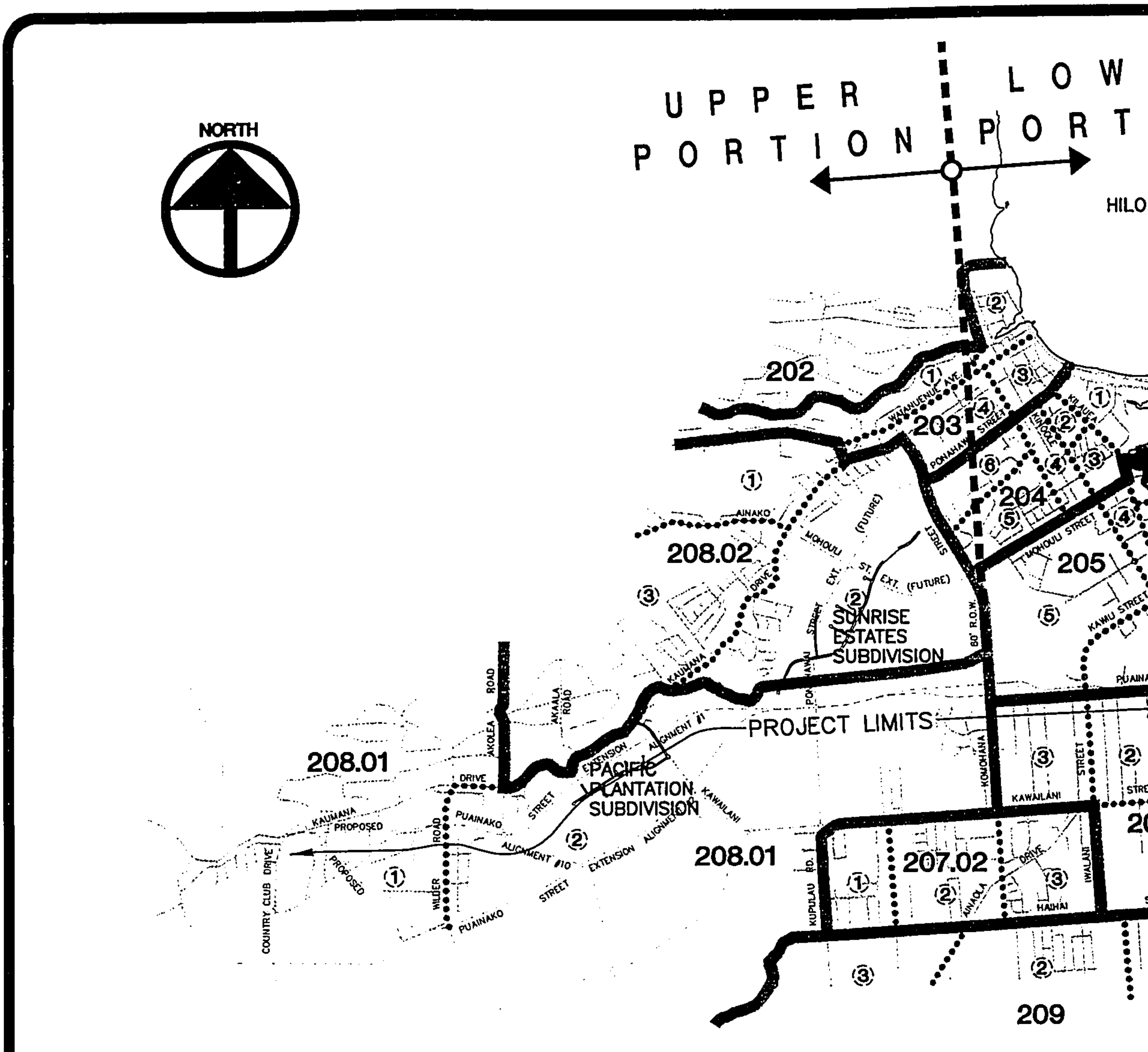
scale

0 2000

scale in f

92014/M:/...DS/ALT-10/F3-4.DWG/SCALE:1=1


OVER 10000 sq. ft.
APPROXIMATE LIMITS
)F A SYMBOL.
MOHOULI EXT.
UPPER PORTION
LOWER PORTION
W12
KOMOHANA STREET
ALIGNMENT A LOWER PORTION
D
C
KAUMANA DRIVE
SUNRISE ESTATES SUBDIVISION
KURULAU EXTENSION
ALIGNMENT B LOWER PORTION
ALTERNATIVE ALIGNMENT #1 UPPER PORTION
-TERNATIVE
-IGNMENT #10
PPER PORTION
LEGEND
APPROX. LIMIT OF 100 YR. FLOOD
1881 LAVA FLOW
TROPOFOLISTS – ORGANIC SOILS
HYDRANDEPTS – DEEP ASH SOILS
LAVA FLOWS
W1 WETLAND I.D. NUMBER
WETLAND DELINEATION SYMBOLS
0–1000 sq. ft. (0–93 sq. m.)
1001–10000 sq. ft. (93–929 sq. m.)
0 1 2
scale in kilometers
0 2000 4000
scale in feet



TITLE	FIGURE	
PROJECT AREA CENSUS TRACTS AND BLOCK GROUPS	3-5	0 1 scale in kilomete
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000	0 4000 scale in fe

92014/M:/...DS/ALT-10/F3-5.DWG/SCALE:1=1

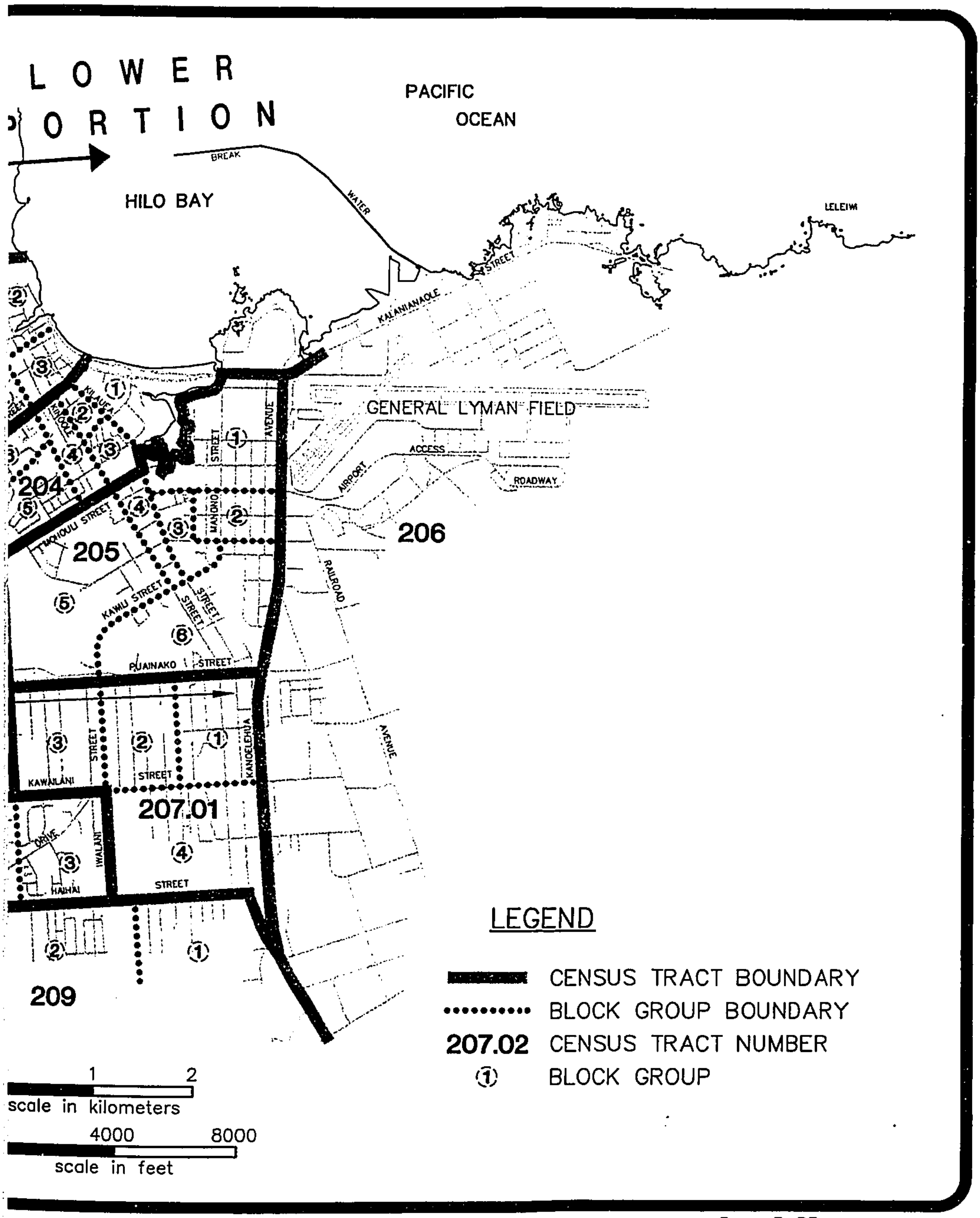

LOWER
PORTION
PACIFIC
OCEAN
HILO BAY
BREAK
WATER
STREET
KALANIANAOLE
LELEIWI
GENERAL LYMAN FIELD
ACCESS
AIRPORT
ROADWAY
206
204
205
MOHOULI STREET
KILAUEA
STREET
AVENUE
MANONO
KAWILI STREET
STREET
STREET
RAILROAD
PUAINAKO STREET
KAWAILANI
STREET
STREET
KANOELEHUA
AVENUE
207.01
DRIVE
IWALANI
HAIHAI
STREET
209
1
2
scale in kilometers
4000
8000
scale in feet
LEGEND
CENSUS TRACT BOUNDARY
BLOCK GROUP BOUNDARY
207.02 CENSUS TRACT NUMBER
1 BLOCK GROUP

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

Trait/Unit	205 Lower Waiakea: Mohouli - Puainako	207.01 Lower Waiakea: Puainako to Haihai	208.01 Upper Kaumana	208.02 Lower Kaumana	Hilo
PERSONS	5,576	4,399	3,062	5,081	37,808
FAMILIES	1,295	1,256	7,355	1,428	9,715
HOUSEHOLDS	2,096	1,559	868	1,746	13,234
%Female	51.5	51.0	51.6	50.7	51.2
%Low Income	***22.5***	***6.2***	***7.6***	***10.9***	***14.5***
ETHNIC					
%Cauc	25.8	16.8	28.1	30.0	26.6
%Fili	9.3	9.2	8.9	8.0	9.5
%Hawa	19.7	15.6	14.0	12.9	20.0
%Japa	33.0	51.8	41.3	39.6	35.2
%Minority	***76.4***	***84.4***	***74.7***	***72.5***	***75.8***
AGE					
%<18	27.5	22.5	31.0	27.0	27.3
%18-29	20.5	12.7	11.1	12.3	15.0
%30-59	30.5	36.9	39.9	39.3	37.8
%>59	21.5	27.9	18.0	21.4	19.9
HOUSEUNITS	2,223	1,586	892	1,802	14,134
%Owner-Occu.	33.6	74.6	81.0	74.0	56.7
%Vacant	5.7	1.7	2.7	3.1	5.7
MEDIAN $HOME VALUE	111,700	114,900	114,500	108,800	84,700
Q1 $RENT	251	316	373	363	270
MEDIAN $RENT	367	412	516	477	371
Q4 $RENT	466	537	610	579	491

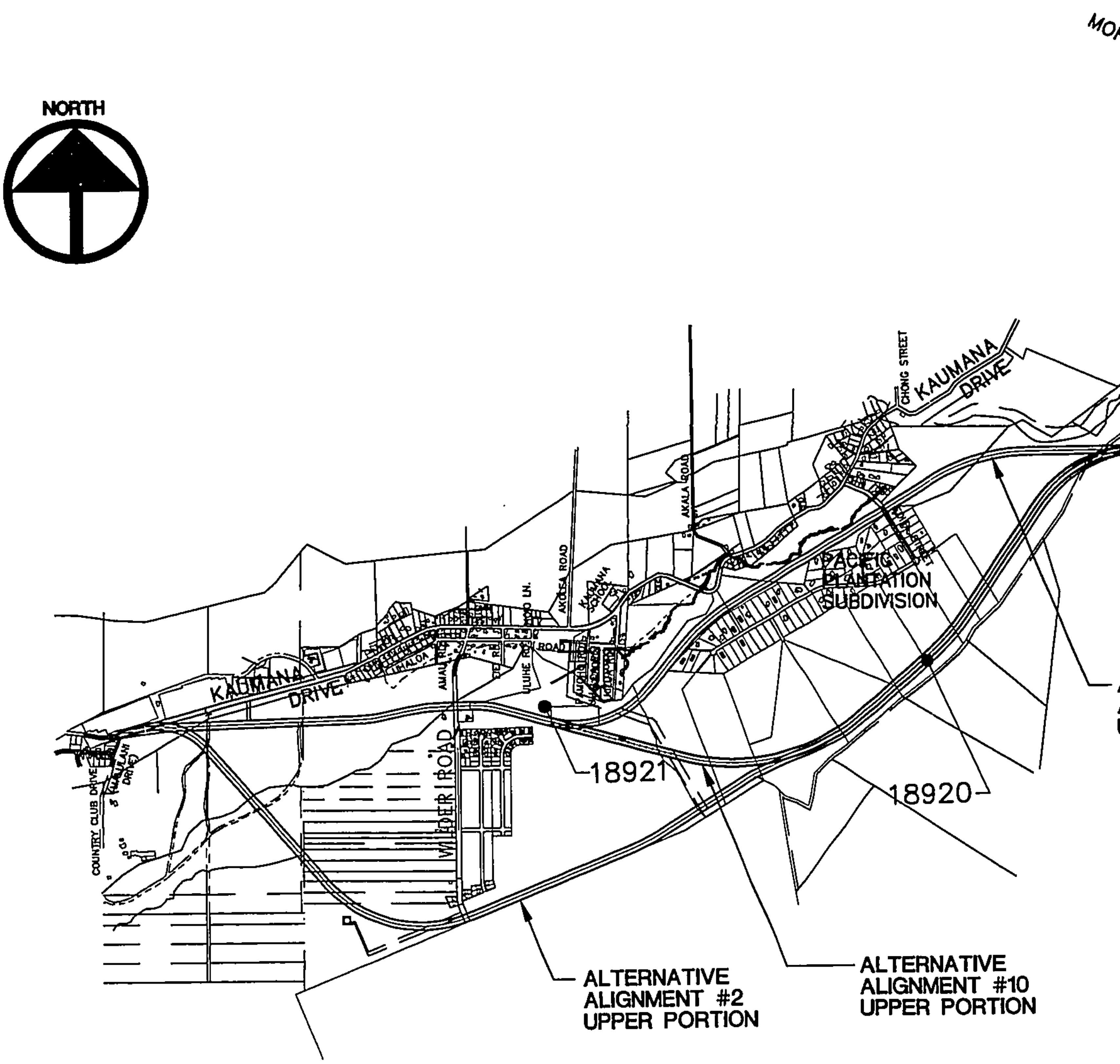
Source: U.S. Census of Population, 1990 STF1-A. Note: Refer to Figure 3-4 for Census Tract boundaries. Key: ETHNIC: CAUC=Caucasian (includes Hispanic Caucasians, who are included in Minority category below), FILI=Filipino, HAWA=Hawaiian; JAPA=Japanese; RENT: Q1=Average of rents in 1st quartile: Q4=Average of rents in 4th quartile. Low income is defined as below Census Bureau poverty threshold.

outside of the historically designated cane fields: Site 18918 is located within pasture land, and Site 18919 is on the boundary between the cane lands and historic pasture. Site 18918 is

Table 3-9
Archaeological Site Summary and Significance

Site No. (50-10-35)	Alignment	No. of Features	Site Type	Interpreted Function	Significance Eligibility Criteria
18911	Shared Lower	11	Complex	Historic agriculture	D
18912	Shared Lower	5	Complex	Historic agriculture	D
18913	A	1	Mound	Historic agriculture	NLS
18914	A	12	Complex	Historic agriculture	C, D
18915	A	9	Complex	Historic agriculture	C, D
18916	B	2	Complex	Historic agriculture	D
18917	A	3	Complex	Historic agriculture	C, D
18918	A	4	Complex	Historic agriculture/pasture	D
18919	B	58	Complex	Historic agriculture/pasture	D
18920	2	8	Complex	Historic agriculture	NLS
18921	1/10	5	Complex	Historic agriculture	D
18922	Shared Lower	1	Modified outcrop	Clearing	D
18923	Shared Lower	1	Modified outcrop	Clearing	D
20681	B	16	complex	Historic agriculture	D

Notes: National Register of Historic Places/Hawaii Register of Historic Places eligibility criteria. From 36 CFR 60
A Site reflects major trends or events in the history of the state or nation
B Site is associated with the lives of persons significant in the past
C Site is an excellent example of a site type
D Site is likely to yield information important to prehistory and history
E Site has cultural or religious significance
Recommended treatments are discussed in Section 4.3.7.
NLS means no longer significant (sufficient data recovery has been accomplished)



TITLE

ARCHAEOLOGICAL SITES

FIGURE 3-6

0

scale in

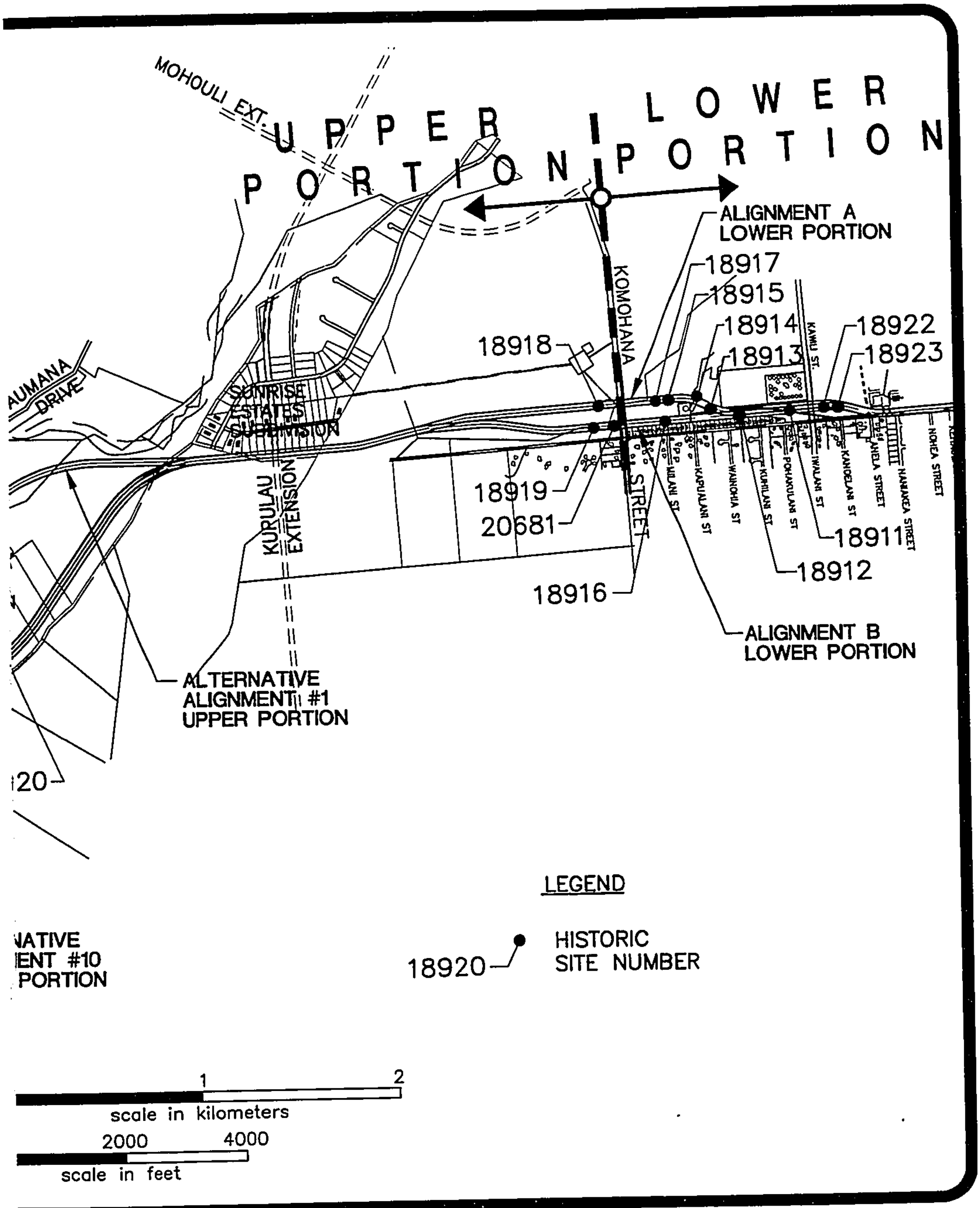
0 2000

scale in feet

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

92014/M:/...EIS/F3-6.DWG/SCALE:1=1


MOHOULI EXT.
UPPER PORTION
LOWER PORTION
ALIGNMENT A LOWER PORTION
KOMOHANA STREET
18917
18915
18914
18913
18918
18922
18923
KAWILI ST
AUMANA DRIVE
SUNRISE ESTATES SUBDIVISION
KURULAU EXTENSION
18919
20681
MILANI ST
KAPUALANI ST
WAINOHIA ST
KUHILANI ST
POKAHULANI ST
IWALANI ST
KANOELANI ST
ANELA STREET
NANIAKEA STREET
NOHEA STREET
18911
18912
18916
ALIGNMENT B LOWER PORTION
ALTERNATIVE ALIGNMENT #1 UPPER PORTION
20
NATIVE ENT #10 PORTION
LEGEND
18920
HISTORIC SITE NUMBER
1
2
scale in kilometers
2000
4000
scale in feet

archaeological work within the project area; finally, Dega (2000) conducted further archaeological work, interviews and consultation with Native Hawaiian Groups and individuals. Following the work of Dega (2000), SCS formalized the process of consultation with OHA (see Appendix A5, letter of Dega to Lee, 24 January 2000).

Based on research and consultation, the FHWA has concluded that no Traditional Cultural Properties (TCPs) or other important cultural sites (e.g., gathering areas) are present within the project area or would in some other way be affected by project activities. This is based on the fact that: a) during all consultations, archaeological field work, and interviews, no groups or individuals have made specific claims or offered specific knowledge regarding the presence of such resources; b) none of the archaeological sites identified within the project area have been identified or suggested as traditional cultural places; and c) historic research and oral historic interviews and consultations have failed to reveal the presence of any traditional sites occurring within the project area. All archaeological sites have been securely identified as temporally and culturally associated with historic sugar cane cultivation in the area.

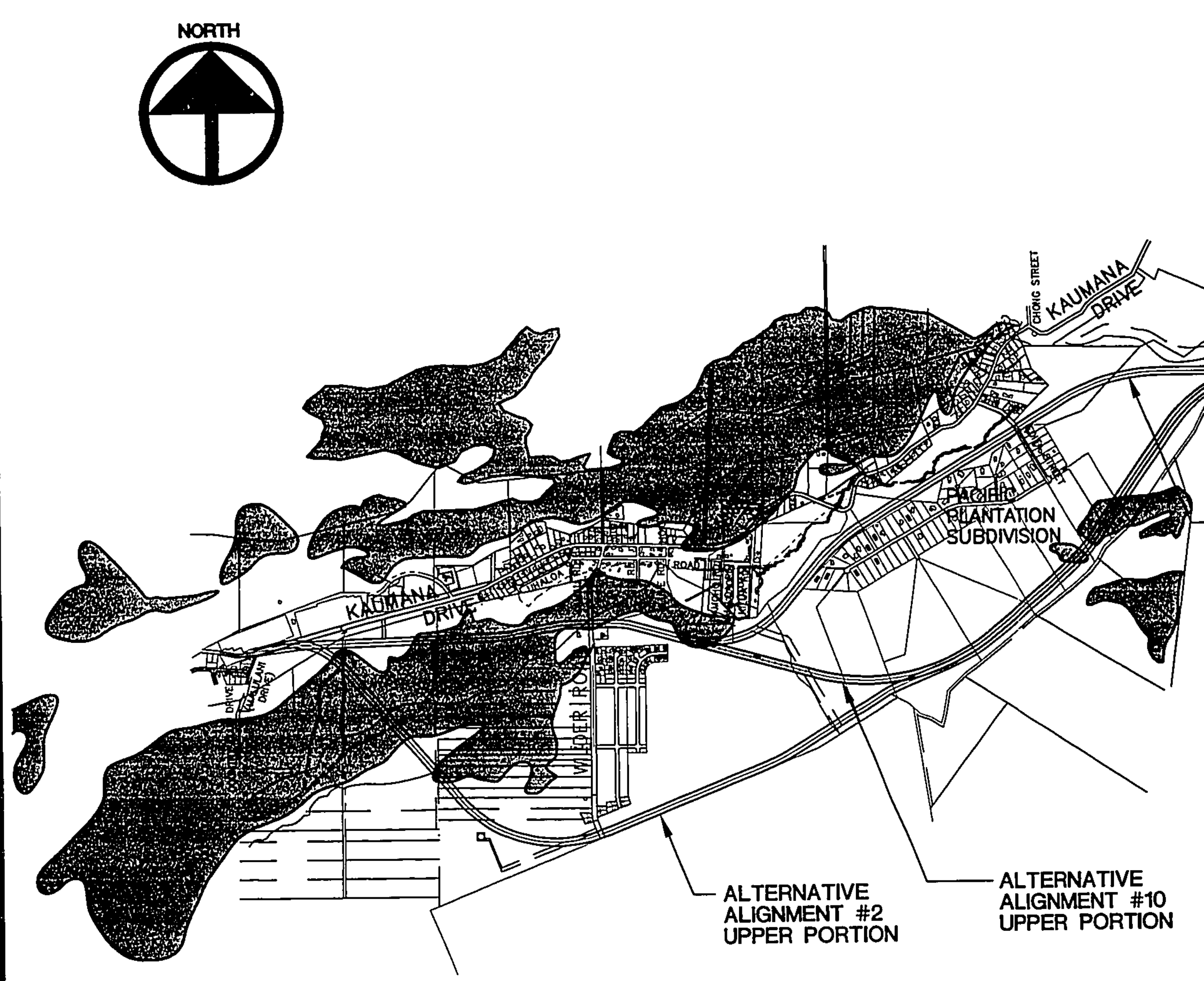
3.3.7 Agricultural Land

The U.S. Natural Resources Conservation Service (USNRCS – formerly U.S. Soil Conservation Service) was consulted to determine the soil and agricultural resources present in the project area. This consultation included formal assessment of the Farmland Conversion Impact Rating evaluation process (see Appendix J for documentation).

The agricultural utility of the land was assessed in the 1970s by the U.S. Soil Conservation Service and mapped as part of the *Agricultural Lands of Importance to the State of Hawaii* (ALISH) map series. Three categories of valuable agricultural land are identified: Prime, Unique, and Other (Baker 1976:4). Prime Land "has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed . . . according to modern farming methods" (Ibid:2). Island-wide, Prime Lands constitute about 4 percent of the surface, Unique Lands less than 1 percent, Other Lands about 18 percent, and Unclassified the remaining 78 percent.

Only the western (mauka) section of the Upper Portion in the Project contains agricultural lands identified as Prime, Unique or Other Important Agricultural land (i.e., especially important for preservation) (Fig. 3-7). Alignments 1 and Alignment 2 both cross approximately 915 m (3,000 ft.) of better-developed soil that was once used for sugar cane cultivation but is now fallow. Calculations show that each alignment displaces approximately 3.2 ha (7.9 ac.) of Prime Agricultural Land. Alignment 10 involves about 10 percent more Prime Agricultural Land than Alignments 1 or 2. No Unique or Other Important Agricultural Land is present or affected.

One farm, located in upper Kaumana west of Kaumana Drive, would be affected by the proposed Project if Alignment 1 or 10 were chosen. The farm occupies somewhat less than half of a 2.10 ha (5.25 ac.) leased area on which a variety of vegetables are grown for both home consumption and market. About 35 percent of the leased area would be converted to right-of-way with Alignment 1, including 25 percent of the area currently farmed; about 15 percent of the leased area would be converted under Alignment 10, converting none of the area currently farmed.



TITLE
AGRICULTURAL LANDS OF IMPORTANCE TO THE STATE OF HAWAII (ALISH)

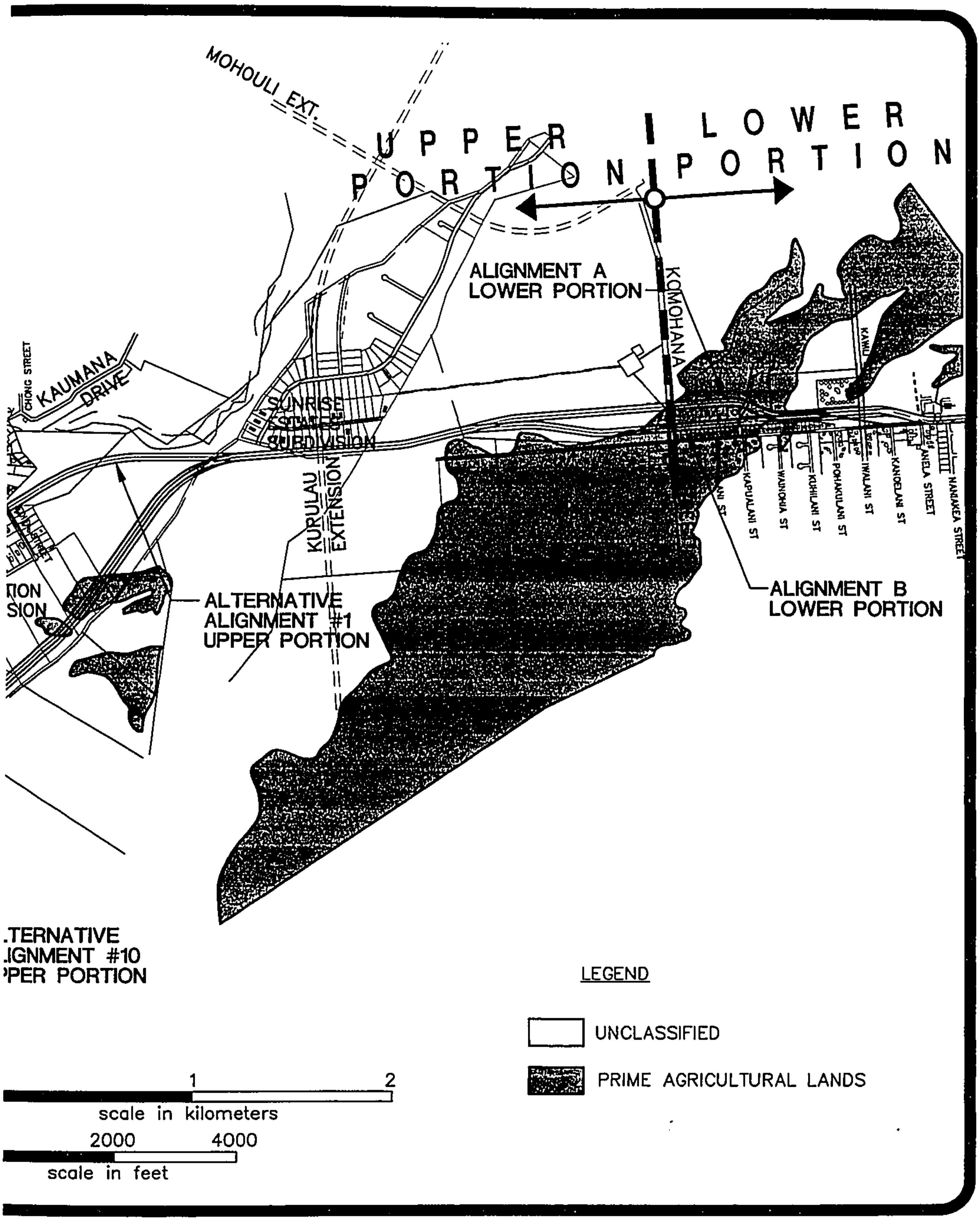
FIGURE
3-7

0
scale in
0 2000
scale in feet

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE
2/03/2000

92014/M:/...EIS/ALT-10/F3-7.DWG/SCALE:1=1



MOHOULI EXT.
UPPER PORTION
LOWER PORTION
ALIGNMENT A
LOWER PORTION
KOMOHANA
CHONG STREET
KAUMANA DRIVE
SUNRISE ESTATES SUBDIVISION
KURULAU EXTENSION
TION
SION
ALTERNATIVE
ALIGNMENT #1
UPPER PORTION
KAPUALANI ST
WAIHOHIA ST
KUHILANI ST
POHAKULANI ST
IWALANI ST
KANOELANI ST
ANELA STREET
NANIAKEA STREET
KAWILI
ALIGNMENT B
LOWER PORTION
.TERNATIVE
.IGNMENT #10
'PER PORTION
LEGEND
UNCLASSIFIED
PRIME AGRICULTURAL LANDS
1
2
scale in kilometers
2000
4000
scale in feet

3.3.8 Transportation Patterns

A detailed description of traffic volumes and safety characteristics specific to the immediate project area is contained in Section 1.4. This section discusses regional traffic patterns and the existing use of the project area by pedestrians and bicycles.

3.3.8.1 Regional Transportation Network

The transportation network of the Project region consists of three major state highways which converge in Hilo, secondary arterials which connect these highways, and minor feeder roads. Figure 3-8 depicts the roadway system and the 1994 average daily traffic associated with each link, if measured. The function of individual roads is described below:

State Highway 11 (Volcano Highway/Kanoelehua Avenue), a four-to-six-lane divided highway, is the primary arterial in the vicinity of the project area and is a segment of the round-the-island "Belt Highway" carrying traffic into Hilo from all parts of the island to the south, terminating in Kailua-Kona. Within Hilo, Highway 11 carries traffic from the port and hotel areas of Hilo and the Hilo Bayfront Highway (State Highway 19) through Hilo's industrial district. Highway 11 provides the only public access to Hilo International Airport. The eastern terminus of Puainako Street is at Railroad Avenue to the east of Highway 11.

State Highway 19 (Kamehameha Avenue/Bayfront Highway) is a two-to-four lane, partially divided highway within urban Hilo and then a two-lane highway from Hilo northwest to Honokaa, Waimea and beyond. It meets Highway 11 in Kailua-Kona.

State Highway 200 (Saddle Road) begins at the western (mauka) end of Kaumana Drive and crosses the island, intersecting with Mamalahoa Highway south of Waimea, South Kohala, and connecting the Kona and Kohala districts with East Hawaii.

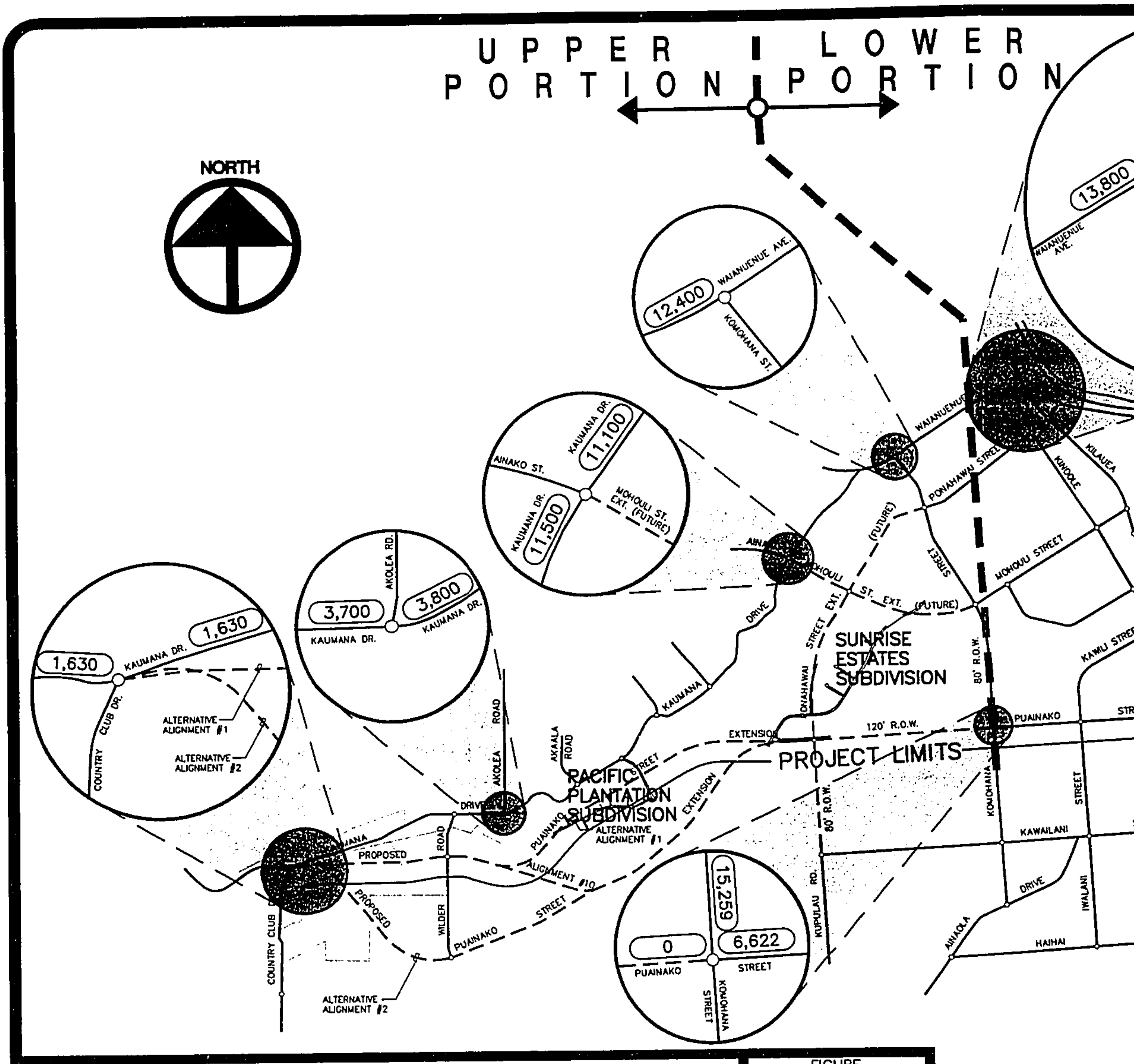
Improvements of Saddle Road that are underway or planned would increase traffic on the roadways connecting it to arterial roads of Hilo and East Hawaii. Puainako Street now carries traffic destined for Kaumana Drive/Waianuenue Avenue and Saddle Road via Komohana Street.

Kilauea Avenue runs along the long axis of the older sections of Hilo, connecting the southern part of the city and the Puna District with downtown. Kilauea Avenue intersects Puainako Street near its eastern terminus at Highway 11.

Komohana Street directly connects the two major upland (mauka) Hilo neighborhoods, Waiakea Uka and Kaumana, and provides the most direct cross-town route for the residents of those two districts. Currently, the western terminus of Puainako Street is at Komohana Street.

Kaumana Drive/Waianuenue Avenue connects downtown Hilo with Kaumana and Saddle Road. Kaumana Drive is a two-lane roadway with a curvilinear horizontal alignment and rolling vertical alignment. At the eastern (makai) end, Kaumana Drive connects to Waianuenue Avenue, which passes Hilo High School and terminates at the Hilo Bayfront Highway.

Trucks represent 3.0 to 6.0 percent of Average Daily Traffic (ADT) at various locations within the network. Neither ADT nor peak hour traffic volumes are markedly seasonal.



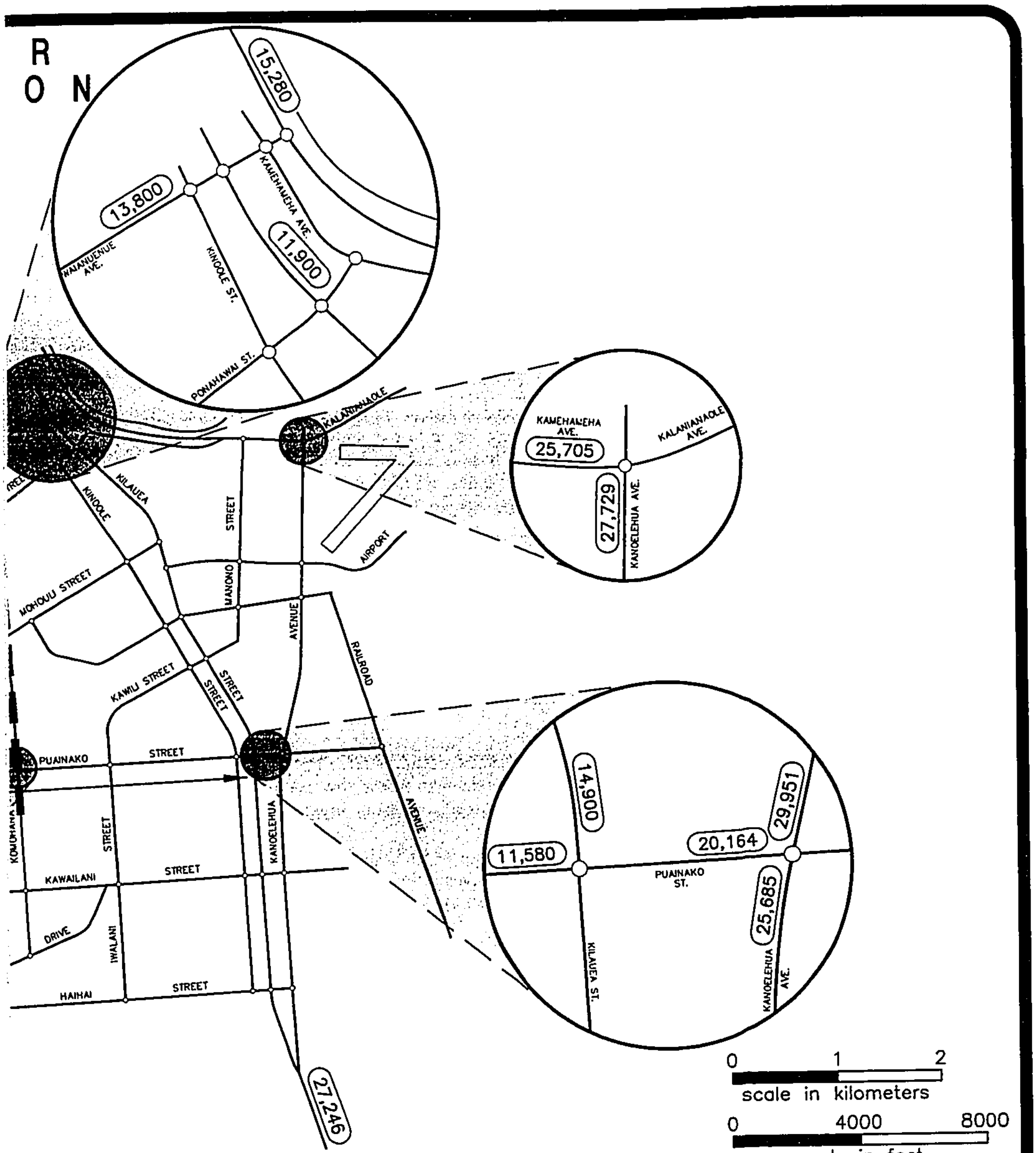
TITLE
1994 AVERAGE DAILY TRAFFIC VOLUMES MAJOR PROJECT AREA ROADWAYS

FIGURE 3-8

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

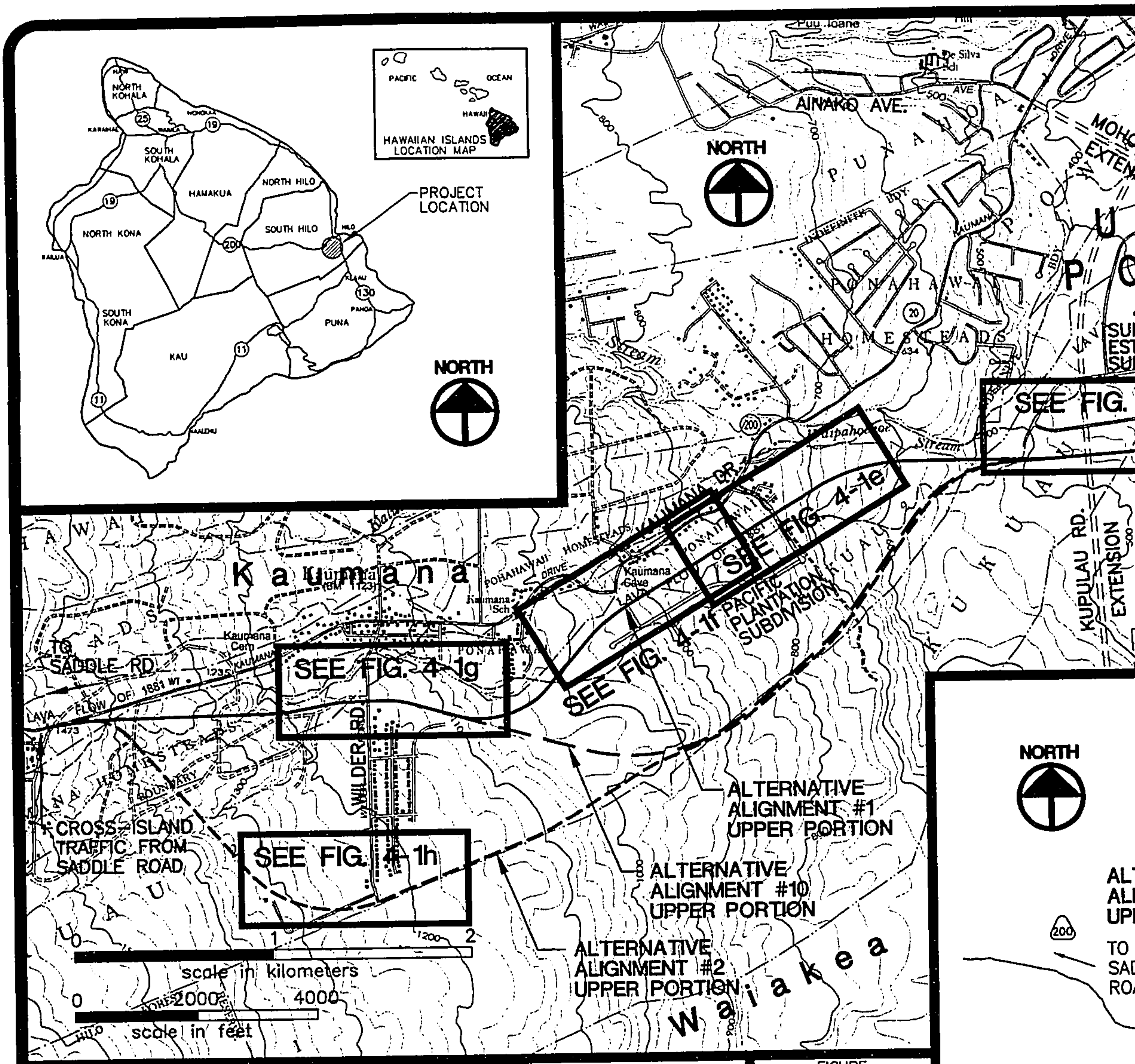
DATE 2/03/2000

92014/M:/...EIS/ALT-10/F3-8.DWG/SCALE:1=1



LEGEND

27,246 — AVERAGE DAILY TRAFFIC LOCATION & COUNTS



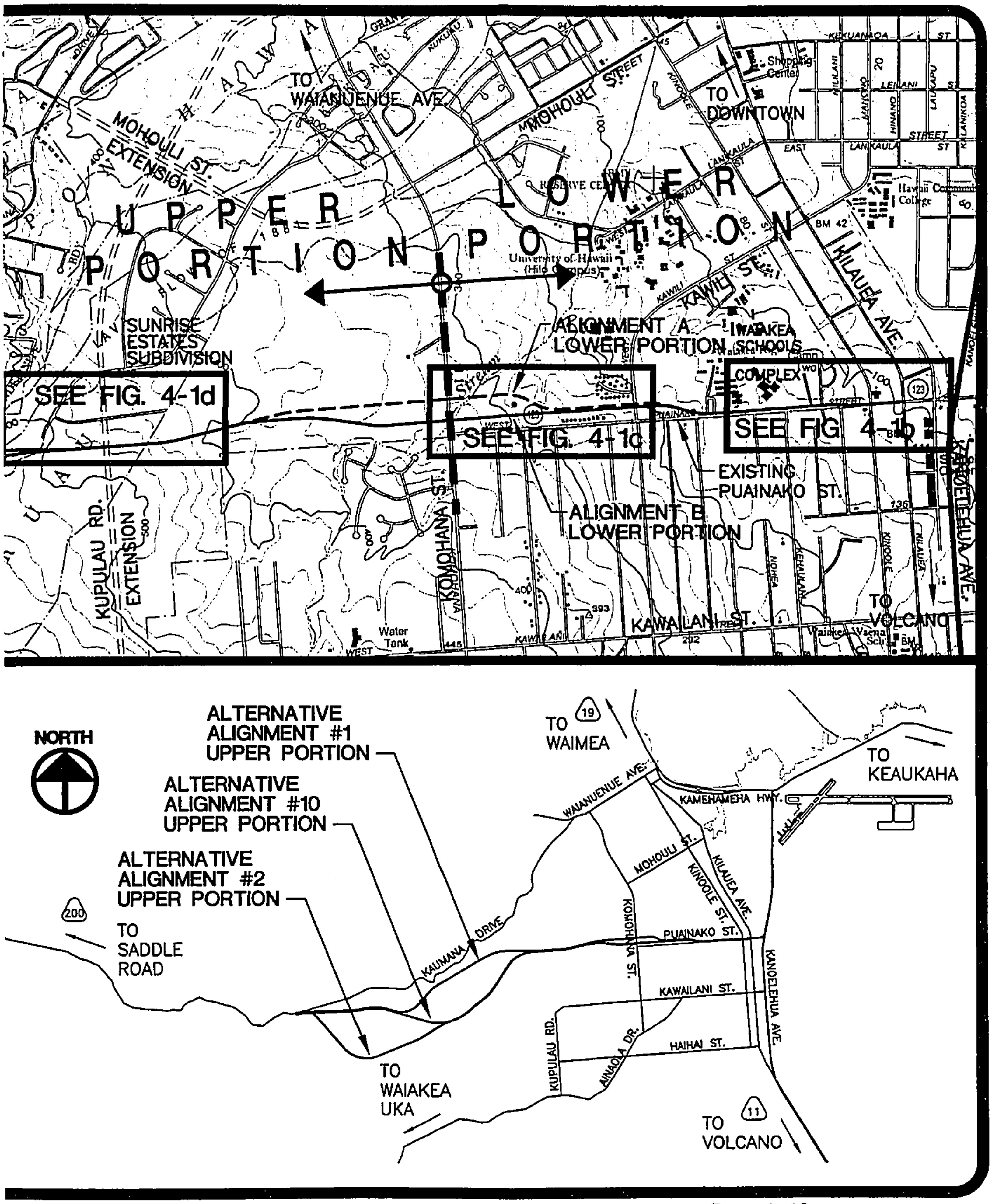
TITLE
NOISE IMPACTS & MITIGATION
KEY TO MAPS

FIGURE
4-1a

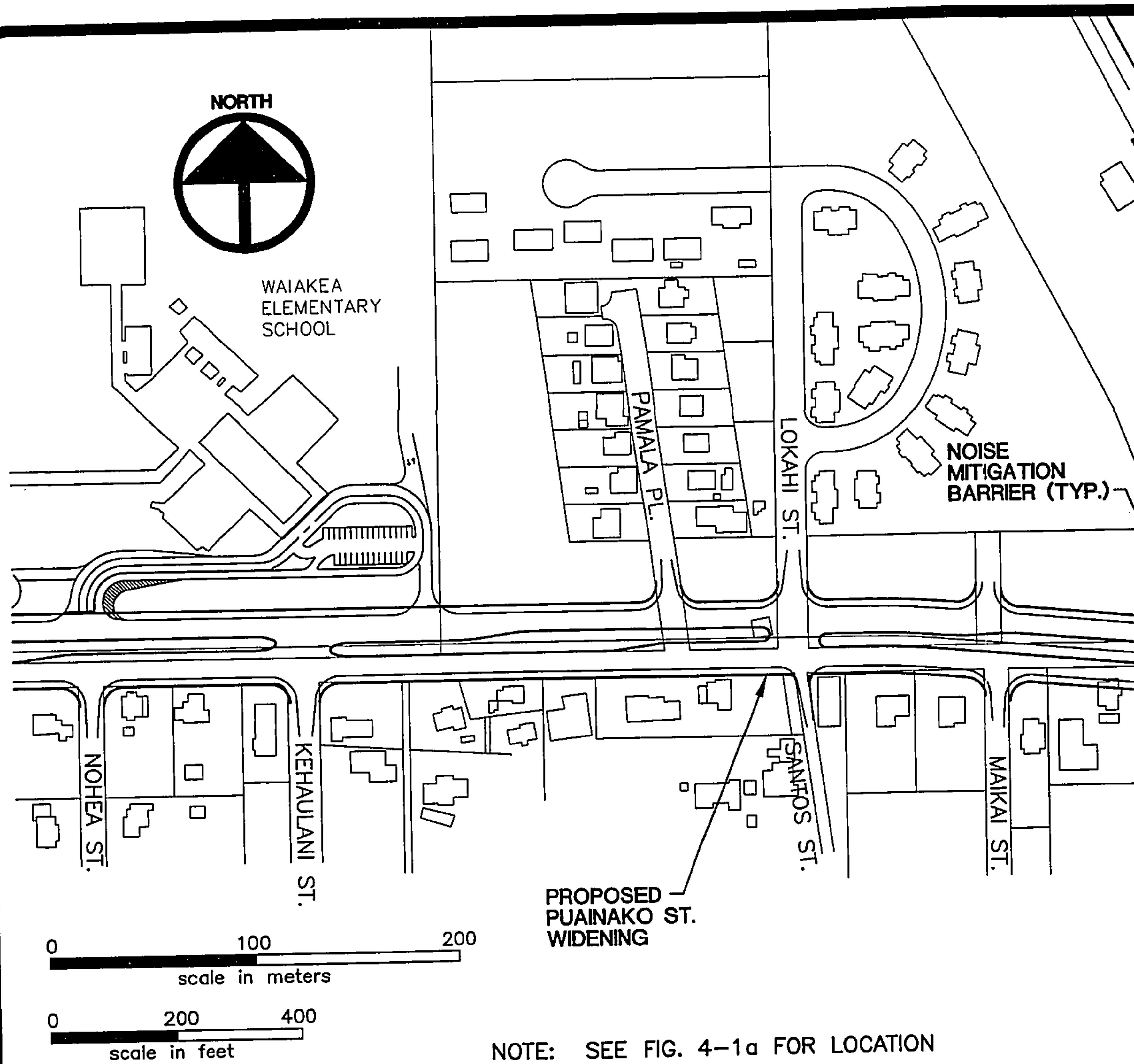
PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE
10/26/98

92014/M:/...EIS/ALT-10/F4-1a.DWG/SCALE:1=1



TO WAIANUENUE AVE.
TO DOWNTOWN
MOHOULI ST. EXTENSION
UPPER PORTION
LOWER PORTION
SUNRISE ESTATES SUBDIVISION
ALIGNMENT A LOWER PORTION
WAIAKEA SCHOOLS COMPLEX
SEE FIG. 4-1d
SEE FIG. 4-1c
SEE FIG. 4-1b
EXISTING PUAINAKO ST.
ALIGNMENT B LOWER PORTION
KUPULAU RD. EXTENSION
KOMOHANA ST.
KAWAILANI ST.
KILAUEA AVE.
KANOELEHUA AVE.
TO VOLCANO
NORTH
ALTERNATIVE ALIGNMENT #1 UPPER PORTION
ALTERNATIVE ALIGNMENT #10 UPPER PORTION
ALTERNATIVE ALIGNMENT #2 UPPER PORTION
TO SADDLE ROAD
TO WAIMEA
TO KEAUKAHA
WAIANUENUE AVE.
KAMEHAMEHA HWY.
MOHOULI ST.
KINOOLE ST.
KAUMANA DRIVE
PUAINAKO ST.
KOMOHANA ST.
KAWAILANI ST.
HAIHAI ST.
KUPULAU RD.
AINAOLA DR.
TO WAIAKEA UKA
TO VOLCANO



NOTE: SEE FIG. 4-1a FOR LOCATION

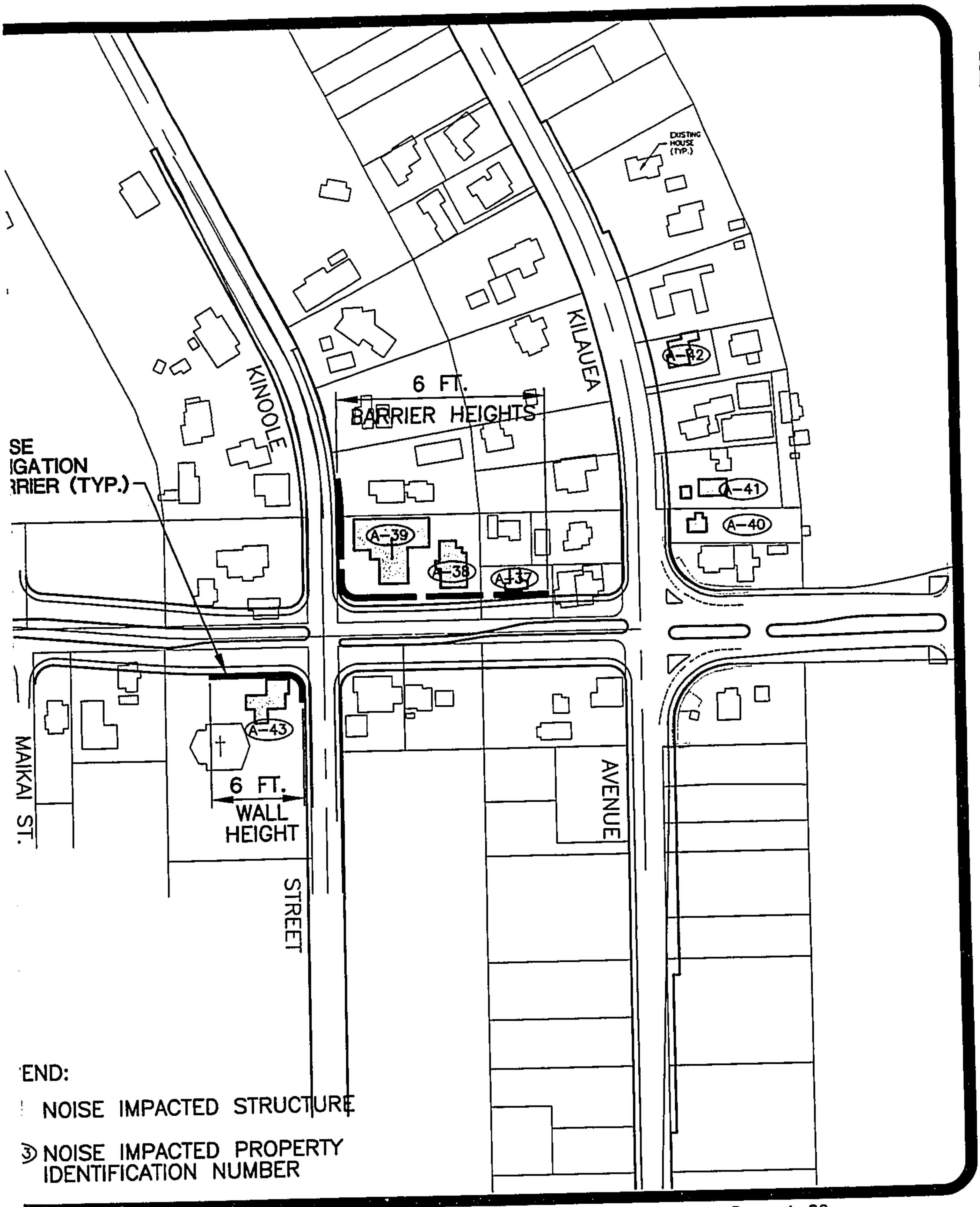
TITLE	FIGURE
NOISE IMPACTS & MITIGATION KILAUEA AVE. TO WAIAKEA SCHOOLS	4-1b
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000

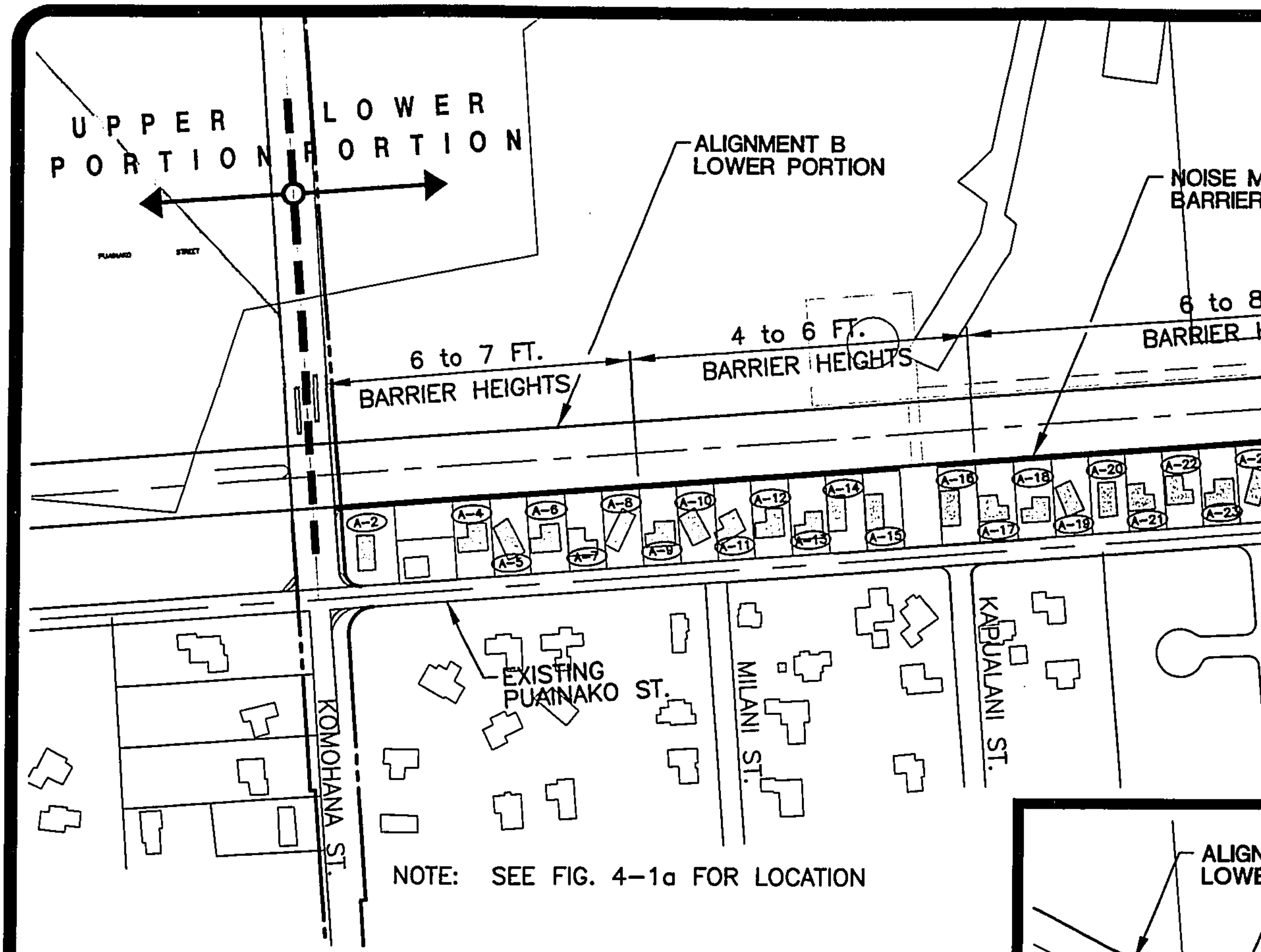
LEGEND:

NOISE IMP

(A-43) NOISE IMP
IDENTIFICA

92014/M:/...EIS/ALT-10/F4-1b.DWG/SCALE:1=1


EXISTING HOUSE (TYP.)
KINOOLE
KILAUEA
6 FT.
BARRIER HEIGHTS
SE
IGATION
RRIER (TYP.)
A-42
A-41
A-40
A-39
A-38
A-37
A-43
6 FT.
WALL
HEIGHT
MAIKAI ST.
AVENUE
STREET
END:
NOISE IMPACTED STRUCTURE
NOISE IMPACTED PROPERTY
IDENTIFICATION NUMBER



ALIGNMENT B

0 100 200
scale in meters

0 250 500
scale in feet

LEGEND:

NOISE IMPACTED STRUCTURE

(A-43) NOISE IMPACTED PROPERTY IDENTIFICATION NUMBER

TITLE

NOISE IMPACTS & MITIGATION

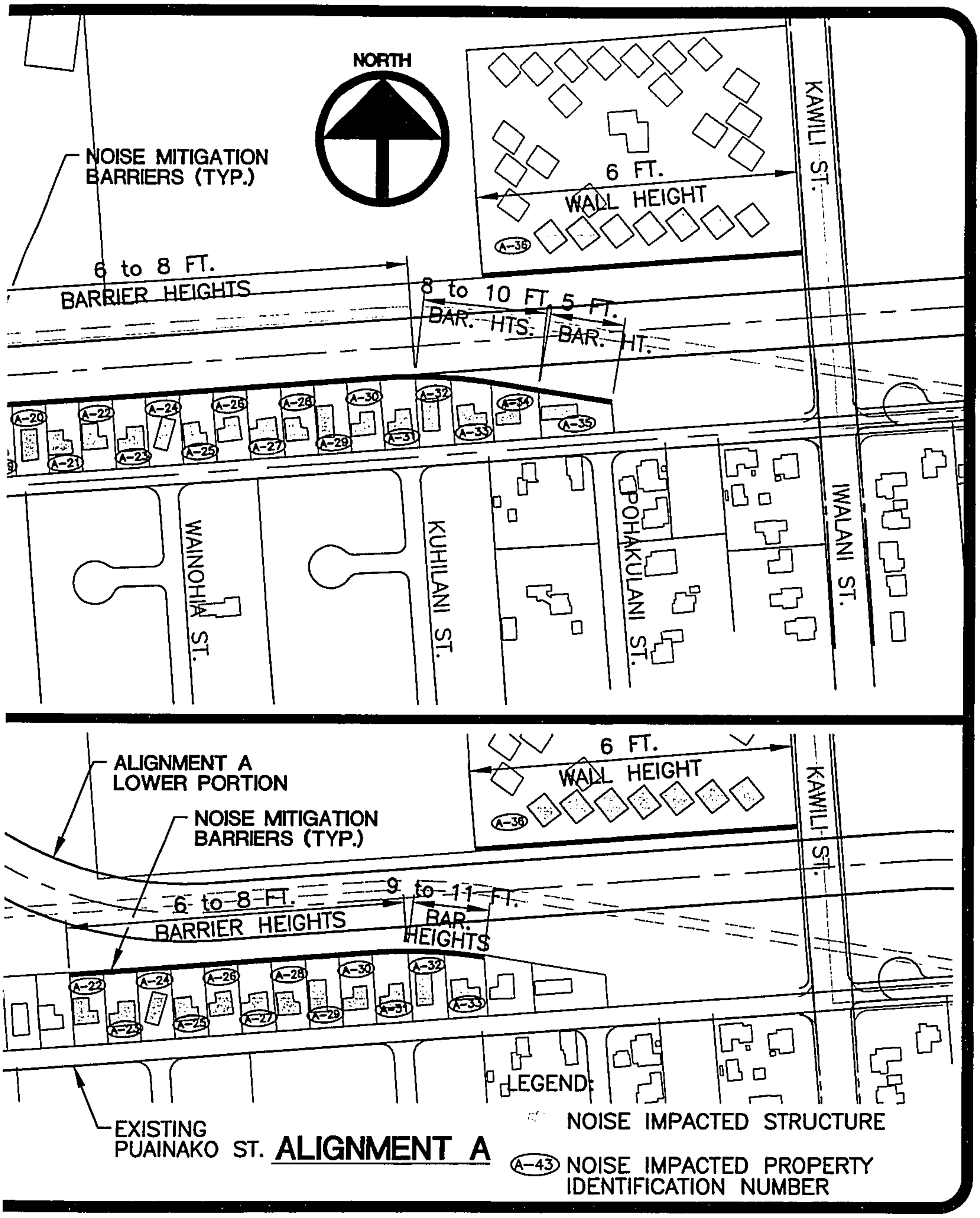
BYPASSES A & B

FIGURE 4-1c

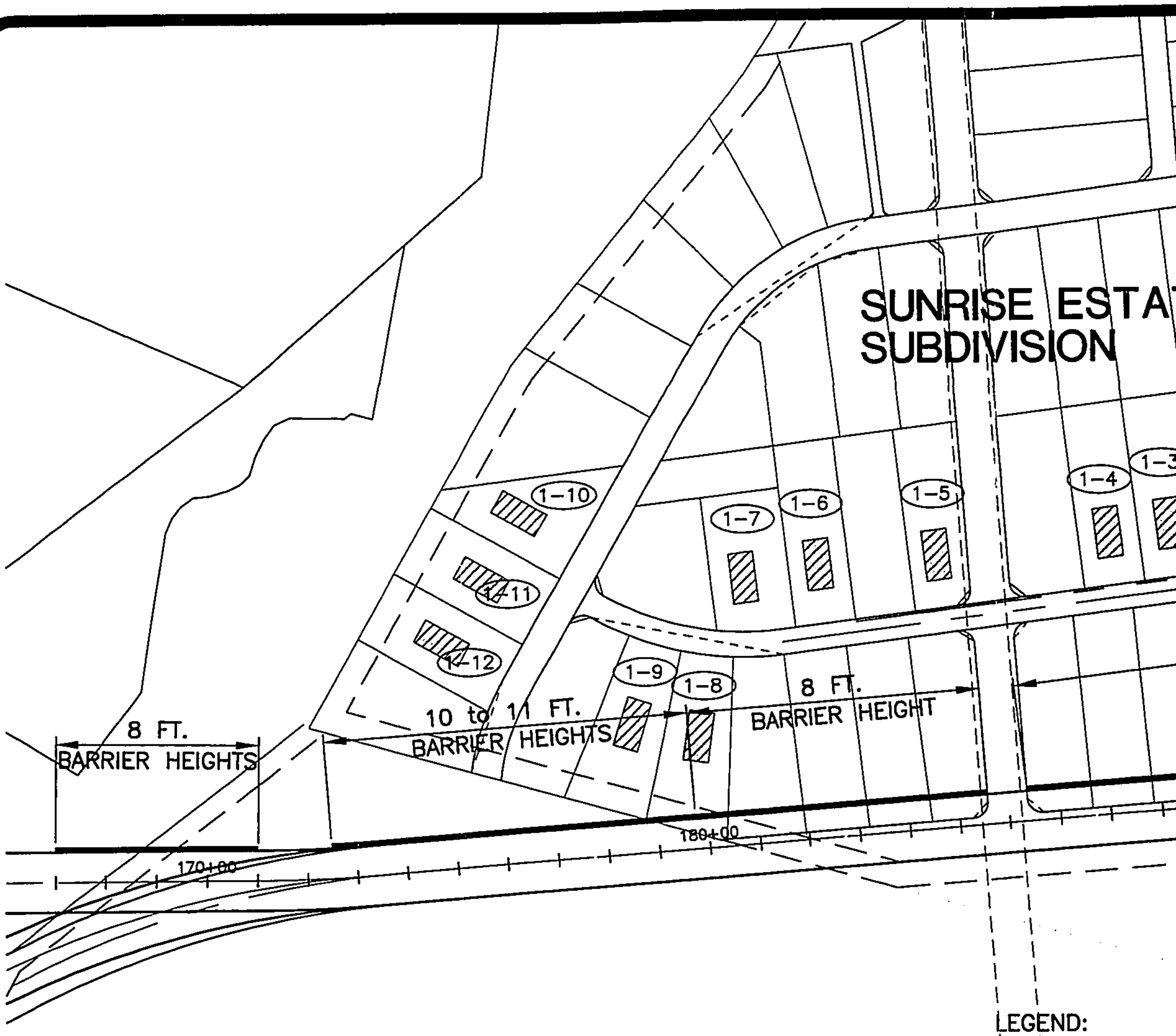
PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

92014/M:/...EIS/ALT-10/F4-1c.DWG/SCALE:1=1


NORTH
NOISE MITIGATION BARRIERS (TYP.)
6 FT. WALL HEIGHT
KAWILI ST.
6 to 8 FT. BARRIER HEIGHTS
8 to 10 FT. BAR. HTS.
5 FT. BAR. HT.
A-20
A-21
A-22
A-23
A-24
A-25
A-26
A-27
A-28
A-29
A-30
A-31
A-32
A-33
A-34
A-35
A-36
WAINOHIA ST.
KUHILANI ST.
POHAKULANI ST.
IWALANI ST.
ALIGNMENT A LOWER PORTION
NOISE MITIGATION BARRIERS (TYP.)
6 FT. WALL HEIGHT
6 to 8 FT. BARRIER HEIGHTS
9 to 11 FT. BAR. HEIGHTS
KAWILI ST.
EXISTING PUAINAKO ST.
LEGEND:
NOISE IMPACTED STRUCTURE
A-43 NOISE IMPACTED PROPERTY IDENTIFICATION NUMBER

ALIGNMENT A



NOTE: SEE FIG. 4-1a FOR LOCATION

LEGEND:

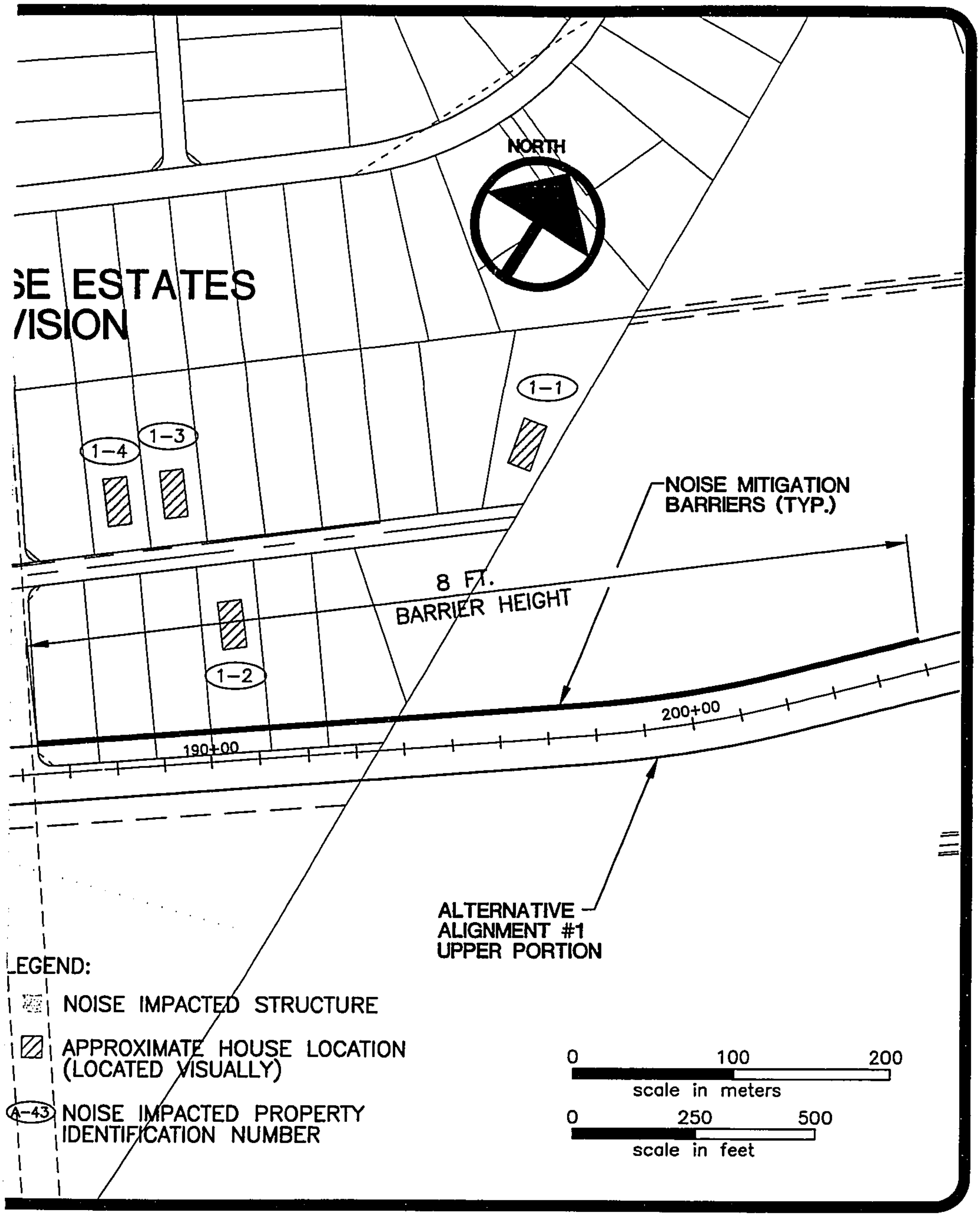
NOISE IMP

APPROXIMA
(LOCATED

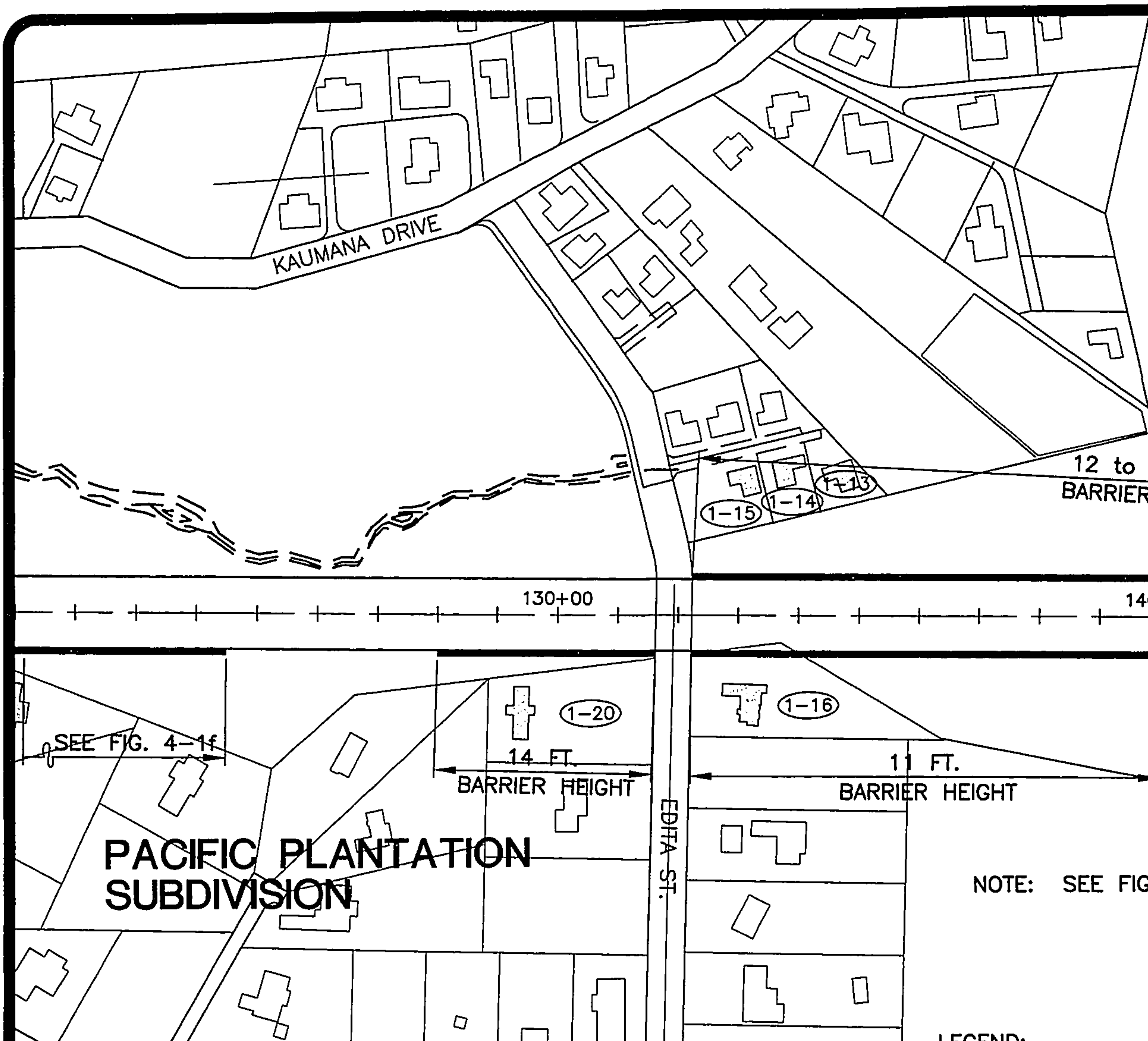
A-43 NOISE IMP
IDENTIFICA

TITLE	FIGURE
NOISE IMPACTS & MITIGATION UPPER PORTION TO SUNRISE ESTATES	4-1d
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000

92014/M:/...EIS/ALT-10/F4-1d.DWG/SCALE:1=1



NORTH
SE ESTATES
/ISION
1-1
1-2
1-3
1-4
NOISE MITIGATION BARRIERS (TYP.)
8 FT. BARRIER HEIGHT
190+00
200+00
ALTERNATIVE ALIGNMENT #1 UPPER PORTION
LEGEND:
NOISE IMPACTED STRUCTURE
APPROXIMATE HOUSE LOCATION (LOCATED VISUALLY)
A-43
NOISE IMPACTED PROPERTY IDENTIFICATION NUMBER
0
100
200
scale in meters
0
250
500
scale in feet



TITLE

NOISE IMPACTS & MITIGATION

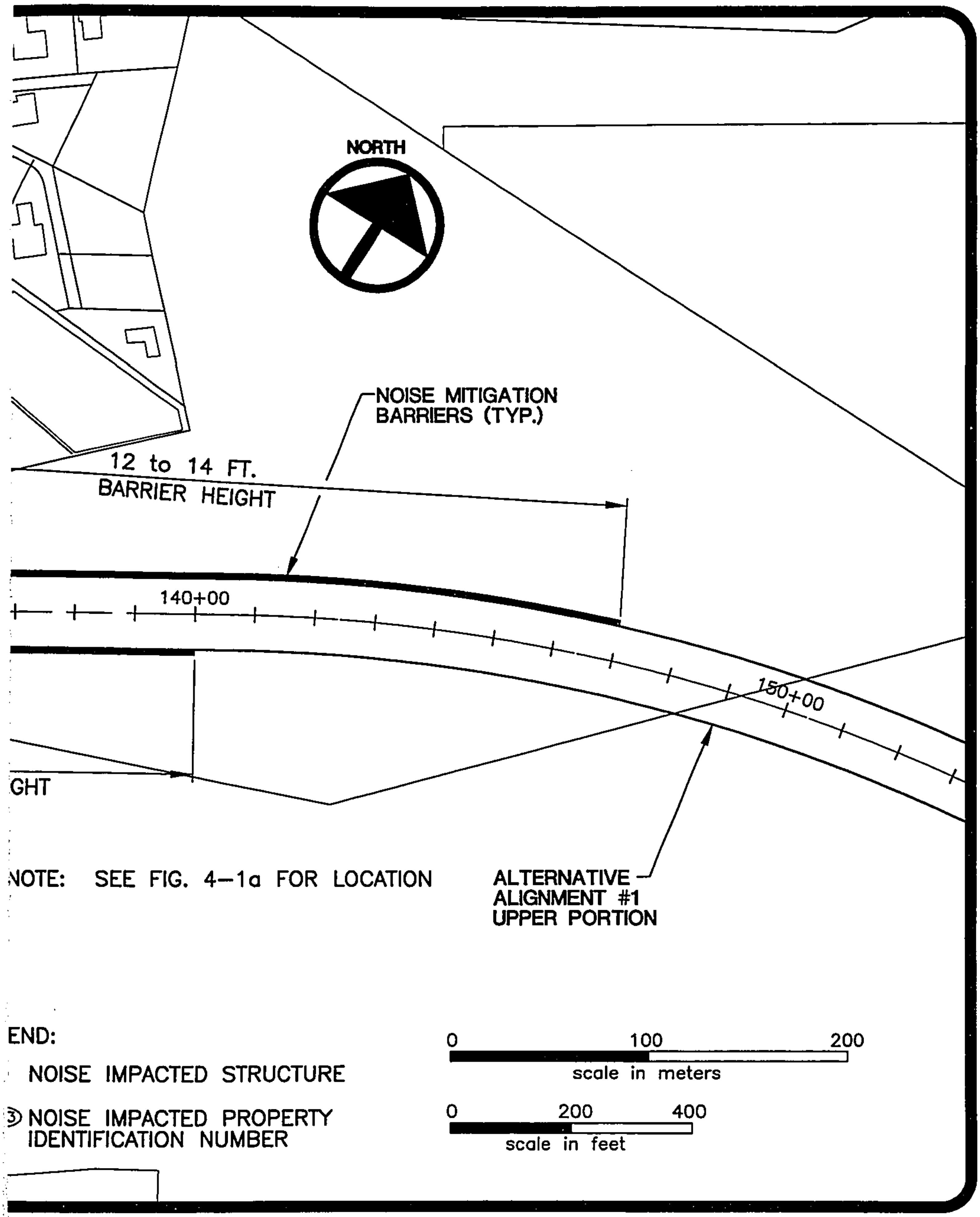
UPPER PORTION, ALIGNMENT 1 – EDITA ST. AREA

FIGURE 4-1e

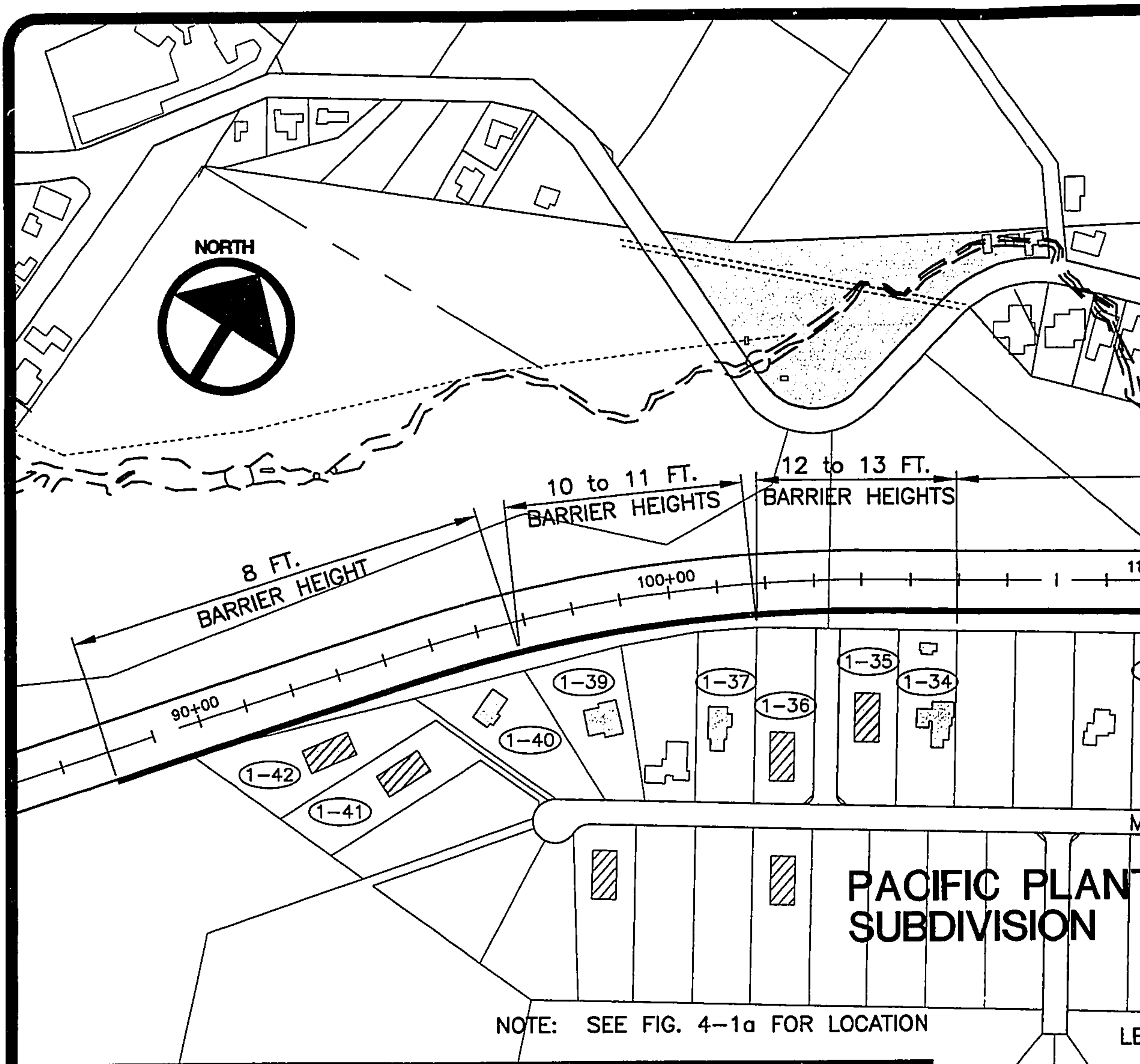
PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

92014/M:/...EIS/ALT-10/F4-1e.DWG/SCALE:1=1



NORTH
NOISE MITIGATION
BARRIERS (TYP.)
12 to 14 FT.
BARRIER HEIGHT
140+00
150+00
GHT
NOTE: SEE FIG. 4-1a FOR LOCATION
ALTERNATIVE
ALIGNMENT #1
UPPER PORTION
END:
NOISE IMPACTED STRUCTURE
NOISE IMPACTED PROPERTY
IDENTIFICATION NUMBER
0
100
200
scale in meters
0
200
400
scale in feet



TITLE

NOISE IMPACTS & MITIGATION

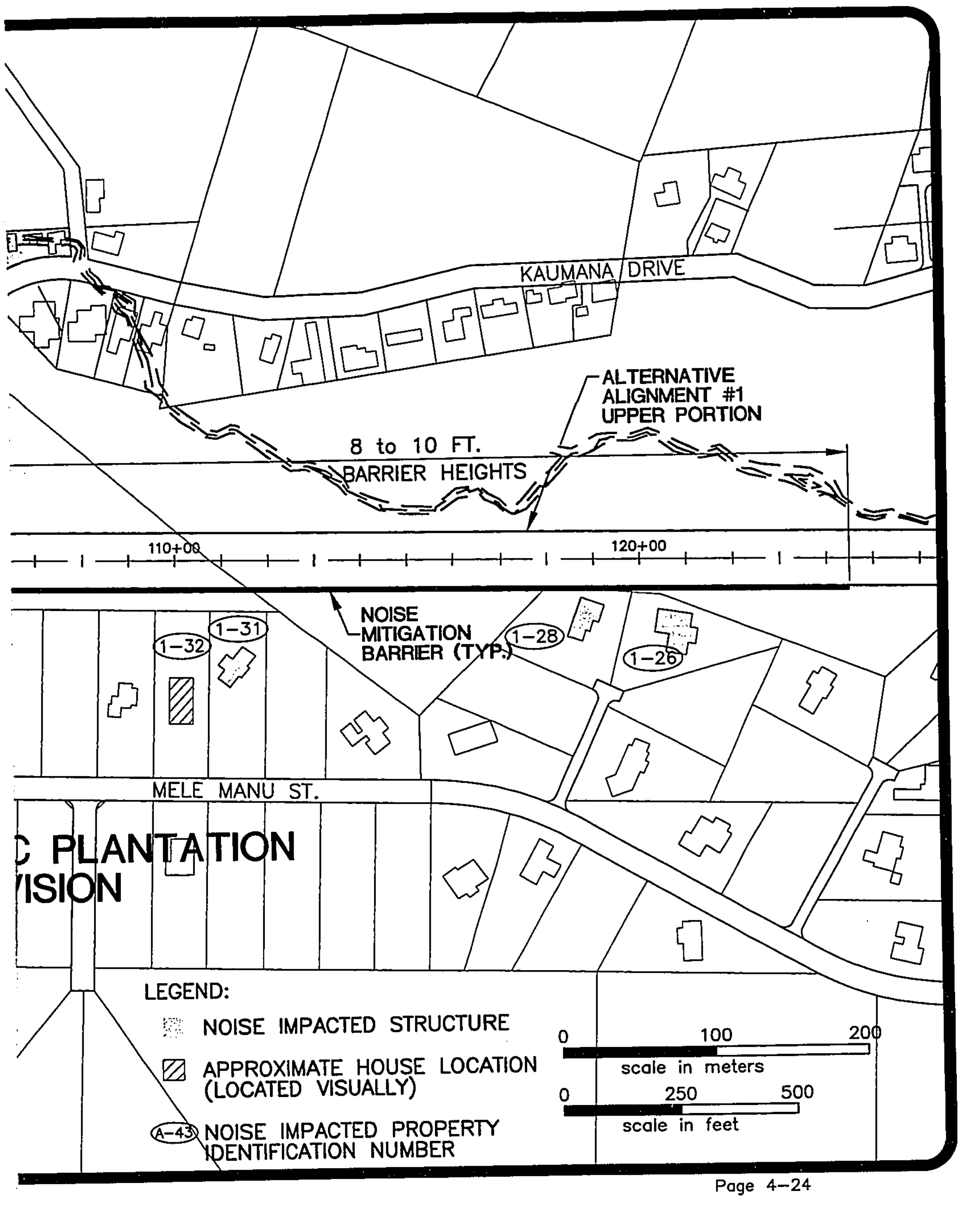
UPPER PORTION, ALIGNMENT 1 – PACIFIC PLANTATIONS

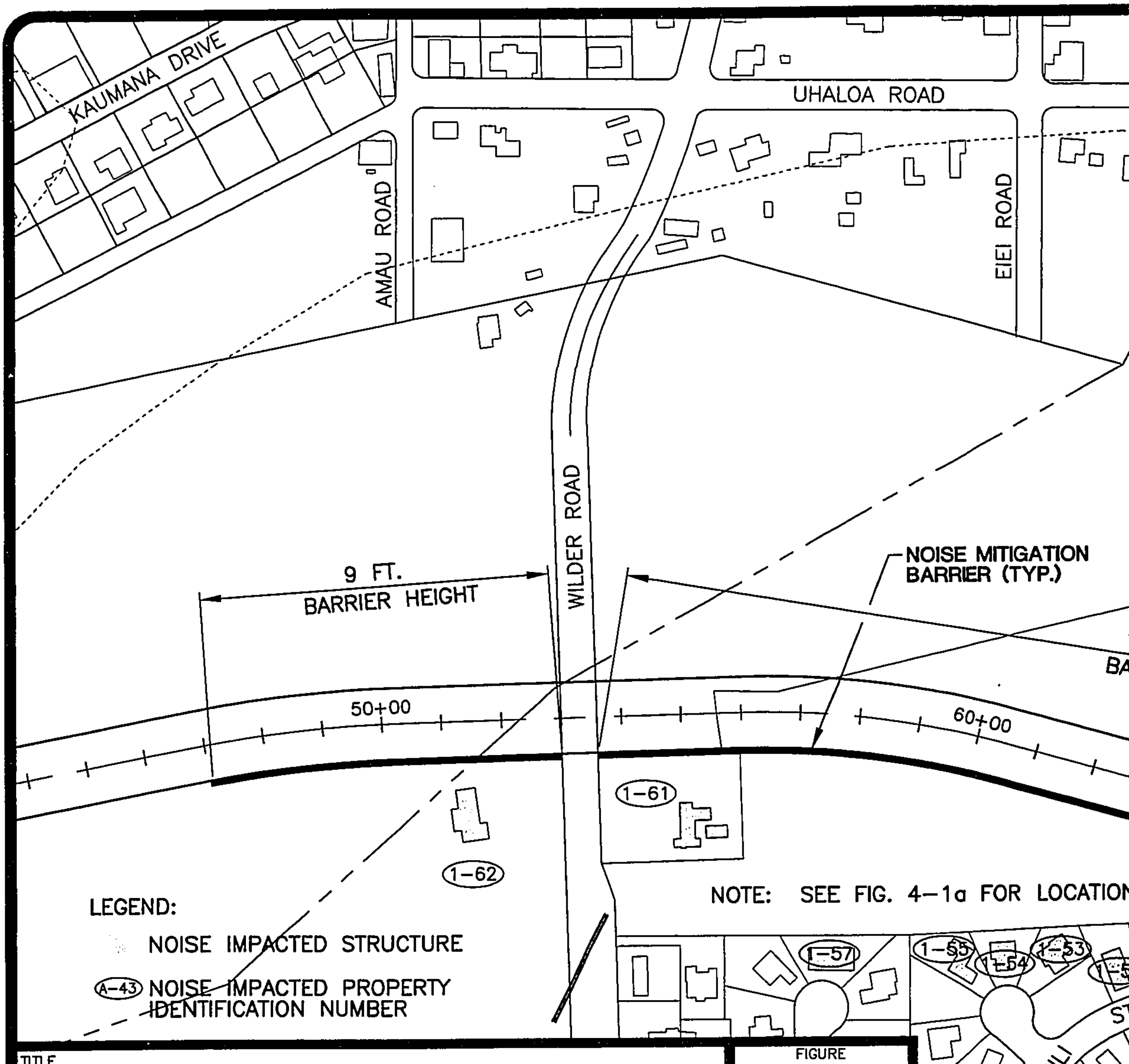
FIGURE 4-1f

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

92014/M:/...EIS/ALT-10/F4-1f.DWG/SCALE:1=1


KAUMANA DRIVE
ALTERNATIVE ALIGNMENT #1 UPPER PORTION
8 to 10 FT. BARRIER HEIGHTS
110+00
120+00
NOISE MITIGATION BARRIER (TYP.)
1-32
1-31
1-28
1-26
MELE MANU ST.
C PLANTATION
VISION
LEGEND:
NOISE IMPACTED STRUCTURE
APPROXIMATE HOUSE LOCATION (LOCATED VISUALLY)
A-43
NOISE IMPACTED PROPERTY IDENTIFICATION NUMBER
0
100
200
scale in meters
0
250
500
scale in feet



TITLE

NOISE IMPACTS & MITIGATION

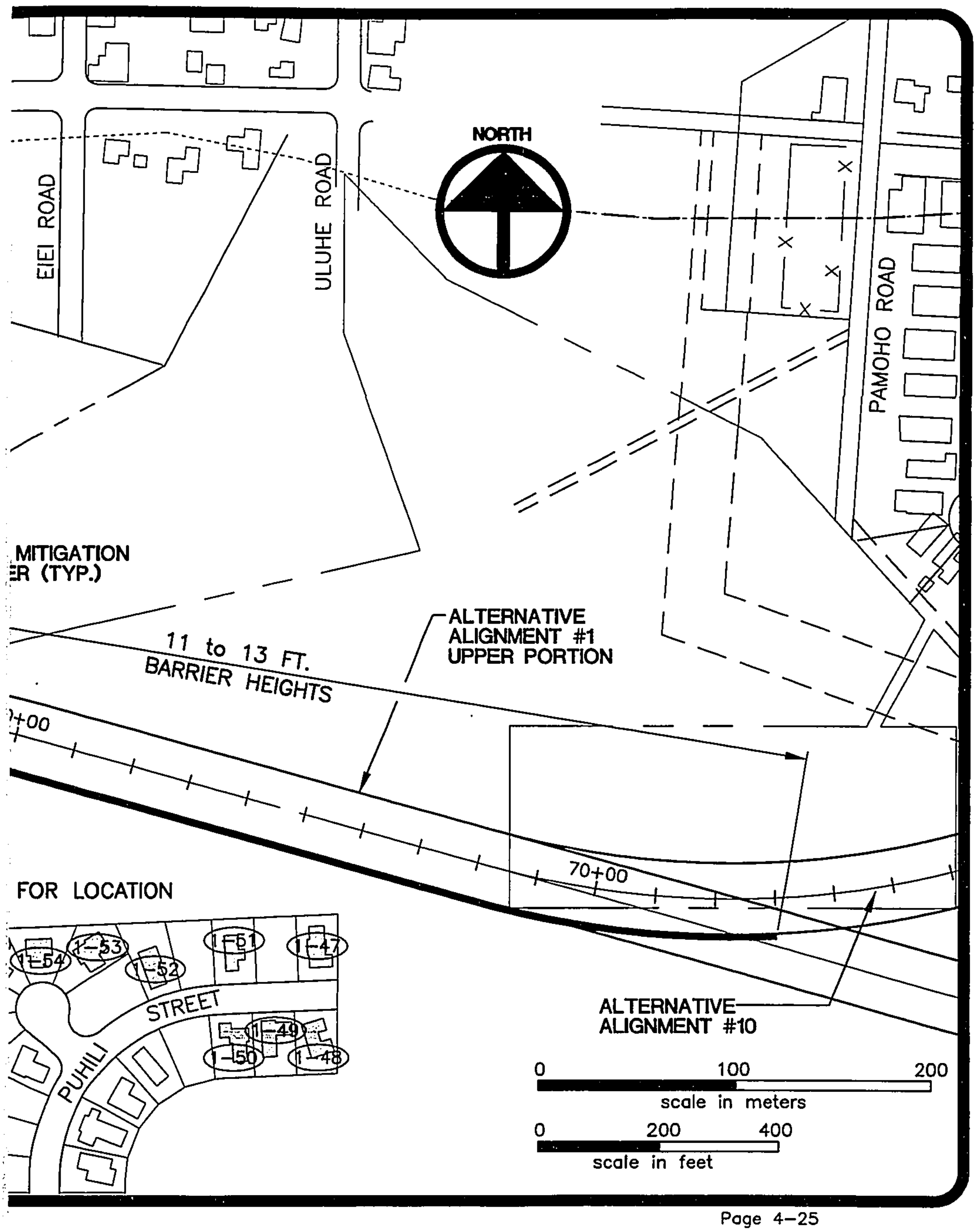
UPPER PORTION, ALIGNMENT 1 – WILDER ROAD AREA

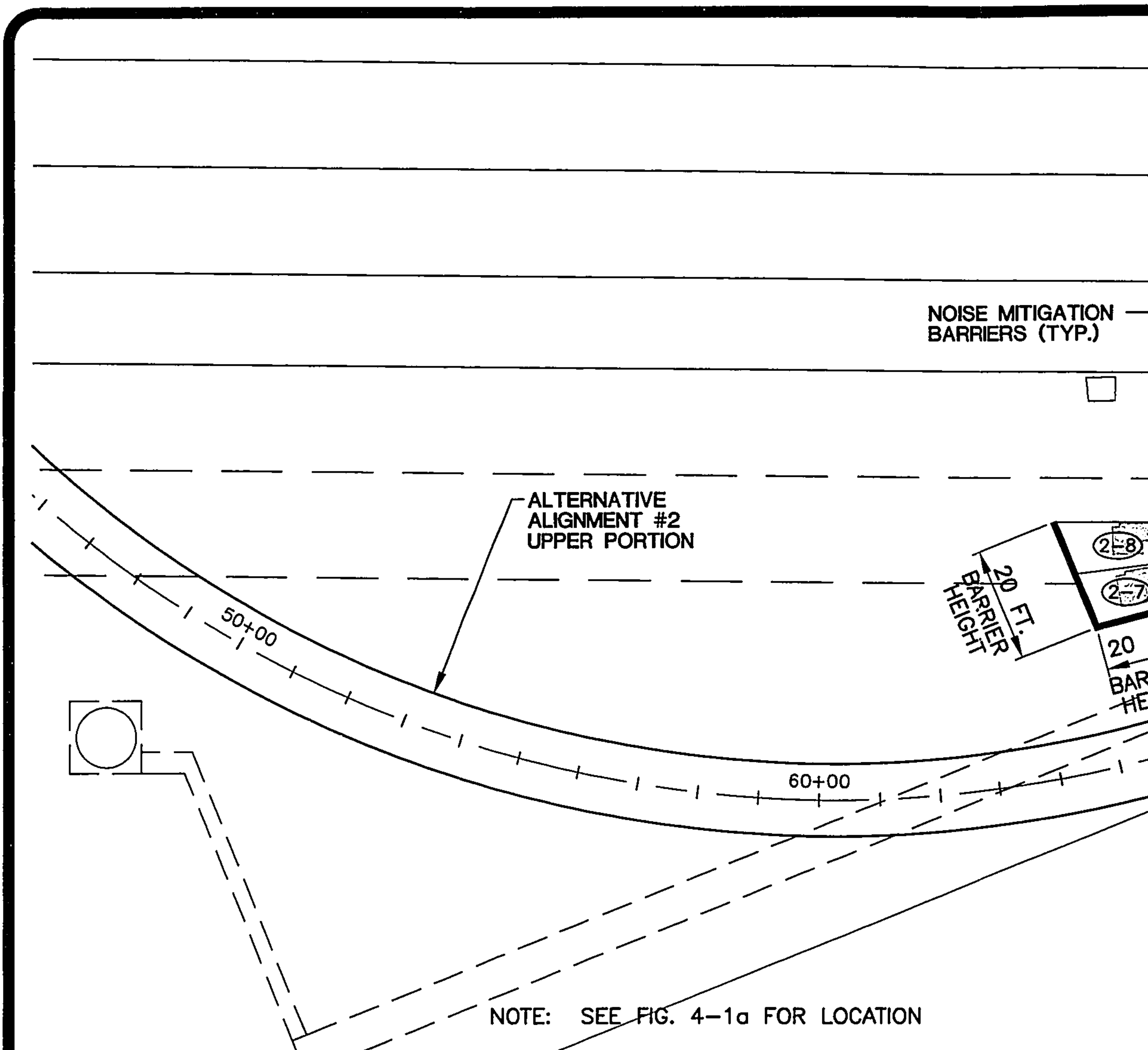
FIGURE 4-1g

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

92014/M:/...EIS/F4-1g.DWG/SCALE:1=1


NORTH
EIEI ROAD
ULUHE ROAD
PAMOHO ROAD
MITIGATION
ER (TYP.)
ALTERNATIVE
ALIGNMENT #1
UPPER PORTION
11 to 13 FT.
BARRIER HEIGHTS
70+00
FOR LOCATION
1-54
1-53
1-52
1-51
1-47
1-49
1-50
1-48
PUHILI STREET
ALTERNATIVE
ALIGNMENT #10
0 100 200
scale in meters
0 200 400
scale in feet



TITLE

NOISE IMPACTS & MITIGATION

UPPER PORTION, ALIGNMENT 2

FIGURE 4-1h

LEGEND:

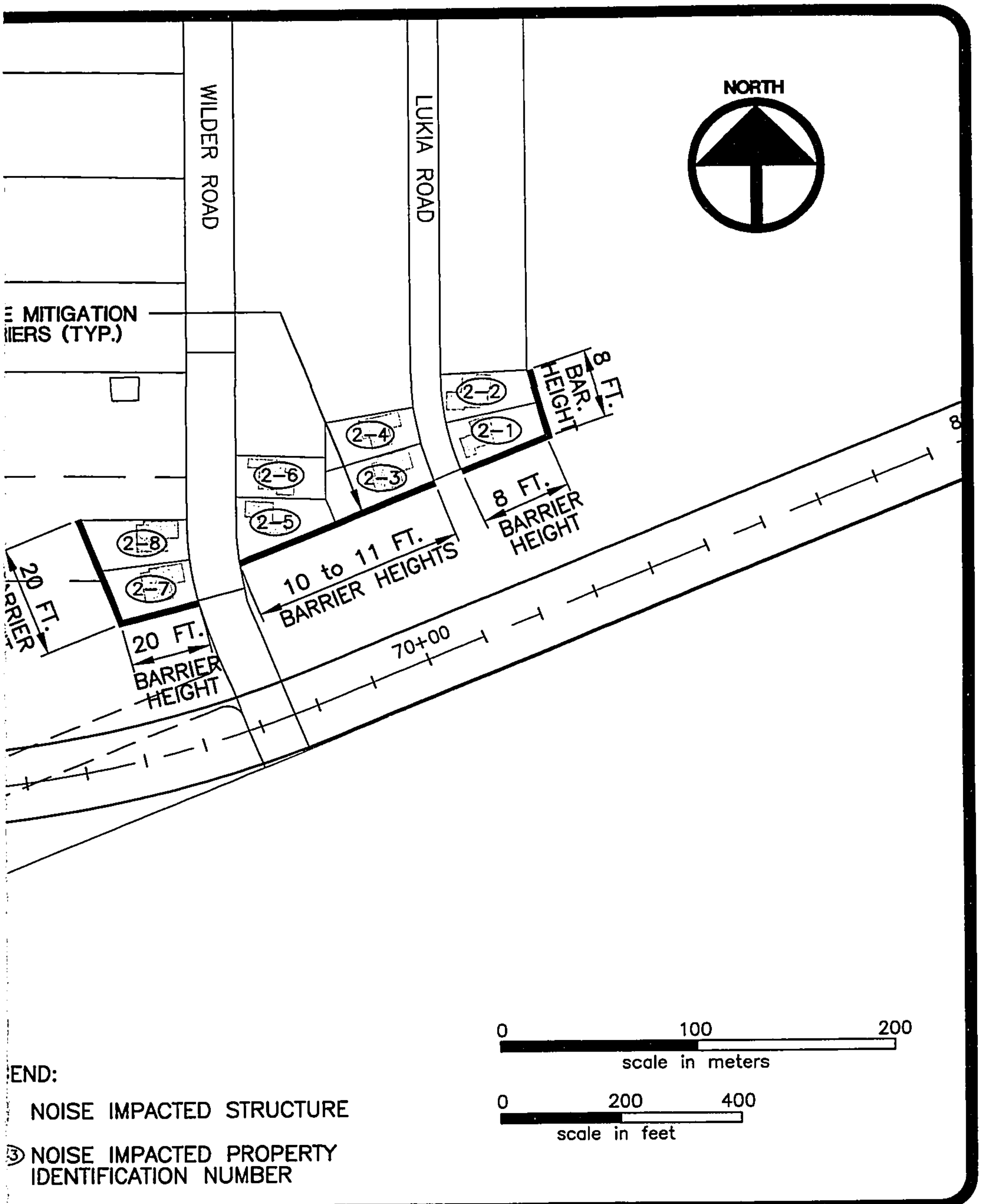
NOISE IMPACT

(A-43) NOISE IMPACT IDENTIFICATION

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

92014/M:/...EIS/ALT-10/F4-1h.DWG/SCALE:1=1



NORTH
WILDER ROAD
LUKIA ROAD
E MITIGATION
IERS (TYP.)
2-1
2-2
2-3
2-4
2-5
2-6
2-7
2-8
8 FT.
BAR.
HEIGHT
8 FT.
BARRIER
HEIGHT
10 to 11 FT.
BARRIER HEIGHTS
20 FT.
BARRIER
HEIGHT
20 FT.
RRIER
70+00
0
100
200
scale in meters
0
200
400
scale in feet
END:
NOISE IMPACTED STRUCTURE
NOISE IMPACTED PROPERTY
IDENTIFICATION NUMBER

International Airport. Most of the right-of-way in the Lower Portion (east of Komohana Street) has been owned by the State of Hawaii for several decades and is dedicated to eventual use by the highway. Housing developments have been granted approval with the ultimate development of the highway in mind. Affected property owners have built knowing that a highway would eventually be built nearby. Thus, while some negative impacts to landowners immediately adjacent to the right-of-way are unavoidable, they have been anticipated for several decades.

The project is consistent with the *Hawaii County General Plan*, the *Hilo Zone Map* and all other State and County Plans (see Chapter 6). Consequently, the Project would not result in any unanticipated development within the Hilo area. However, the highway might accelerate the pace of development in Kaumana by providing quicker access to planned housing subdivisions (see Section 4.5).

4.3.2 Relocation and Right-of-Way Acquisition

4.3.2.1 Impacts

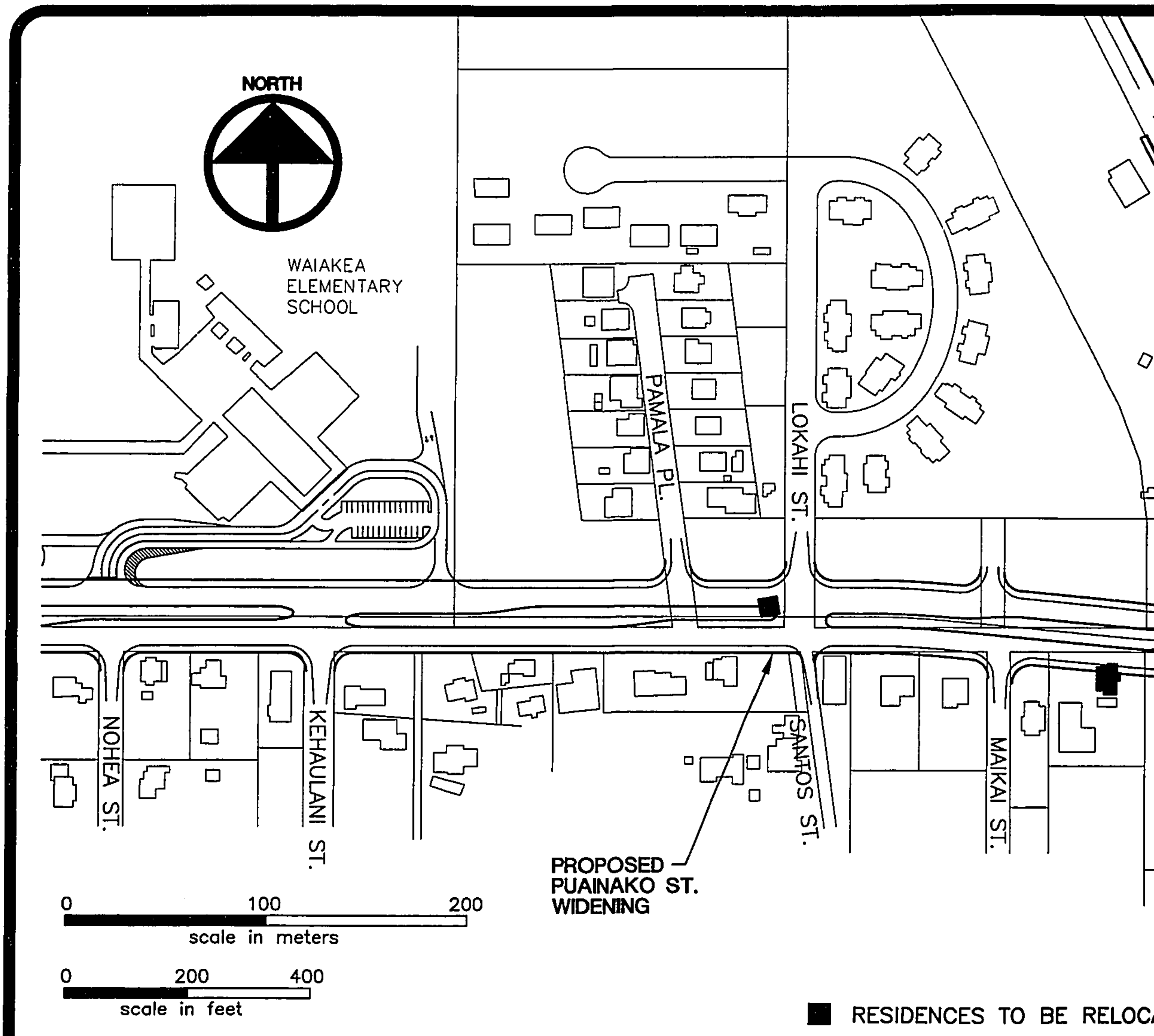
Residential Relocation

Widening the existing Puainako Street between Kilauea and Kawili Streets would necessitate the acquisition of five (5) single family residential units. No other relocations are associated with the Project.

Table 4-7 summarizes the potential relocation impacts to impacted residences, which are indicated in Figure 4-2. A field survey was conducted to identify and record the basic characteristics of each residence. Three of the existing residential units impacted by this project are vacant, and all but one of these three is likely to remain so or even be dismantled before commencement of the Project. Consequently, potential displacement of residents is limited to a total of two households within the entire project corridor. These two households have a total of four occupants. Two of these occupants are over 65 years of age, and none are reported to be disabled.

Following selection of a preferred alternative, each unit identified for actual relocation will be subject to an assessment to determine its individual characteristics and value before acquisition proceedings are initiated. All households affected under the selected alternative will be interviewed to determine their specific requirements before any acquisitions are made or relocations are begun. Each non-residential relocation will be similarly assessed for specific value and characteristics before acquisition.

Property values for residential and nonresidential properties from current records of Hawaii County Real Property Tax records do not adequately reflect current market values. Therefore, the data were supplemented from discussions with local real estate professionals to obtain current market values for comparable sales and rental prices in the project area.



TITLE

RESIDENTIAL RELOCATIONS

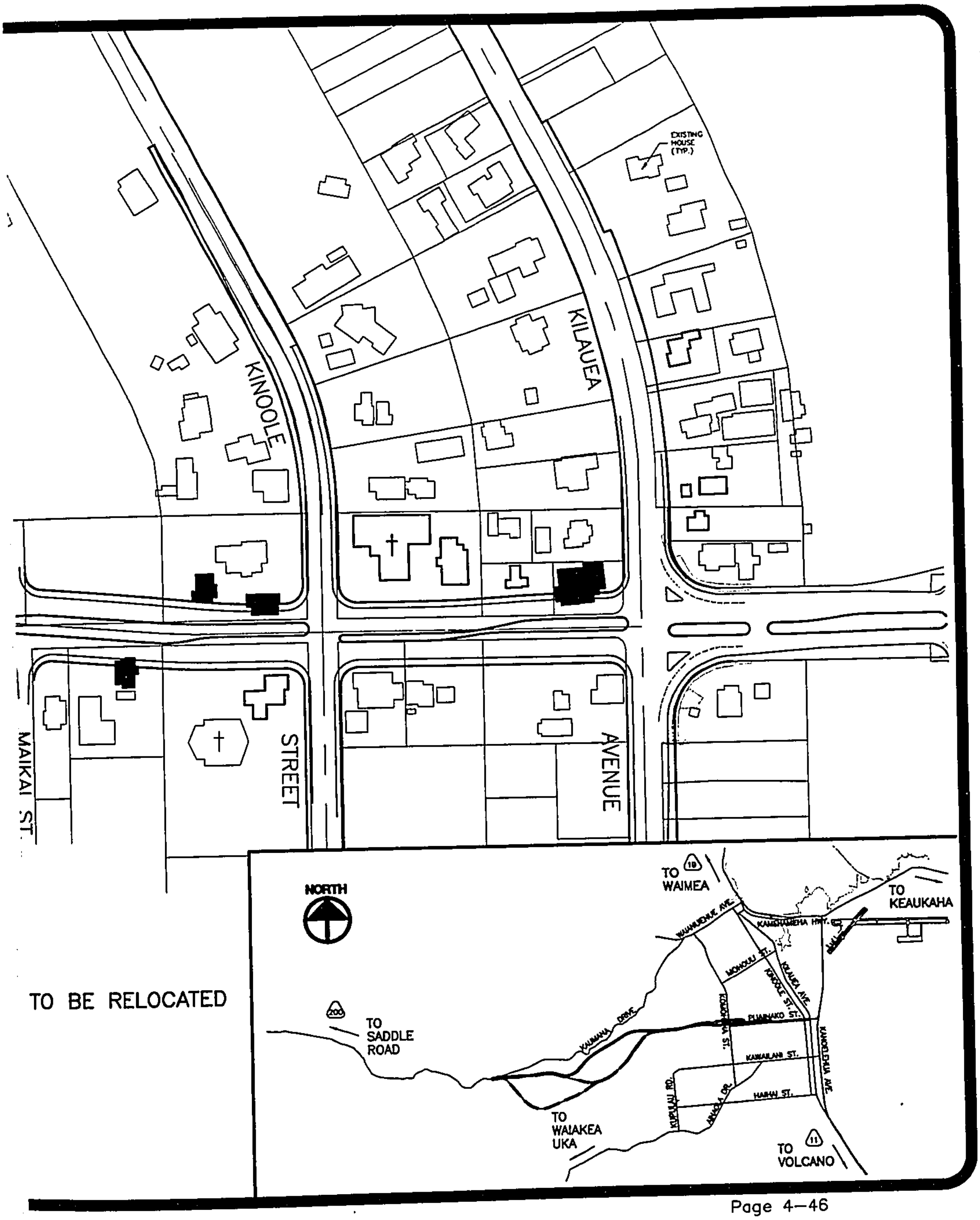
FIGURE

4-2

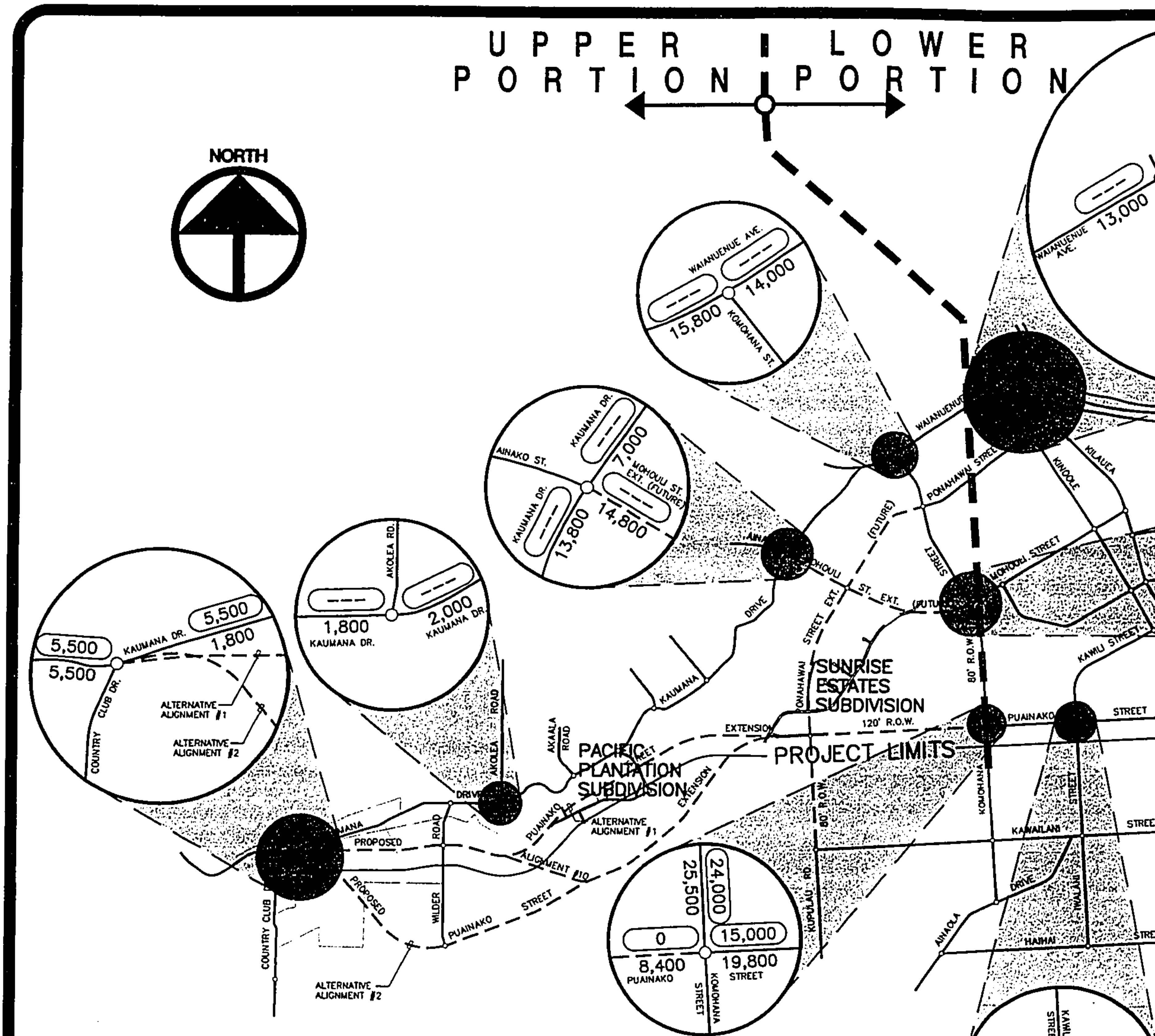
PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE
2/03/2000

92014/M:/...EIS/ALT-10/F4-2.DWG/SCALE:1=1



EXISTING HOUSE (TYP.)
KINOOLE STREET
KILAUEA AVENUE
MAIKAI ST.
TO BE RELOCATED
NORTH
TO WAIMEA
TO KEAUKAHA
KAMEHAMEHA HWY.
MOHOULI ST.
KINOOLE ST.
KILAUEA AVE.
PUAINAKO ST.
KAWAILANI ST.
HAIHAI ST.
KANOELEHUA AVE.
KUPULAU RD.
TO SADDLE ROAD
TO WAIAKEA UKA
TO VOLCANO



TITLE

2020 AVERAGE DAILY TRAFFIC VOLUMES

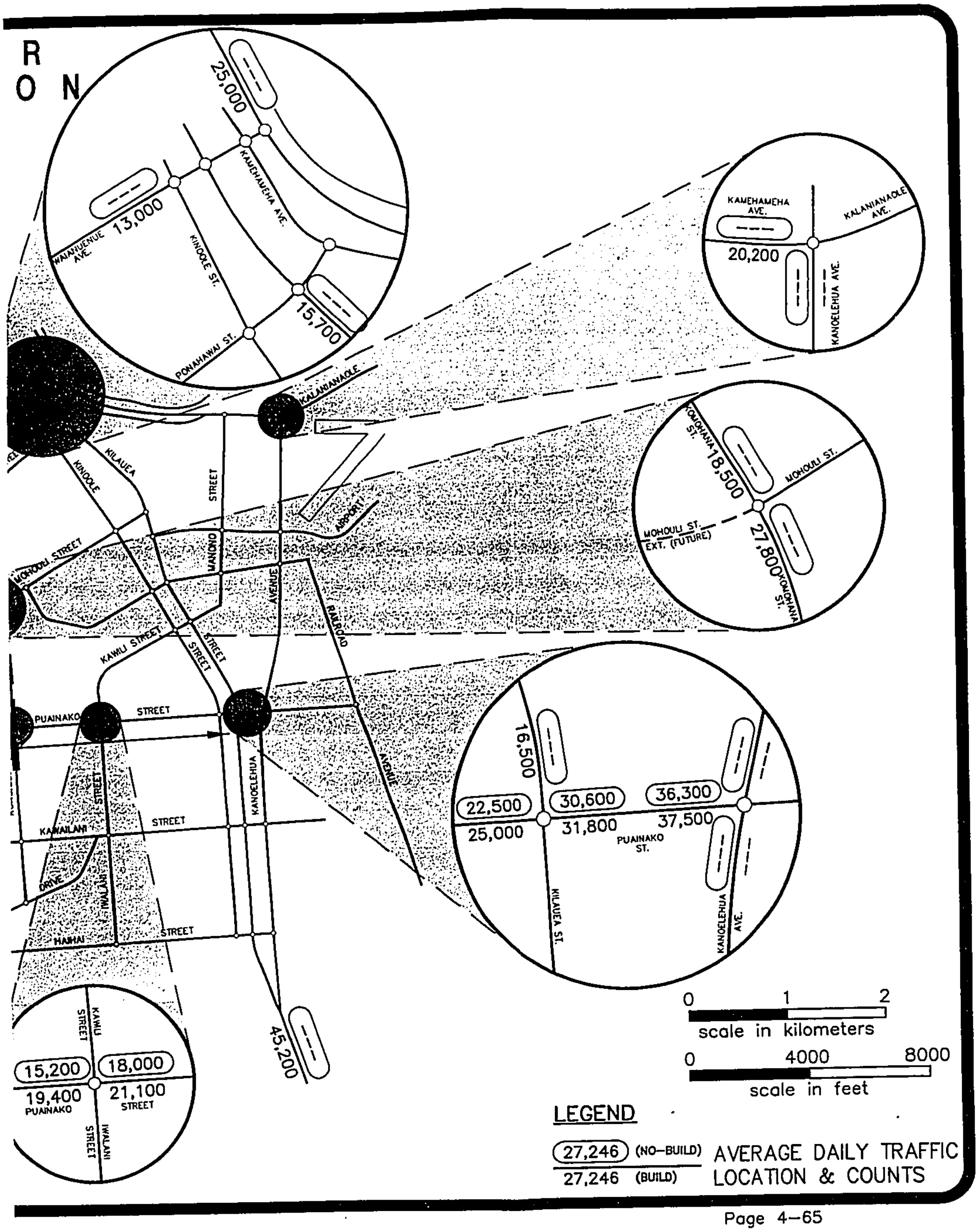
MAJOR PROJECT AREA ROADWAYS, BUILD & NO-BUILD SCENARIOS

FIGURE 4-3

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

92014/M:/...DS/ALT-10/F4-3.DWG/SCALE:1=1


R
O N
25,000
13,000
WAIANUENUE AVE.
KINOOLE ST.
KAMEHAMEHA AVE.
PONAHAWAI ST.
15,700
KAMEHAMEHA AVE.
KALANIANAOLE AVE.
20,200
KANOELEHUA AVE.
KALANIANAOLE
KINOOLE
KILAUEA
STREET
AIRPORT
KOMOHANA ST.
18,500
MOHOULI ST.
MOHOULI ST. EXT. (FUTURE)
27,800
KOMOHANA ST.
MOHOULI STREET
MANONO
AVENUE
RAILROAD
KAWILI STREET
STREET
STREET
PUAINAKO
STREET
16,500
22,500
25,000
30,600
31,800
36,300
37,500
PUAINAKO ST.
KILAUEA ST.
KANOELEHUA AVE.
KANOELEHUA
AVENUE
KAWAILANI
STREET
DRIVE
HAIHAI
STREET
45,200
KAWILI STREET
15,200
19,400
PUAINAKO
18,000
21,100
STREET
IWALANI STREET
0 1 2
scale in kilometers
0 4000 8000
scale in feet
LEGEND
27,246 (NO-BUILD)
27,246 (BUILD)
AVERAGE DAILY TRAFFIC
LOCATION & COUNTS

Puainako Street itself (as discussed in the previous section) would experience a substantial rise in traffic, which would increase further if the proposed improvements occur. However, the increased number of lanes, improved vertical profile and improved intersections would more than offset the traffic increase.

In summary, the proposed project would benefit the regional traffic circulation relative to the No Project scenario.

4.3.10 Pedestrian and Bicycle Traffic

4.3.10.1 Impacts

Lower Portion

The existing facilities in the Lower Portion – dual asphalt sidewalk/bikeways separated from the roadway by intermittent raised asphalt curbing – would be improved by the separation of sidewalks and bicycle lanes under current project design.

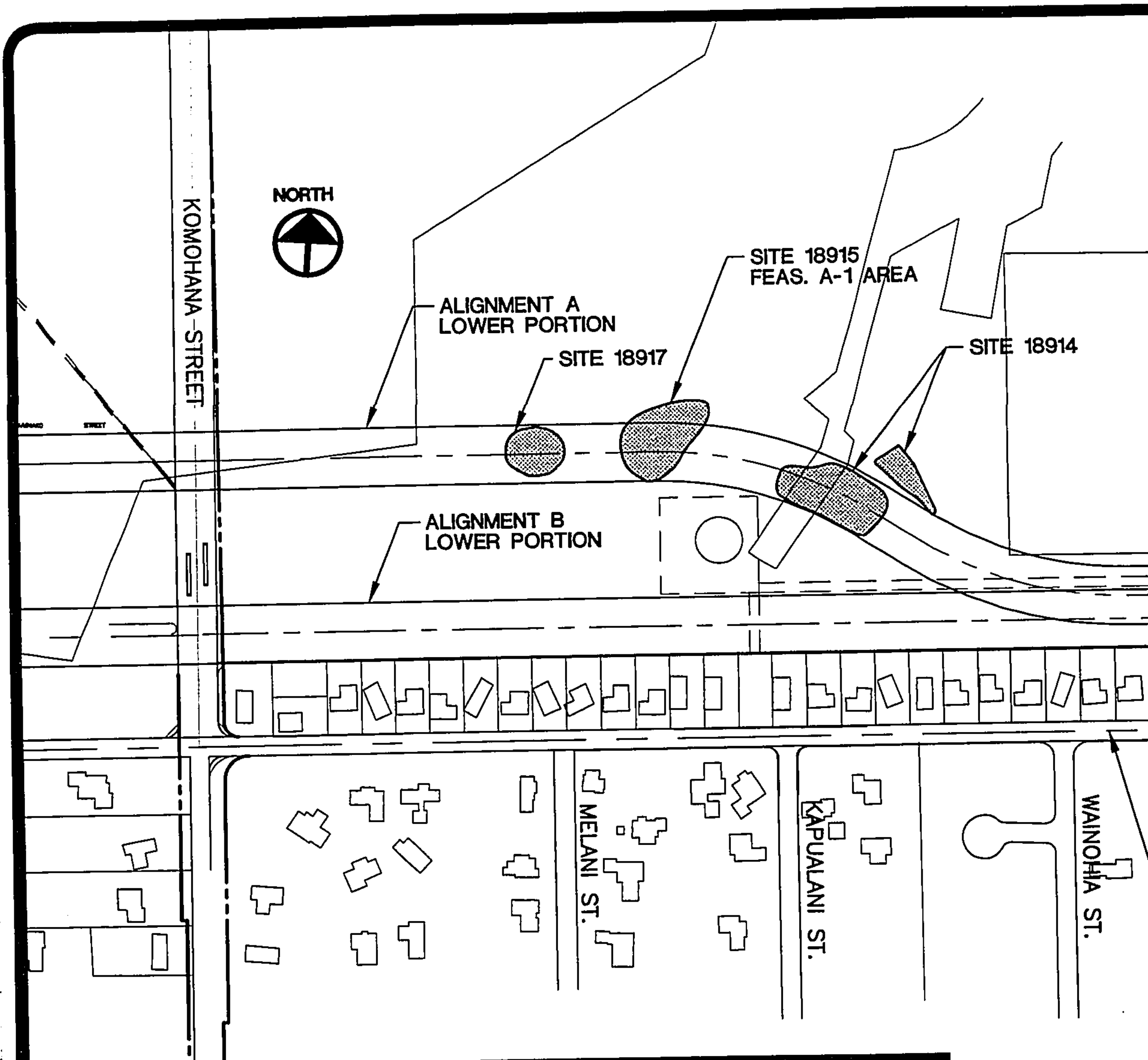
Students crossing Puainako Street at the Waiakea School Complex would have to contend with a crossing three times longer than the current 12 m (40 ft.), although a signalized intersection with crosswalks would be present.

Upper Portion

As discussed in Section 3.3.8, there is currently no pedestrian or bicycle use of the area that would be traversed by the proposed project in the Upper Portion (west or mauka of Komohana Street). If the road were constructed, it would provide a new access route among discrete clusters of residential neighborhoods currently separated by open space, and between these areas and Komohana Street. The distance from Komohana Street uphill along the Puainako Extension to the nearest residential area would be a minimum (depending on selection of Alignment 1 or 2) of approximately 2.1 km (1.3 mi.). The Upper Portion does not provide the sort of links among areas that generate substantial pedestrian use. It is perhaps for this reason that the existing Puainako Street and the proposed Extension have not been planned as integral components of the bikeway system in the *Bike Plan Hawaii* (HDOT 1994). The lack of sidewalks and bike lanes in the Upper Portion would not adversely impact pedestrians or bicyclists. A wide shoulder would provide adequate areas for the small amount of pedestrian and bicycle traffic expected. The size of the right-of-way allows for future improvements in sidewalks as needed.

Kaumana and Komohana Drive

Bicycle lanes for portions of these roadways are called for in the *Bike Plan Hawaii: A State of Hawaii Master Plan* (HDOT 1994). Pedestrians and bicyclists would benefit from a reduction in traffic relative to the expected increase in the project year 2020.



TITLE
LOCATION OF HISTORIC SITES 18914, 18915 & 18917

FIGURE 5-1

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE 2/03/2000

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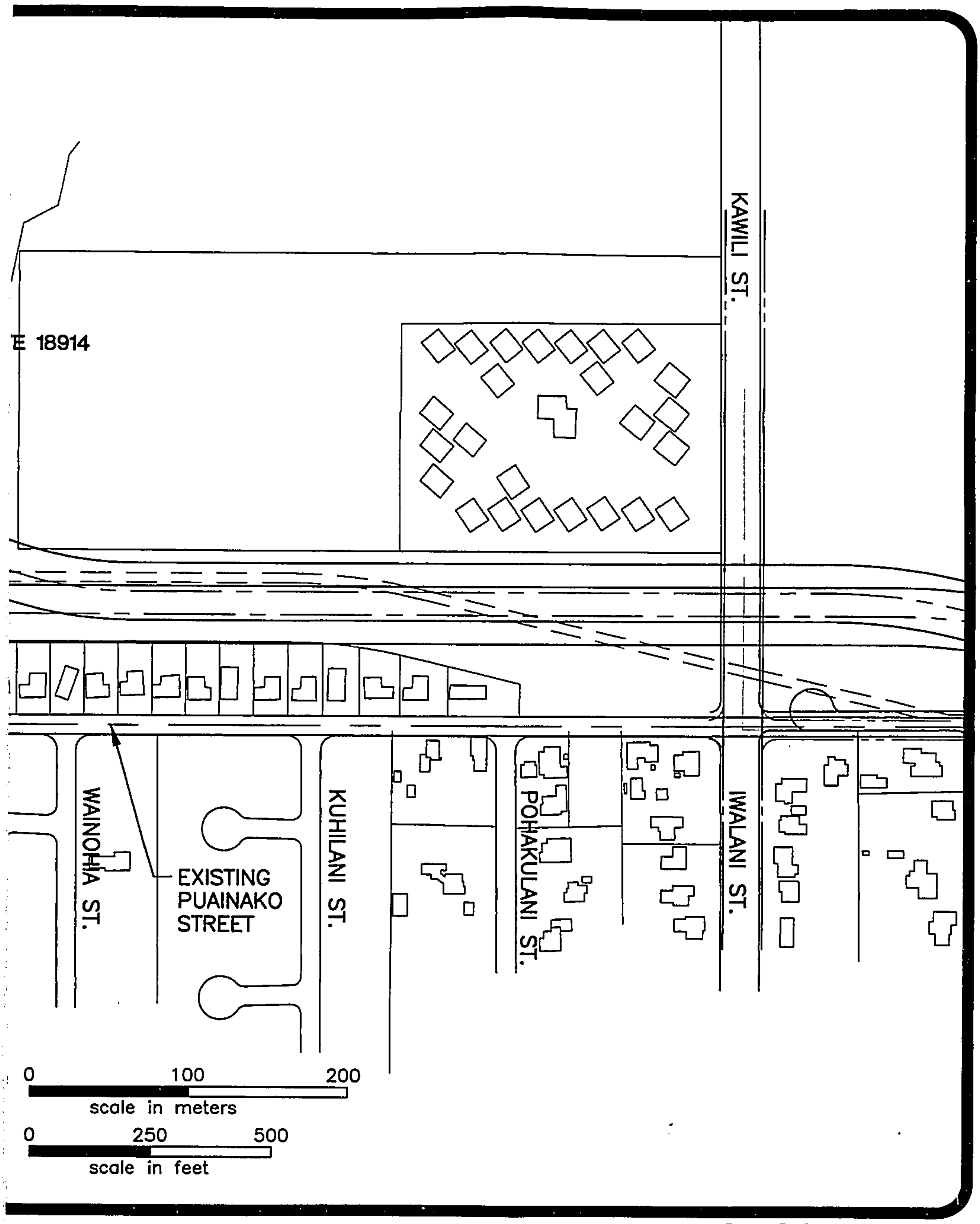
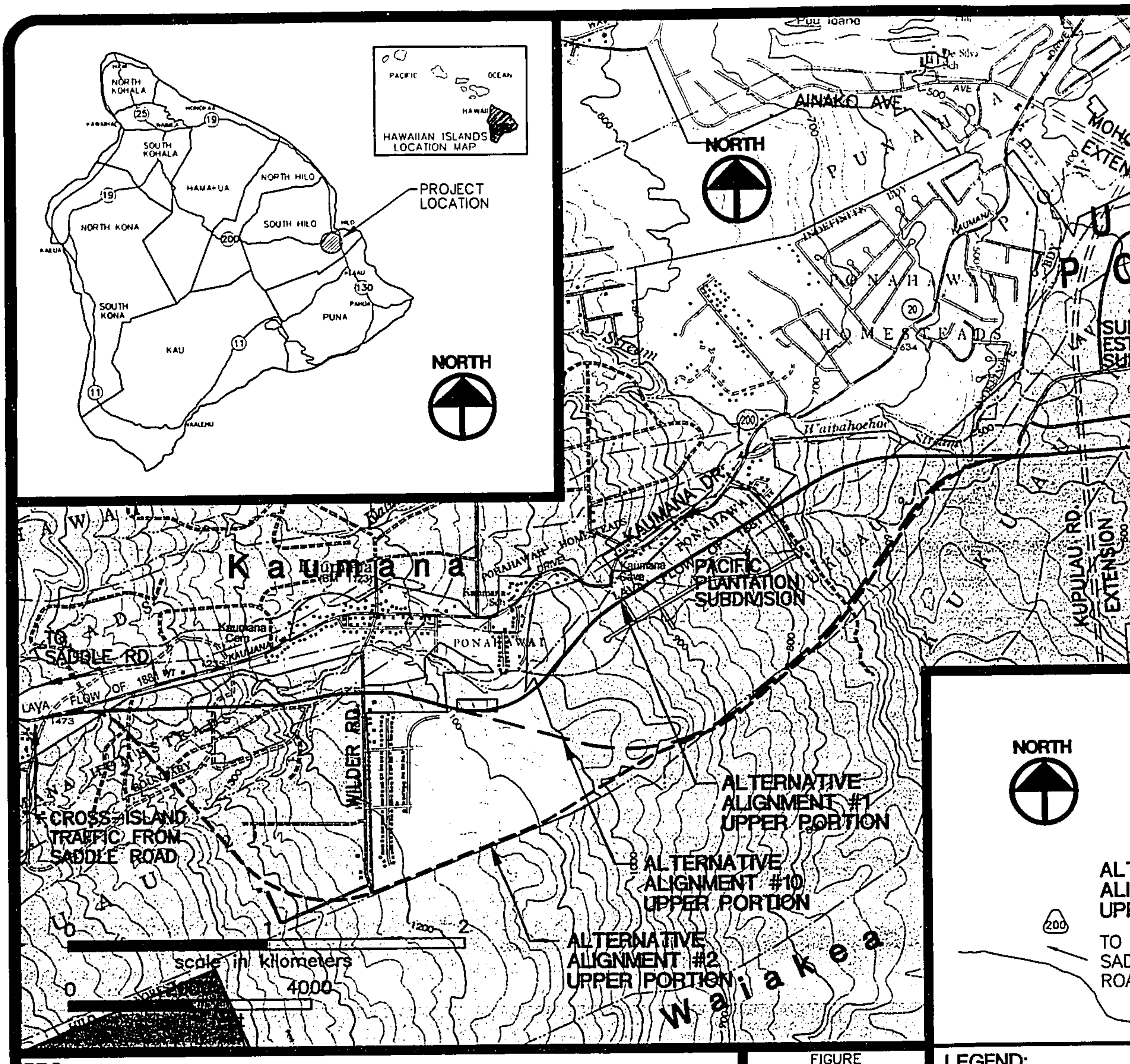

E 18914
KAWILI ST.
WAINOHIA ST.
EXISTING PUAINAKO STREET
KUHILANI ST.
POHAKULANI ST.
IWALANI ST.
0 100 200
scale in meters
0 250 500
scale in feet

Table 5-1
Archaeological Sites Requiring Preservation

Site No. (50-10-35)	Feat. Name	No. of Feat.	Architectural Type	Size (sq. m.)	Interpreted Function	Significance	Recom-mended
18914	–	12	Complex of Structures	–	Historic Agriculture	C,D	P
	A		Rectangular platform	34	Clearing/Foundation		
	B		Rectangular platform	50	Clear/ramp		
	C		Irregular mound	25	Clearing		
	D		Irregular mound	34.5	Clearing		
	E		Linear terrace	55	Retaining Wall		
	F		Rectangular platform	66	Clear/ramp		
	G		Irregular mod. outcrop	1092	Clearing		
	H		Curvilinear mod. outcrop	62.5	Clearing		
	I		Irregular platform	49.2	Clearing		
	3		Rectangular mound	32.2	Clearing		
	4		Rectangular platform	54.2	Clear/ramp		
	5		Circular mound	0.7	Clearing		
18915	–	9	Complex of Structures	–	Historic Agriculture	C,D	P
	A		Oval enclosure	112.5	Clear/foundation		
	B		Linear terrace-mound	20	Railroad bed		
	C		Rectangular platform	42	Clear/ramp		
	D		Rectangular mound	3.5	Clear/ramp		
	E		Rectangular platform	42	Clear/foundation		
	F		Rectangular platform	46	Clearing		
	G		Rectangular mound	13	Clearing		
	H		Oval platform	45	Clear/foundation		
	I		Irregular mound	29.5	Clearing		
18917	–	3	Complex of Structures	–	Historic Agriculture	C,D	P
	A		Linear Stone Alignment	12.5	Clearing		
	B		Rectangular mound	9.5	Clear/foundation		
	C		Rectangular mound	21.5	Clearing		

Source: Appendix E2



TITLE

STATE LAND USE DISTRICT

FIGURE

6-1

LEGEND:

URBAN DIS

AGRICULT

CONSERV

PROJECT PUAINAKO STREET WIDENING/EXTENSION
HILO, HAWAII

DATE
10/26/98

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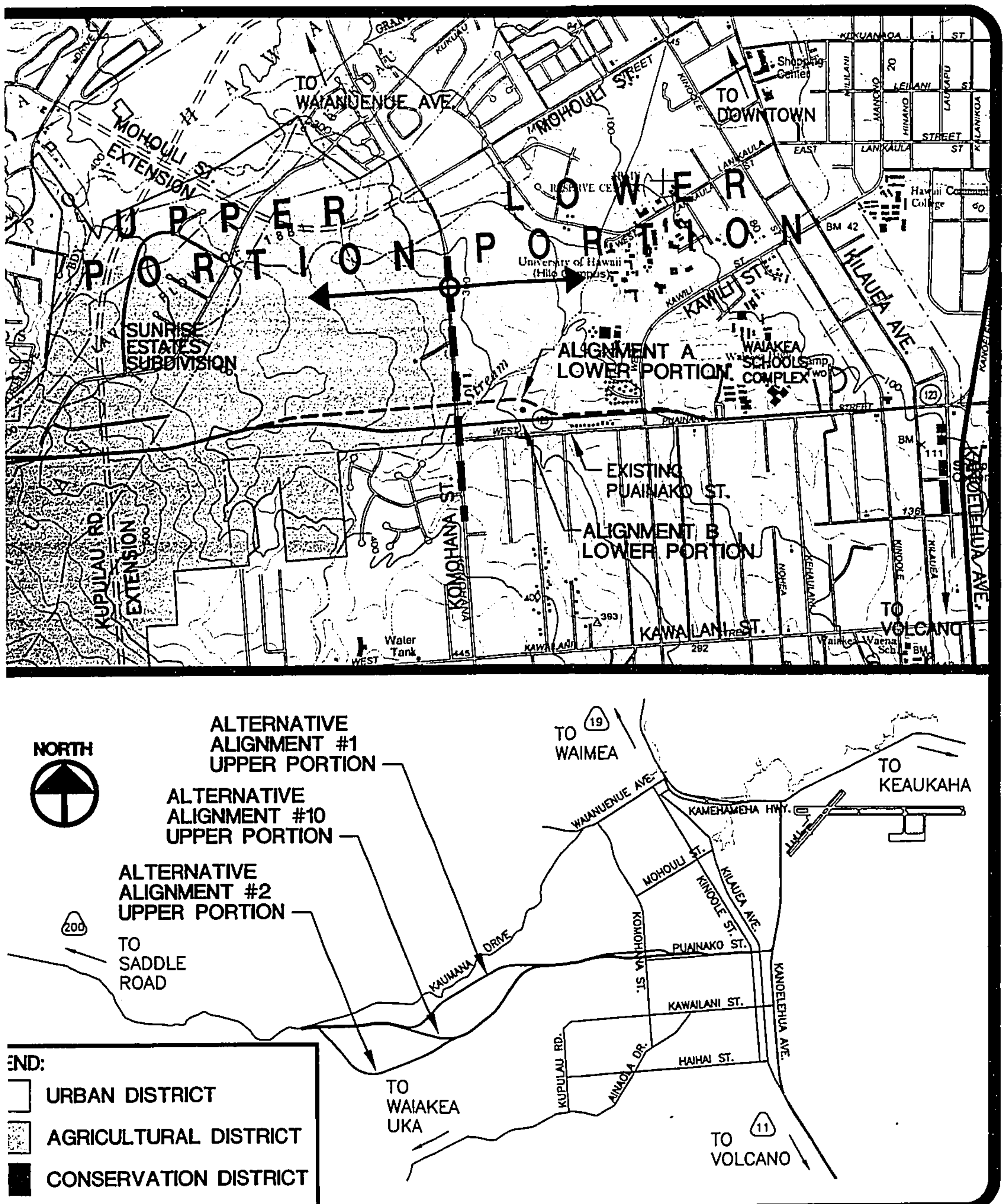
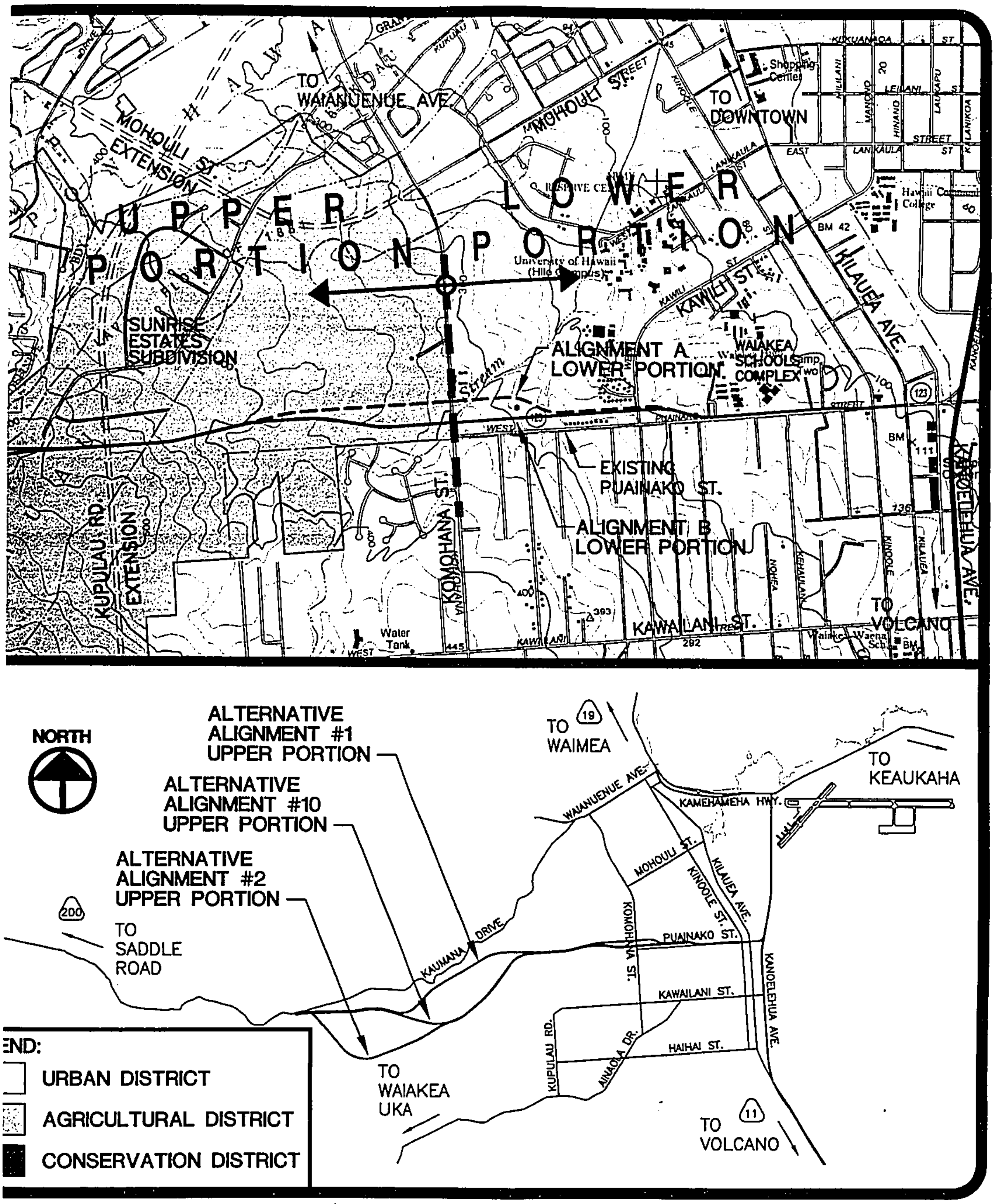


TO WAIANUENUE AVE.
MOHOULI ST.
MOHOULI ST. EXTENSION
TO DOWNTOWN
UPPER PORTION
LOWER PORTION
University of Hawaii (Hilo Campus)
KAWILI ST.
KILAUEA AVE.
SUNRISE ESTATES SUBDIVISION
ALIGNMENT A LOWER PORTION
WAIAKEA SCHOOLS COMPLEX
Stream
EXISTING PUAINAKO ST.
ALIGNMENT B LOWER PORTION
KOMOHANA ST.
KUPULAU RD.
EXTENSION
KAWAILANI ST.
TO VOLCANO
KANOELEHUA AVE.
Water Tank
Hawaii Community College
Shopping Center
NORTH
ALTERNATIVE ALIGNMENT #1 UPPER PORTION
ALTERNATIVE ALIGNMENT #10 UPPER PORTION
ALTERNATIVE ALIGNMENT #2 UPPER PORTION
TO WAIMEA
TO KEAUKAHA
WAIANUENUE AVE.
KAMEHAMEHA HWY.
MOHOULI ST.
KINOOLE ST.
KILAUEA AVE.
KOMOHANA ST.
PUAINAKO ST.
KAUMANA DRIVE
TO SADDLE ROAD
KANOELEHUA AVE.
KAWAILANI ST.
HAIHAI ST.
KUPULAU RD.
AINAOLA DR.
TO WAIAKEA UKA
TO VOLCANO
END:
URBAN DISTRICT
AGRICULTURAL DISTRICT
CONSERVATION DISTRICT

CORRECTION

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


TO WAIANUENUE AVE.
MOHOULI ST. EXTENSION
UPPER PORTION
LOWER PORTION
TO DOWNTOWN
SUNRISE ESTATES SUBDIVISION
ALIGNMENT A LOWER PORTION
WAIAKEA SCHOOLS COMPLEX
EXISTING PUAINAKO ST.
ALIGNMENT B LOWER PORTION
KUPULAU RD. EXTENSION
KOMOHANA ST.
KAWAILANI ST.
TO VOLCANO
KILAUEA AVE.
KANOELEHUA AVE.
University of Hawaii (Hilo Campus)
Water Tank
NORTH
ALTERNATIVE ALIGNMENT #1 UPPER PORTION
ALTERNATIVE ALIGNMENT #10 UPPER PORTION
ALTERNATIVE ALIGNMENT #2 UPPER PORTION
TO WAIMEA
TO KEAUKAHA
TO SADDLE ROAD
TO WAIAKEA UKA
TO VOLCANO
WAIANUENUE AVE.
KAMEHAMEHA HWY.
MOHOULI ST.
KINOOLE ST.
KILAUEA AVE.
KAUMANA DRIVE
PUAINAKO ST.
KOMOHANA ST.
KAWAILANI ST.
KANOELEHUA AVE.
KUPULAU RD.
AINAOLA DR.
HAIHAI ST.
END:
URBAN DISTRICT
AGRICULTURAL DISTRICT
CONSERVATION DISTRICT

3. Provide a system of thoroughfares and streets for the safe, efficient and comfortable movement of people and goods between and within the various sections of the County.

4. Provide an integrated State and County system so that new major routes would complement and encourage proposed land uses.

Transportation Policies:

1. A framework of transportation facilities which would promote and influence desired land use shall be established by concerned agencies.

2. The agencies concerned with transportation systems should provide for present traffic and future demands, including mass transit programs for high growth areas.

3. The improvement of transportation service shall be encouraged.

Specific Course of Action

1. A realignment of the Saddle Road from the Forest Reserve boundary on the south side of Kaumana Drive and along the north side of Puainako Street, intersecting the present Puainako alignment at Kinoole Street and continuing to the intersection of Kanoelehua Avenue should be constructed. Limited access control is recommended with intersections at the major cross arterials serving the various areas of the city.

Discussion:

The proposed Project is consistent with the *Hawaii County General Plan* and Zoning Map. Consequently, the roadway would not prematurely encourage development of areas not presently anticipated for development. However, the Project would support the ongoing development activities both in the Waiakea and Kaumana areas as circulation patterns improve.

6.5 General Plan Land Use Pattern Allocation Guide Maps and Facilities Map

County Planning Designations

The *Hawaii County General Plan* is a policy document expressing the broad goals and policies for the long-range development of the Island of Hawaii. The plan was adopted by ordinance in 1989. The Land Use Pattern Allocation Guide (LUPAG) map component of the *General Plan* is a graphic representation of the Plan's goals and policies. The Facilities Map of the *General Plan* identifies existing and proposed roads and existing facilities. These Maps 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 Puainako Road Extension links areas identified as High- and Medium-Density Urban in the lowland (makai) portion to areas identified as Medium- and Low-Density Urban at higher elevations, as well as land slated for Urban Expansion. The proposed project is thus an appropriate corridor for traffic between areas designated as urban. The Facilities Map (effective date 14 November 1989) explicitly identifies the Lower Portion of Puainako Street as a primary arterial to be improved. The Upper Portion of the proposed project is designated as a planned primary arterial.

6.6 <u>Hawaii County Comprehensive Zoning Ordinance</u>

The *Hawaii County General Plan* is the basis for Ordinance No. 63, the County Comprehensive Zoning Ordinance, which was adopted in 1967. Zoning maps (portion duplicated in Figure 6-2~~1~~) show the project as a secondary arterial street of a 37-meter (120-foot) wide right-of-way. Note that the roadway indicated on the map is only an approximation of the path of the Puainako Extension, the ultimate alignment of which can only be determined through considerations of design, environmental impact, and land ownership.

The zoning of areas crossed by the proposed project is either Residential (RS-15) or Agricultural (A-1a, A-3a, A-10a, and A-20a). Nearly all of this land would ultimately be developed as either urban or agricultural/residential lots, for which the proposed project would be both appropriate and convenient.

6.7 <u>Hilo Community Development Plan</u>

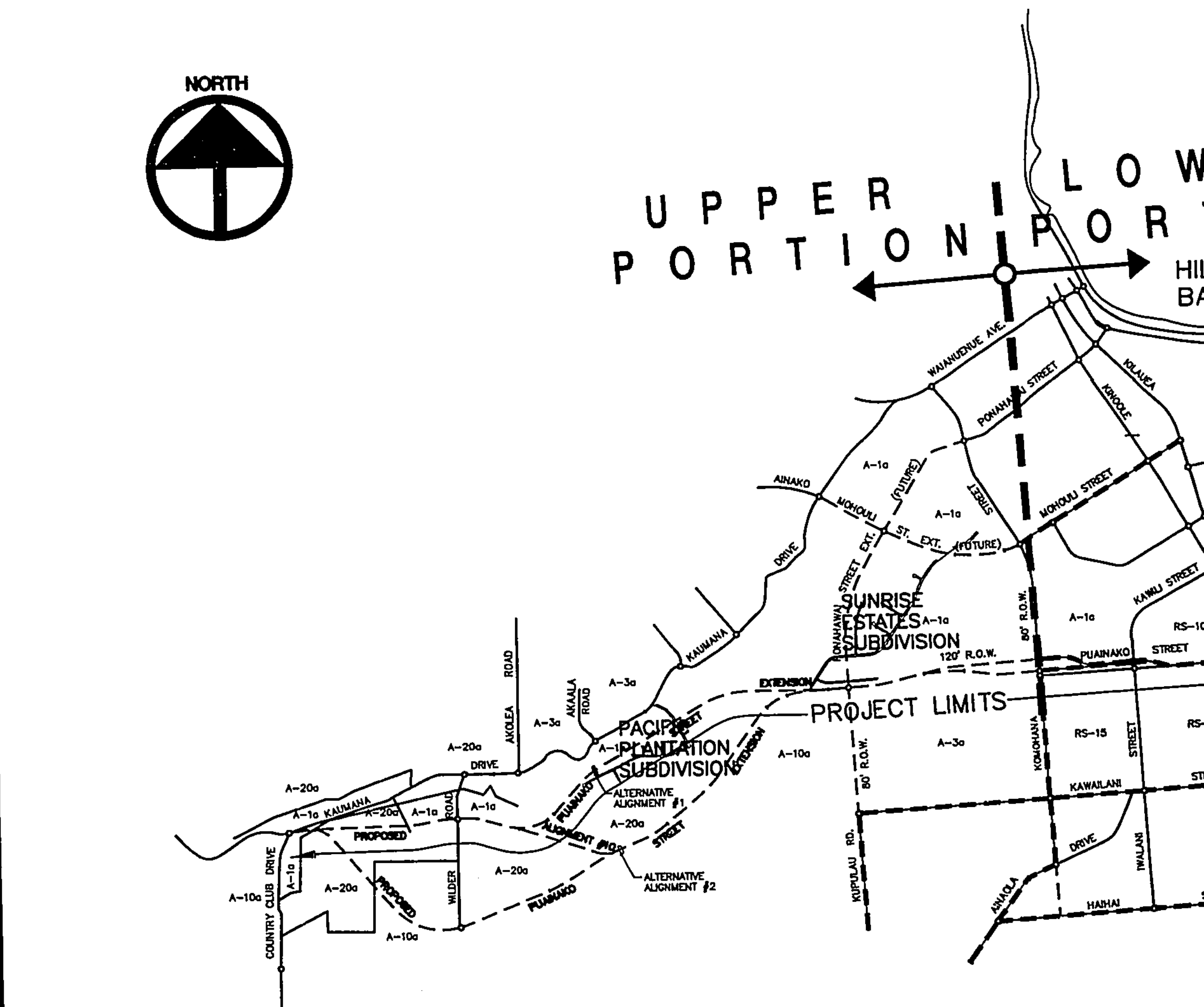
The Hilo Community Development Plan, developed by the County Planning Department in 1975 and still in effect, identifies planning priorities for the Hilo area (Belt, Collins and Assoc. 1975). The Puainako Road Extension is explicitly identified as an integral part of the Transportation Plan of Hilo (Ibid:90).

6.8 <u>Island of Hawaii Long-Range Highway Transportation Plan</u>

The *Island of Hawaii Long Range Highway Transportation Plan* (IHLRHP) was prepared in 1991 (and updated in 1998, renamed the *Hawaii Long Range Land Transportation Plan*) for the State Department of Transportation, in cooperation with the County of Hawaii Departments of Public Works and Planning and the U.S. Department of Transportation, Federal Highway Administration. The purpose of the study was to identify major highway corridors that are required to accommodate traffic demands projected for the Year 2010. The widening of Puainako Street, between Kilauea Avenue and Komohana Street, and the extension of Puainako Street, from Komohana Street to Kaumana Drive, are included as Tier 1 Priorities. Tier 1 Priorities are those projects that are recommended to be initiated by 2005 to address immediate highway capacity enhancement needs. This plan is currently under review by the State DOT.

6.9 <u>Coastal Zone Management Act (CZMA)</u>

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 the State



TITLE	FIGURE
RIGHTS-OF-WAY AND ZONING	6-2
PROJECT PUAINAKO STREET WIDENING/EXTENSION HILO, HAWAII	DATE 2/03/2000

0 1 scale in kilome
0 4000 scale in f

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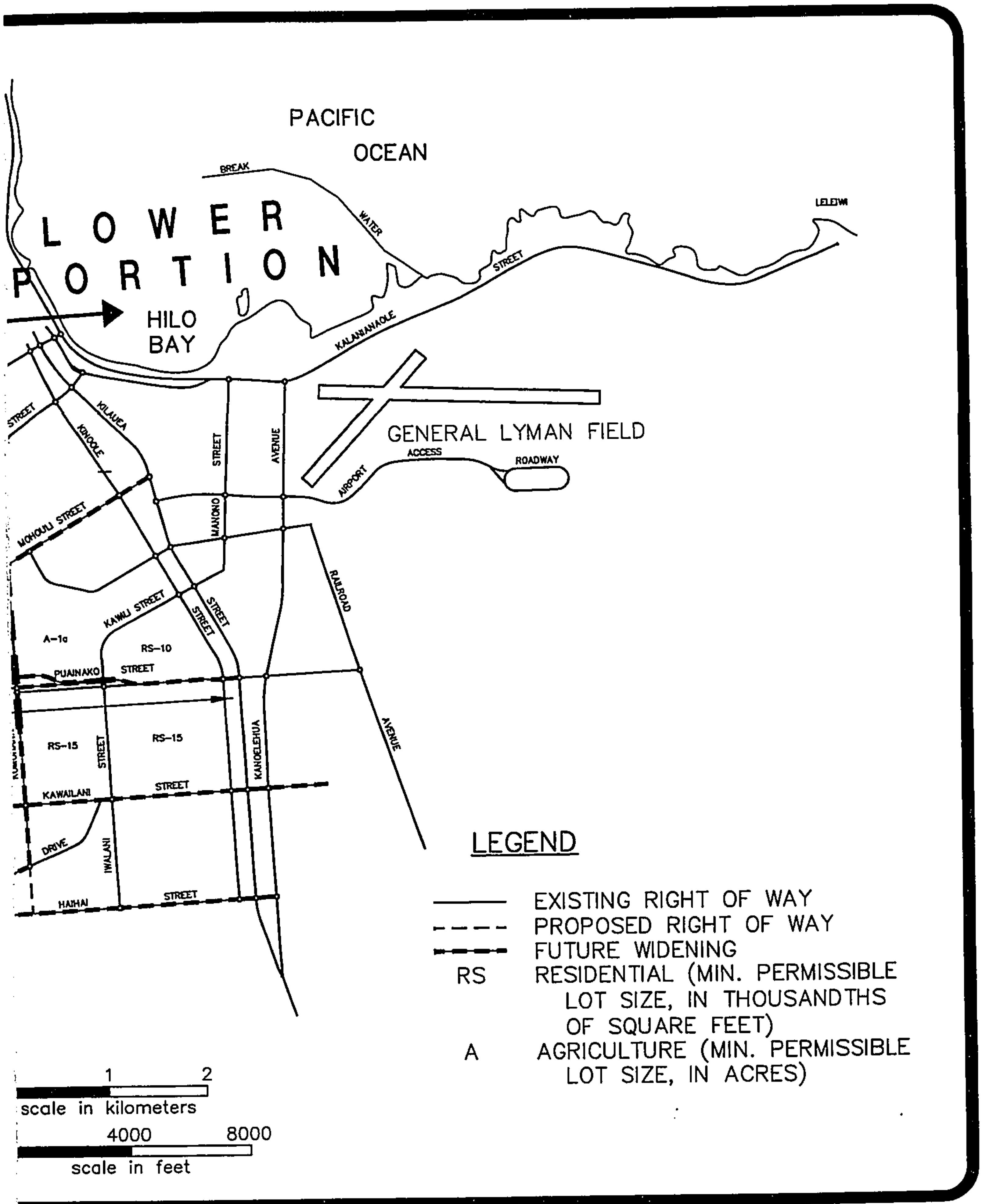
PACIFIC
OCEAN
BREAK
WATER
LELEIWI
LOWER
PORTION
HILO
BAY
KALANIANAOLE
STREET
GENERAL LYMAN FIELD
ACCESS
ROADWAY
AIRPORT
MANONO
STREET
AVENUE
KILAUEA
KINOOLE
STREET
MOHOULI STREET
KAWILI STREET
STREET
STREET
RAILROAD
AVENUE
A-1a
RS-10
PUAINAKO
STREET
RS-15
RS-15
STREET
KANOELEHUA
KAWAILANI
STREET
DRIVE
IWALANI
HAIHAI
STREET
LEGEND
EXISTING RIGHT OF WAY
PROPOSED RIGHT OF WAY
FUTURE WIDENING
RS RESIDENTIAL (MIN. PERMISSIBLE LOT SIZE, IN THOUSANDTHS OF SQUARE FEET)
A AGRICULTURE (MIN. PERMISSIBLE LOT SIZE, IN ACRES)
1
2
scale in kilometers
4000
8000
scale in feet