

NEIL ABERCROMBIE  
GOVERNOR



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

GLENN M. OKIMOTO  
DIRECTOR


Deputy Directors  
FORD N. FUCHIGAMI  
JAN S. GOUVEIA  
RANDY GRUNE  
JADINE URASAKI

IN REPLY REFER TO:

HWY-PA  
2.8347

May 5, 2011

TO: GARY HOOSER, DIRECTOR  
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

FROM: GLENN M. OKIMOTO, Ph.D.  
DIRECTOR OF TRANSPORTATION 

SUBJECT: FINAL ENVIRONMENTAL ASSESSMENT (EA)/FINDING OF NO  
SIGNIFICANT IMPACT (FONSI), KEAAU-PAHOA ROAD  
IMPROVEMENTS, KEAAU BYPASS TO PAHOA-KAPOHO ROAD,  
FEDERAL-AID PROJECT NO. STP-0130(27)

Enclosed are two (2) copies of the Final Environmental Assessment/Finding of No Significant Impact (FONSI) for the Keaau-Pahoa Road Improvements, Keaau Bypass to Pahoa-Kapoho Road, Federal-Aid Project No. STP-0130(27), Keaau and Pahoa, Puna District, Island of Hawaii in compliance with requirements of Chapter 343, Hawaii Revised Statutes and Hawaii Administrative Rules, Title 11, State of Hawaii Department of Health, Chapter 200. The two (2) copies will be submitted by SSFM International, our consultant.

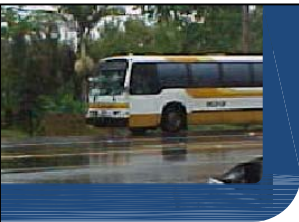
A Finding of No Significant Impact (FONSI) is determined for this project. The basis for this determination is set forth in Chapter 6 of the final EA, which follows the significance criteria set forth in Hawaii Administrative Rules, Title 11, Department of Health, Chapter 200, Environmental Impact Statement Rules, Section 12. See the attached.

Please publish the notice of availability of the Final EA in the next issue of the Environmental Notice.

If you have any questions, please contact Lance Manabe, Project Manager at 587-6396, or Douglas Zang of SSFM International at (808) 356-1249.

Enclosures

***THIS PAGE INTENTIONALLY LEFT BLANK***



# Final Environmental Assessment

## Kea'au - Pāhoa Road Improvements

Kea'au Bypass to Pāhoa - Kapoho Road,  
Puna District, Hawai'i Island, Hawai'i  
Project No. STP-130(27)



Submitted Pursuant to the National  
Environmental Policy Act & Chapter 343,  
Hawai'i Revised Statutes by:



April 2011

***THIS PAGE INTENTIONALLY LEFT BLANK***

# KEA'AU-PĀHOA ROAD IMPROVEMENTS

Kea'au Bypass to Pāhoa-Kapoho Road  
Puna District, Hawai'i Island, Hawai'i

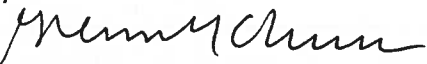
## FINAL ENVIRONMENTAL ASSESSMENT

Submitted Pursuant to the  
National Environmental Policy Act, 42 USC 4332 (2) (c)  
and  
Chapter 343, Hawai'i Revised Statutes

US Department of Transportation  
Federal Highway Administration  
and  
State of Hawai'i Department of Transportation  
Highways Division

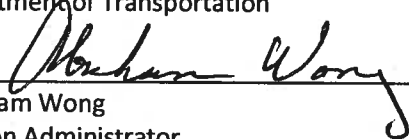
**MAY 04 2011**

Date of Approval

  
Glenn Okimoto  
Director of Transportation  
State of Hawai'i  
Department of Transportation

**MAY 05 2011**

Date of Approval

  
Abraham Wong  
Division Administrator  
Federal Highway Administration  
US Department of Transportation

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

Abraham Wong, Division Administrator  
Federal Highway Administration  
P.O. Box 50206  
Honolulu, HI 96950  
(808) 541-2700

Ken Tatsuguchi, Head Planning Engineer  
Hawai'i Department of Transportation  
869 Punchbowl Street  
Honolulu, HI 96813  
(808) 587-1830

This report documents the anticipated impacts of reconstruction of 9.5 miles of Kea'au-Pāhoa Road (State Route 130), from the terminus of the existing 4-lane Kea'au Bypass to its intersection with Pāhoa-Kapoho Road. The project purpose is to improve highway safety, increase roadway capacity, and modernize the existing facility, which is heavily congested during its peak hours of operation and has an accident rate much higher than the statewide average. Five alternatives (including No-Build and Transportation Systems Management) are evaluated. The Proposed Action (Alternative 4) will not have significant impacts based on criteria specified in Section 11-200-12b of the Hawai'i Administrative Rules. A Finding of No Significant Impact (FONSI) is included.

***THIS PAGE INTENTIONALLY LEFT BLANK***



## Project Summary

<b>Project Name:</b>	Kea'au-Pāhoa Road Improvements
<b>Location:</b>	Between Kea'au and Pāhoa Villages, Hawai'i
<b>District:</b>	Puna
<b>Project Site Tax Map Key:</b>	(3)-1-5-various through (3)-1-6-various
<b>Project Study Area:</b>	Approximately 230 acres (a 200-foot wide corridor was considered over a distance of approximately 9.5 miles). The Proposed Action also includes improvements of local subdivision roadways to serve access management purposes.
<b>Project Site Existing Use:</b>	Existing two-lane highway corridor. Areas of right-of-way acquisition that abut corridor include open space, residential, commercial, institutional and other uses.
<b>Project Site Existing Land Use Designations:</b>	<p>Generally within state highway right-of-way. Areas that abut project, which may require acquisition for right-of-way purposes are classified as follows:</p> <p><u>State Land Use:</u> All agricultural with the exception of one localized urban zone near Pāhoa</p> <p><u>Hawai'i County General Plan's Land Use Pattern Allocation Guide (LUPAG):</u> Generally Rural, Extensive Agriculture, and Urban Expansion. Small pockets of Low Density Urban and Medium Density Urban</p> <p><u>Hawai'i County Zoning:</u> Primarily agricultural of varying density levels</p>
<b>Proposed Action:</b>	<p>The Hawai'i Department of Transportation (HDOT) has proposed improvements along approximately 9.5 miles of Kea'au-Pāhoa Road (State Route 130), from the terminus of the existing four-lane Kea'au Bypass to its intersection with Pāhoa-Kapoho Road.</p> <p>The Preferred Alternative selected for the Proposed Action will widen Kea'au-Pāhoa Road to four lanes between Kea'au Bypass and Pāhoa-Kapoho Road. This alternative includes a shoulder/bikeway, bus pull-outs, improved shoulders, and median treatments. Traffic improvements also include provision of signals or roundabouts at major intersections. Local access improvements in subdivisions adjoining the corridor will improve traffic operations and provide safer conditions at major intersections.</p> <p>The purpose of the project is to improve safety, provide mobility/relieve congestion, improve travel for alternative modes (transit, bicycles, pedestrians), address future traffic increases, support future land use objectives, and enable civil defense/emergency travel/evacuations.</p>
<b>Anticipated Impacts</b>	A variety of impacts are anticipated under all five alternatives, but none are expected to be significant after mitigation. They include:

	<ul style="list-style-type: none"> <li>• Right-of-Way acquisitions</li> <li>• Relocations Traffic Impacts (generally beneficial) and improved safety</li> <li>• Access changes</li> <li>• Future growth (directed by Puna Community Development Plan)</li> <li>• Air Quality</li> <li>• Noise</li> <li>• Removal of vegetation</li> <li>• Modification of waterways</li> <li>• Impacts on historic properties and cultural practices</li> <li>• Utility relocations</li> <li>• Construction-phase impacts on air, water, noise levels, sedimentation, vegetation, etc.</li> </ul>
<b>HRS Chapter 343 Proposing Agency and Accepting Authority:</b>	State of Hawai'i Department of Transportation 869 Punchbowl Street Honolulu, HI Glenn Okimoto, Director of Transportation (808) 587-2150
<b>Determination:</b>	Finding of No Significant Impact (FONSI)
<b>Project Site Permits/Approvals Required (not an exhaustive list, refer to Section 4.17 for more information)</b>	<ul style="list-style-type: none"> <li>• National Pollutant Discharge Elimination System (NPDES)</li> <li>• State of Hawai'i DBEDT - Coastal Zone Management Federal Consistency</li> <li>• State of Hawai'i DLNR/SHPD - Archaeological Inventory Survey, Archaeological Mitigation Plan, Cultural Impact Assessment approvals</li> <li>• State of Hawai'i DOH - Noise Permit/Variance</li> <li>• State of Hawai'i DOH - Underground Injection Control</li> <li>• County of Hawai'i Grubbing, Grading, Excavation and Stockpile Permits</li> </ul>
<b>EA Preparer</b>	SSFM International 99 Aupuni Street, Suite 202 Hilo, HI 96720 (808) 933-2727 Contact: Douglas Zang, AICP
<b>Individuals, Community Groups and Agencies Consulted</b>	See <b>Chapter 7: PUBLIC INVOLVEMENT</b> for list

# TABLE OF CONTENTS

## PURPOSE FOR FINAL ENVIRONMENTAL ASSESSMENT ..... XV

## CHAPTER 1: PURPOSE AND NEED FOR PROJECT .....1-1

1.1	Purpose and Need for Action.....	1-1
1.1.1	Community Needs .....	1-3
1.1.2	Project Purpose.....	1-4
1.1.2.1	Safety .....	1-5
1.1.2.2	Mobility and Congestion .....	1-10
1.1.2.3	Alternative Modes .....	1-20
1.1.2.4	Future Traffic Increases .....	1-21
1.1.2.5	Support Future Land Use Objectives .....	1-23
1.1.2.6	Civil Defense, Emergency Travel, and Evacuations .....	1-24
1.1.3	Other Goals and Objectives .....	1-24
1.2	Project History .....	1-25
1.2.1	Past Planning for Project.....	1-25
1.2.2	Interim Improvements.....	1-26
1.2.2.1	The Kea'au-Pāhoa Road Shoulder Lane Conversion Project .....	1-26
1.2.2.2	Other Interim Improvements .....	1-27
1.2.3	Related Actions .....	1-27
1.3	Community Participation in Determination of Project Purpose and Need.....	1-27
1.4	Environmental Justice.....	1-30

## CHAPTER 2: ALTERNATIVES AND PROPOSED ACTION .....2-1

2.1	Selection of a Preferred Alternative .....	2-1
2.2	Proposed Action – Four Lane Highway With Associated Access Management Improvements.....	2-2
2.2.1	Preferred Alternative Cross Section .....	2-4
2.2.2	Access Control Under the Preferred Alternative.....	2-4
2.2.3	Traffic Control Improvements Under the Preferred Alternative.....	2-11
2.2.3.1	Signalized Intersections .....	2-12
2.2.3.2	Stop Sign Controlled Intersections .....	2-13
2.2.3.3	Roundabouts.....	2-14
2.2.4	Turn Lanes.....	2-16
2.2.5	Transit Improvements.....	2-16
2.2.6	Land Use Strategies Identified in the PCDP .....	2-17
2.2.7	Phasing of Preferred Alternative .....	2-19
2.3	Alternatives Considered in Draft EA but not Selected as Preferred Alternative.....	2-20
2.3.1	Alternative 1 - No-Build Alternative .....	2-20
2.3.2	Alternative 2 - TSM Alternative .....	2-20
2.3.3	Build Alternatives 3 and 5 .....	2-21

2.3.3.1	Alternative 3 - Four-/Two-Lane Section.....	2-21
2.3.3.2	Alternative 5 - Six-/Four-/Two-Lane Section .....	2-24
2.4	Project Cost Estimates .....	2-27
2.5	Alternatives Considered Prior to Draft EA But Not Analyzed .....	2-28
<b>CHAPTER 3: AFFECTED ENVIRONMENT .....</b>		<b>3-1</b>
3.1	Land Use and Zoning.....	3-1
3.1.1	Existing Communities and Land Uses .....	3-1
3.1.2	State Land Use Designations.....	3-1
3.1.3	Hawai'i County Plans and Policies .....	3-3
3.1.3.1	County of Hawai'i General Plan .....	3-3
3.1.3.2	County of Hawai'i Zoning.....	3-3
3.1.3.3	Puna Community Development Plan (PCDP).....	3-3
3.1.3.4	Puna Regional Circulation Plan (PRCP) .....	3-7
3.1.4	State of Hawai'i Department of Hawaiian Homelands.....	3-9
3.2	Traffic and Transportation .....	3-11
3.2.1	Existing Roadway Volumes and Level of Service .....	3-11
3.2.2	Intersection LOS.....	3-15
3.2.3	Corridor-Wide Delay .....	3-19
3.2.4	Safety .....	3-20
3.2.4.1	Intersection Safety.....	3-20
3.2.4.2	Roadway Segments Between Intersections .....	3-22
3.2.4.3	Uncontrolled Access .....	3-25
3.2.5	Bicycles and Pedestrians.....	3-25
3.2.6	Transit .....	3-25
3.3	Socioeconomic Environment .....	3-26
3.3.1	Population and Housing.....	3-26
3.3.1.1	Regional Population and Housing Trends from 1970 to 2000.....	3-26
3.3.1.2	Puna District Characteristics from 2000 Census.....	3-27
3.3.1.3	Future Population Projections.....	3-30
3.3.2	Environmental Justice Communities in Immediate Study Area .....	3-31
3.3.2.1	Low Income Persons in the Immediate Study Area.....	3-31
3.3.2.2	Racial Minorities in Immediate Study Area .....	3-34
3.3.2.3	Incorporation of Title VI and Environmental Justice Requirements into the Proposed Project.....	3-36
3.3.3	Economic Environment.....	3-36
3.3.4	Community Character and Facilities .....	3-37
3.3.4.1	Medical Facilities.....	3-37
3.3.4.2	Educational Facilities.....	3-37
3.3.4.3	Police Services.....	3-39
3.3.4.4	Fire/EMS Services.....	3-40
3.4	Climate and Air Quality .....	3-40
3.5	Noise .....	3-41
3.5.1	Introduction to the Concepts of Noise .....	3-41

3.5.2	Noise Guidelines, Standards and Regulations .....	3-43
3.5.3	Measured Noise Environment .....	3-44
3.5.3.1	Measured Noise Along Kea'au-Pāhoa Road .....	3-44
3.5.3.2	Measured Noise Along Access Management Roadways .....	3-44
3.5.4	Modeled Existing Noise Levels.....	3-47
3.5.4.1	Modeled Existing Noise Levels Along Kea'au-Pāhoa Road .....	3-47
3.5.4.2	Modeled Existing Noise Levels Along Access Management Roadways.....	3-48
3.6	Biological Resources .....	3-50
3.6.1	Flora .....	3-50
3.6.2	Fauna.....	3-51
3.6.2.1	Avian Survey and Resources .....	3-51
3.6.2.2	Mammalian Survey and Resources.....	3-52
3.6.3	Aquatic Biota.....	3-53
3.6.3.1	Invertebrates.....	3-53
3.7	Water Resources .....	3-54
3.7.1	Surface and Groundwater.....	3-54
3.7.2	Wetlands .....	3-57
3.7.3	Floodplains and Hydrology .....	3-58
3.8	Geographic Setting and Natural Hazards.....	3-59
3.8.1	Geology .....	3-59
3.8.2	Lava Flows .....	3-63
3.8.3	Earthquakes .....	3-63
3.9	Cultural Resources .....	3-65
3.9.1	Natural and Historic Context of Area.....	3-66
3.9.2	Archaeological Resources .....	3-66
3.9.3	Historic Resources.....	3-68
3.9.3.1	1930s-Era Concrete Bridge .....	3-69
3.9.3.2	Sacred Heart Catholic Church Cemetery .....	3-72
3.9.3.3	Roadside Memorials .....	3-72
3.9.4	Cultural Practices .....	3-75
3.10	Parks and Recreational Resources.....	3-76
3.11	Agricultural Lands .....	3-76
3.12	Visual Environment.....	3-79
3.12.1	View From the Corridor .....	3-80
3.12.2	View of the Corridor .....	3-81
3.13	Utilities.....	3-81
3.13.1	Electrical Service .....	3-82
3.13.2	Telecommunications.....	3-82
3.13.3	Water Service.....	3-82
3.13.4	Wastewater Services.....	3-83
3.14	Hazardous Materials .....	3-83
<b>CHAPTER 4: ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES.....</b>		<b>4-1</b>
4.1	Land Use.....	4-1

4.1.1	Consistency with Government Plans, Policies and Controls .....	4-1
4.1.1.1	County of Hawai'i General Plan .....	4-1
4.1.1.2	County of Hawai'i Zoning.....	4-2
4.1.1.3	Puna Community Development Plan (PCDP).....	4-3
4.1.1.4	Puna Regional Circulation Plan (PRCP) .....	4-5
4.1.1.5	State of Hawai'i Statewide Transportation Plan.....	4-7
4.1.1.6	Hawai'i Long-Range Land Transportation Plan (HLRLTP) .....	4-7
4.1.1.7	State of Hawai'i Statewide Transportation Improvement Program (STIP) .....	4-8
4.1.1.8	Bike Plan Hawai'i.....	4-8
4.1.1.9	Hawaiian Paradise Park Master Plan .....	4-9
4.1.1.10	State of Hawai'i Department of Hawaiian Homelands.....	4-10
4.1.1.11	Hawai'i 2050 Sustainability Plan .....	4-10
4.1.2	Induced Development.....	4-11
4.2	Traffic and Transportation .....	4-12
4.2.1	Roadway LOS Between Intersections .....	4-13
4.2.1.1	New Issues or Clarification of Issues for Final EA .....	4-13
4.2.1.2	No-Build Alternative Roadway LOS Between Intersections .....	4-14
4.2.1.3	Preferred Alternative LOS Between Intersections.....	4-16
4.2.1.4	Other Alternatives.....	4-19
4.2.2	Intersection LOS.....	4-20
4.2.2.1	New Issues or Clarification of Issues for Final EA .....	4-21
4.2.2.2	No-Build Alternative Intersection Operations .....	4-21
4.2.2.3	Preferred Alternative Intersection Operations.....	4-24
4.2.2.4	Other Alternatives.....	4-28
4.2.3	Roundabouts Implementation.....	4-30
4.2.4	Safety .....	4-31
4.2.5	Access Changes .....	4-32
4.2.6	Bicycles and Pedestrians.....	4-33
4.2.7	Transit .....	4-34
4.3	Social and Community Impacts.....	4-35
4.3.1	Social Impact Interview Findings .....	4-35
4.3.2	Social Impacts Anticipated on the Project.....	4-38
4.3.3	Impacts on Environmental Justice Communities.....	4-39
4.3.4	Impacts on Community Facilities.....	4-41
4.3.4.1	Medical Facilities.....	4-41
4.3.4.2	Educational Facilities.....	4-42
4.3.4.3	Police, Fire, and EMS Services.....	4-43
4.4	Air Quality .....	4-43
4.4.1	Microscale Air Quality Impacts .....	4-44
4.4.2	Mesoscale Air Quality Impacts.....	4-46
4.4.3	Mobile Source Air Toxics.....	4-47
4.4.4	Construction Impacts on Air Quality.....	4-48
4.5	Noise .....	4-48

4.5.1	Future Year Noise Impacts and Mitigation .....	4-48
4.5.1.1	Future Noise Along Kea'au-Pāhoa Road .....	4-49
4.5.1.2	Future Noise Along Access Management Roadways.....	4-50
4.5.2	Mitigation of Project-Related Noise .....	4-53
4.5.2.1	Mitigation of Noise Along Kea'au-Pāhoa Road.....	4-53
4.5.2.2	Mitigation of Noise Along Access Management Roadways .....	4-53
4.5.3	Construction Noise Impacts and Mitigation .....	4-54
4.6	Biological Resources .....	4-57
4.6.1	Flora .....	4-57
4.6.2	Fauna.....	4-58
4.6.2.1	Hawaiian Hawk .....	4-59
4.6.2.2	Hawaiian Petrel and Newell's Shearwater .....	4-60
4.6.2.3	Hawaiian Hoary Bat.....	4-61
4.6.2.4	Migratory Shorebirds.....	4-62
4.6.3	Aquatic Biota.....	4-62
4.7	Water Resources.....	4-63
4.7.1	Surface and Groundwater.....	4-63
4.7.2	Wetlands .....	4-65
4.7.3	Floodplains and Hydrology .....	4-65
4.8	Geographic Setting and Natural Hazards.....	4-67
4.8.1	Geology .....	4-67
4.8.2	Natural Disasters.....	4-68
4.9	Cultural Resources .....	4-69
4.9.1	Archaeological Resources .....	4-69
4.9.2	Historic Resources.....	4-70
4.9.2.1	SIHP # 50-10-44-26874, Circa 1930s Concrete Slab Bridge and Roadway ....	4-70
4.9.2.2	SIHP # 50-10-55-7388, Sacred Heart Catholic Church Cemetery .....	4-71
4.9.2.3	Lava Tubes.....	4-72
4.9.2.4	Roadside Memorials .....	4-73
4.9.3	Cultural Practices .....	4-73
4.10	Parks and Recreational Resources.....	4-75
4.11	Agricultural Lands .....	4-76
4.12	Visual Environment.....	4-78
4.13	Utilities .....	4-79
4.13.1	Electrical.....	4-79
4.13.2	Telecommunication .....	4-81
4.13.3	Water Service.....	4-81
4.13.4	Wastewater Services.....	4-83
4.14	Hazardous Materials .....	4-83
4.15	Right-of-Way, Relocations, and Access Changes.....	4-84
4.15.1	Right-of-Way Acquisitions for Kea'au-Pāhoa Road .....	4-84
4.15.2	Right-of-Way Acquisitions for Roundabouts .....	4-85
4.15.3	Right-of-Way Acquisitions From Access Management.....	4-86

4.15.4	Relocations.....	4-87
4.15.5	Mitigation of Right-of-Way Acquisition Impacts .....	4-88
4.15.6	Private Use of Public Right-of-Way.....	4-89
4.15.7	Changes to Property Access.....	4-89
4.16	Construction Impacts.....	4-90
4.16.1	Construction-Related Air Quality.....	4-91
4.16.2	Construction Noise.....	4-92
4.16.3	Construction Impacts on Surface Waters .....	4-92
4.16.4	Construction Impacts on Vegetation .....	4-93
4.16.5	Construction Impacts on Traffic and Property Access.....	4-93
4.16.6	Construction Impacts on Bicycles, Pedestrians, and Transit .....	4-94
4.16.7	Construction Impacts on Utilities .....	4-94
4.16.8	Construction Impacts from Hazardous Materials.....	4-94
4.16.9	Construction Impacts on Cultural Resources.....	4-94
4.16.10	Construction Impacts on Lava Tubes .....	4-95
4.16.11	Economic Effects of Construction .....	4-95
4.17	Laws, Permits, Orders and Approvals.....	4-96
4.17.1	Federal .....	4-96
4.17.1.1	National Environmental Policy Act (NEPA) of 1970.....	4-96
4.17.1.2	US Department of Transportation Act of 1966 .....	4-96
4.17.1.3	Section 6(f) of the Land and Water Conservation Fund Act of 1965.....	4-96
4.17.1.4	Uniform Relocation Assistance & Real Property Acquisition Act of 1970.....	4-96
4.17.1.5	Title VI of the Civil Rights Act of 1964.....	4-96
4.17.1.6	Americans with Disabilities Act of 1990 .....	4-97
4.17.1.7	Executive Order 12898: Environmental Justice .....	4-97
4.17.1.8	Section 106 of the National Historic Preservation Act of 1966.....	4-97
4.17.1.9	Historic Bridge Program.....	4-98
4.17.1.10	Coastal Zone Management Act of 1972 .....	4-98
4.17.1.11	Endangered Species Act of 1973 .....	4-98
4.17.1.12	Migratory Bird Treaty Act of 1918.....	4-98
4.17.1.13	Clean Water Act of 1972.....	4-99
4.17.1.14	Executive Order 11990: Protection of Wetlands.....	4-99
4.17.1.15	Executive Orders 11988 and 12148: Floodplain Management .....	4-100
4.17.1.16	Executive Order 13112: Invasive Species .....	4-100
4.17.1.17	Farmland Protection Policy Act of 1981 .....	4-100
4.17.1.18	Clean Air Act and Amendments.....	4-100
4.17.1.19	RCRA and CERCLA .....	4-100
4.17.2	State of Hawai'i.....	4-101
4.17.2.1	Hawai'i Revised Statutes, Act 343 .....	4-101
4.17.2.2	State Land Use Law, Chapter 205 .....	4-101
4.17.2.3	Stream Channel Alteration Permit.....	4-101
4.17.2.4	Coastal Zone Management Act, Chapter 205A, Hawai'i Revised Statutes.....	4-101

---

4.17.2.5	Act 50, Cultural Practices .....	4-102
4.17.2.6	Underground Injection Control Permit.....	4-102
4.17.2.7	Noise Control Permit or Variance .....	4-102
4.17.3	County of Hawai'i.....	4-103
4.17.4	Summary of Permits and Approvals Needed.....	4-103
4.18	Coastal Zone Management Consistency Determination .....	4-103
4.18.1	Recreational Resources.....	4-104
4.18.1.1	CZM Objective for Recreational Resources .....	4-104
4.18.1.2	CZM Policies for Recreational Resources.....	4-104
4.18.1.3	Recreational Resources Discussion.....	4-105
4.18.2	Historic Resources.....	4-105
4.18.2.1	CZM Objective for Historic Resources .....	4-105
4.18.2.2	CZM Policies for Historic Resources.....	4-105
4.18.2.3	Historic Resources Discussion.....	4-105
4.18.3	Scenic and Open Space Resources.....	4-106
4.18.3.1	CZM Objective for Scenic and Open Space Resources .....	4-106
4.18.3.2	CZM Policies for Scenic and Open Space Resources.....	4-106
4.18.3.3	Scenic and Open Space Resources Discussion.....	4-106
4.18.4	Coastal Ecosystems.....	4-107
4.18.4.1	CZM Objective for Coastal Ecosystems.....	4-107
4.18.4.2	CZM Policies for Coastal Ecosystems.....	4-107
4.18.4.3	Coastal Ecosystems Discussion .....	4-107
4.18.5	Economic Uses .....	4-108
4.18.5.1	CZM Objective for Economic Uses .....	4-108
4.18.5.2	CZM Policies for Economic Uses .....	4-108
4.18.5.3	Economic Uses Discussion .....	4-108
4.18.6	Coastal Hazards.....	4-109
4.18.6.1	CZM Objective for Coastal Hazards .....	4-109
4.18.6.2	CZM Policies for Coastal Hazards.....	4-109
4.18.6.3	Coastal Hazards Discussion .....	4-109
4.18.7	Managing Development .....	4-109
4.18.7.1	CZM Objective for Managing Development .....	4-109
4.18.7.2	CZM Policies for Managing Development .....	4-109
4.18.7.3	Managing Development Discussion.....	4-110
4.18.8	Public Participation .....	4-110
4.18.8.1	CZM Objective for Public Participation.....	4-110
4.18.8.2	CZM Policies for Public Participation .....	4-111
4.18.8.3	Public Participation Discussion .....	4-111
4.18.9	Beach Protection.....	4-111
4.18.9.1	CZM Objective for Beach Protection .....	4-111
4.18.9.2	CZM Policies on Beach Protection .....	4-111
4.18.9.3	Beach Protection Discussion.....	4-111
4.18.10	Marine Resources .....	4-112

4.18.10.1	CZM Objective for Marine Resources .....	4-112
4.18.10.2	CZM Policies on Marine Resources .....	4-112
4.18.10.3	Discussion on Marine Resources .....	4-112
4.19	Indirect and Cumulative Impacts .....	4-112
4.19.1	Indirect Impacts .....	4-113
4.19.1.1	Induced Growth .....	4-113
4.19.1.2	Land Use Changes .....	4-114
4.19.1.3	Induced Traffic .....	4-114
4.19.1.4	Fiscal Effects .....	4-115
4.19.2	Cumulative Impacts .....	4-115
4.19.2.1	Vegetation and Wildlife Habitat .....	4-116
4.19.2.2	Water Resources .....	4-116
4.19.2.3	Archaeological/Historic Resources and Cultural Practices .....	4-117
4.19.2.4	Geological Resources .....	4-117
4.19.2.5	Visual Quality .....	4-117
4.19.2.6	Environmental Justice Communities .....	4-117
4.19.2.7	Community Cohesion .....	4-118
4.19.2.8	Right-of-Way Impacts .....	4-118
4.20	Relationship Between Short Term Uses and Long Term Productivity .....	4-118
4.21	Irreversible & Irretrievable Commitments of Resources .....	4-119
4.22	Summary of Impacts and Mitigation Commitments .....	4-120
<b>CHAPTER 5: SECTION 4(F) EVALUATION .....</b>		<b>5-1</b>
5.1	Proposed Action .....	5-2
5.1.1	Project Description .....	5-2
5.1.2	Project Purpose and Need .....	5-2
5.1.3	Project Alternatives .....	5-3
5.2	1930s Era Concrete Bridge .....	5-4
5.2.1	Section 4(f) Property .....	5-4
5.2.2	Impacts on 1930s Era Concrete Bridge .....	5-5
5.2.3	Avoidance Alternatives .....	5-5
5.2.4	Measures to Minimize Harm .....	5-5
5.2.5	Coordination .....	5-5
5.3	Sacred Heart Church Cemetery .....	5-5
5.3.1	Section 4(f) Property .....	5-5
5.3.2	Impacts on Sacred Heart Church Cemetery .....	5-6
5.3.3	Avoidance Alternatives .....	5-6
5.3.4	Measures to Minimize Harm .....	5-7
5.3.5	Coordination .....	5-7
<b>CHAPTER 6: DETERMINATION OF SIGNIFICANCE .....</b>		<b>6-1</b>
6.1	Findings Under Hawai'i Chapter 343 .....	6-1
6.1.1	Significance Criteria .....	6-1
6.1.2	Determination of Significance Under Chapter 343 .....	6-6

---

6.2	Finding of No Significant Impact Under NEPA Process.....	6-6
<b>CHAPTER 7: PUBLIC INVOLVEMENT AND AGENCY CONSULTATION.....</b>		<b>7-1</b>
7.1	Community Participation and CSS Process.....	7-1
7.1.1	Kea'au-Pāhoa Road Advisory Group (KPAG).....	7-1
7.1.2	Public Information Meetings and Public Review .....	7-3
7.1.3	Project Website.....	7-3
7.2	Comments and Responses on the Draft EA.....	7-3
7.3	Agency Consultation .....	7-5
7.4	Pre-Assessment Consultation .....	7-6
<b>CHAPTER 8: LIST OF PREPARERS .....</b>		<b>8-1</b>
<b>CHAPTER 9: REFERENCES .....</b>		<b>9-1</b>
Appendix A:	Roadway Design Plans for Proposed Action .....	A-1
Appendix B:	Agency Consultation and Public Comments .....	B-1
Appendix B-1:	Agency Consultation on the Draft EA .....	B-1
Appendix B-2:	Citizen Comments and Responses on the Draft EA .....	B-59
Appendix B-3:	Public Hearing Testimony .....	B-103
Appendix B-4:	Pre-Consultation Comments Received .....	B-181
Appendix C:	Traffic Study .....	B-1
Appendix D:	Water Quality and Aquatics.....	D-1
Appendix D-1:	Addendum to Draft EA Aquatics Study .....	D-1
Appendix D-2:	Draft EA Aquatics Study .....	D-2
Appendix E:	Noise Study .....	E-1
Appendix F:	Air Study.....	F-1
Appendix G:	Social Impact Assessment.....	G-1
Appendix H:	Fauna Study.....	H-1
Appendix I:	Botanical Study .....	I-1
Appendix I-1:	Addendum to Draft EA Botanical Study.....	I-1
Appendix I-2:	Botanical Study in Draft EA.....	I-2
Appendix J:	Archaeological Inventory Survey .....	J-1
Appendix J-1:	Addendum to Draft EA Archaeological Inventory Survey.....	J-1
Appendix J-2:	Draft EA Archaeological Inventory Survey.....	J-3
Appendix K:	Cultural Impact Assessment .....	K-1
Appendix L:	Culvert Drainage Study .....	L-1
Appendix M:	Pavement Drainage Report & BMP Assessment .....	M-1
Appendix N:	Farmland Conversion Impact Rating Form .....	N-1
Appendix O:	Section 7 Documentation .....	O-1

## LIST OF FIGURES

Figure 1-1: Project Study Area .....	1-2
Figure 2-1: Preferred Alternative.....	2-3
Figure 2-2: Typical Cross Section Under Preferred Alternative .....	2-5
Figure 2-3: Access Management Changes Along Kea'au-Pāhoa Road .....	2-7
Figure 2-4: U-Turn Options Under Project Alternatives .....	2-8
Figure 2-5: Alternative 3 .....	2-22
Figure 2-6: Typical Cross Section for Two-Lane Segments .....	2-23
Figure 2-7: Alternative 5 .....	2-24
Figure 2-8: Typical Cross Section for Six-Lane Segment .....	2-26
Figure 3-1: Puna Subdivisions By Year of Establishment.....	3-2
Figure 3-2: Hawaii County Land Use Pattern Allocation Guide (LUPAG).....	3-4
Figure 3-3: County of Hawaii Zoning.....	3-5
Figure 3-4: PCDDP Proposed Town and Village Center Locations .....	3-6
Figure 3-5: DHHL Lands Near Kea'au-Pāhoa Road.....	3-10
Figure 3-6: Representations of Level of Service Along a Multi-Lane Highway .....	3-12
Figure 3-7: Representations of Levels of Service for Stop-Sign Controlled Intersections.....	3-16
Figure 3-8: Immediate Study Area Communities .....	3-32
Figure 3-9: Common Outdoor and Indoor Sound Levels in dBA.....	3-42
Figure 3-10: Noise Measurement Locations Along Kea'au-Pāhoa Road .....	3-45
Figure 3-11: Noise Monitoring Locations Near Access Management Roadways .....	3-46
Figure 3-12: Unnamed Stream and Tributary Location .....	3-55
Figure 3-13: Lava Flows Surrounding Project Corridor .....	3-60
Figure 3-14: Location of Kazumura and Pāhoa Lava Tube Caves Relative to Project Corridor .	3-62
Figure 3-15: USGS Lava Flow Hazard Zones.....	3-64
Figure 3-16: Abandoned 1930s-Era Concrete Bridge, View to Northeast.....	3-70
Figure 3-17: Abandoned 1930s-Era Concrete Bridge, Close-up View to North.....	3-70
Figure 3-18: View of Existing Kea'au-Pāhoa Road to Southeast from Abandoned Bridge .....	3-71
Figure 3-19: Asphalt-Paved Roadway at Southeastern End Abandoned Bridge, View to South .....	3-71
Figure 3-20: Path of Meditation, Sacred Heart Catholic Church, View to Northwest.....	3-73
Figure 3-21: Placard on Path of Meditation Showing Family Who Helped Construct Path .....	3-73
Figure 3-22: Sacred Heart Catholic Church Path of Meditation, View to South .....	3-74
Figure 3-23: Sacred Heart Path of Meditation and Kea'au-Pāhoa Road, View to North .....	3-74
Figure 3-24: Agricultural Lands of Significance to the State of Hawai'i (ALISH) .....	3-78
Figure 4-1: Hawai'i Maximum Permissible Sound Levels for Various Zoning Districts.....	4-55
Figure 4-2: Typical Sound Levels from Construction Equipment.....	4-56

## LIST OF TABLES

Table 1-1: Top Five Percent Intersections in Hawaii With Most Severe Safety Needs .....	1-6
Table 1-2: General Summary of Crashes on Kea'au-Pāhoa Road 2004 - 2007 .....	1-7
Table 1-3: Summary of Intersection Crashes on Kea'au-Pāhoa Road, 2004-2007 .....	1-8
Table 1-4: Summary of Kea'au-Pāhoa Road Crashes by Segment, 2004 - 2007.....	1-9
Table 1-5: Existing (2006) Roadway Segment Volumes, Level of Service and Capacity.....	1-12
Table 1-6: Volumes, Level of Service and Capacity, 2038 No-Build Conditions, Between Intersections .....	1-14
Table 1-7: Existing LOS and V/C, AM Peak Hour, Year 2006, Study Corridor Intersections .....	1-15
Table 1-8: Existing LOS and V/C, PM Peak Hour, Year 2006, Study Corridor Intersections .....	1-17
Table 1-9: No-Build LOS and V/C, AM Peak Hour, Year 2038, Study Corridor Intersections ....	1-18
Table 1-10: No-Build LOS and V/C, PM Peak Hour , Year 2038, Study Corridor Intersections..	1-19
Table 1-11: Ridership Increase on Hele-On Bus Routes, 2008-2009 .....	1-20
Table 1-12: Estimated Average Daily Traffic (ADT) on Keaau - Pāhoa Road, 2006-2038 .....	1-23
Table 1-13: Summary of KPAG's Purpose and Need for the Proposed Project.....	1-29
Table 2-1: Reduction in Intersection Turning Movements at Right-In-Right-Out Intersections	2-10
Table 2-2: Turn Lane Additions or Lengthening Under the Preferred Alternative .....	2-16
Table 2-3: Estimated Development Timeline for Commercial Centers in PCDP .....	2-18
Table 2-4: Improvements in Kea'au-Pāhoa Shoulder Lane Conversion Project .....	2-20
Table 2-5: Preliminary Estimated Project Construction Costs for Alternatives, 2011 Dollars ..	2-27
Table 3-1: PCDP General Use and Design Criteria by Village/Town Center Type.....	3-8
Table 3-2: Volumes, Capacity and LOS Along Corridor, Existing Year (2006), AM Peak Hour...	3-13
Table 3-3: Volumes, Capacity and LOS Along Corridor, Existing Year (2006), PM Peak Hour ...	3-14
Table 3-4: Existing LOS and V/C, AM Peak Hour, Year 2006, Study Corridor Intersections .....	3-17
Table 3-5: Existing LOS and V/C, PM Peak Hour, Year 2006, Study Corridor Intersections .....	3-18
Table 3-6: Total Daily Delay in Project Corridor, Kea'au-Pāhoa Road and Cross-Streets.....	3-19
Table 3-7: Top Five Percent Intersections in Hawaii With Most Severe Safety Needs .....	3-20
Table 3-8: Kea'au - Pāhoa Road Intersection Crash Types and Rates, 2004-2007 .....	3-21
Table 3-9: Kea'au-Pāhoa Road Crash Numbers and Rates Between Intersections, 2004-2007	3-23
Table 3-10: Kea'au-Pāhoa Road Crash Types, Segments Between Intersections, 2004-2007 ..	3-24
Table 3-11: Population in Hawai'i County and Puna District, 1970 to 2000 .....	3-26
Table 3-12: Housing Units in Hawai'i County and Puna District, 1970 to 2000 .....	3-27
Table 3-13: Selected Characteristics of Puna District, 2000 .....	3-28
Table 3-14: Income Distribution and Poverty Levels, Puna Households and Families, 2000 Census .....	3-29
Table 3-15: Race of Hawai'i County and Puna Residents, 2000 .....	3-30
Table 3-16: Hawaii County General Plan Projections, 2020 .....	3-30
Table 3-17: Income Distribution and Poverty Levels of Households and Families in the Immediate Study Area, 2000 Census.....	3-33
Table 3-18: Race of Immediate Study Area Residents, 2000 Census .....	3-35
Table 3-19: Current and Projected Enrollments for Kea'au and Pāhoa Complex Public Schools ....	3-38

Table 3-20: FHWA and HDOT Noise Abatement Criteria.....	3-43
Table 3-21: Calculated 2006 Peak Hour Noise Levels on Access Management Roadways.....	3-49
Table 3-22: Parcels With Agricultural Activity Directly Bordering Study Corridor .....	3-79
Table 4-1: Volumes, Level of Service and Capacity, 2038 No-Build Conditions, Between Intersections .....	4-15
Table 4-2: 2038 No-Build, Operational Speeds on Approaches to Intersections .....	4-16
Table 4-3: Volumes, Level of Service and Capacity, 2038, Preferred Alternative, Between Intersections .....	4-17
Table 4-4: 2038 Preferred Alternative, Operational Speeds on Approaches to Intersections..	4-19
Table 4-5: No-Build LOS and V/C, AM Peak Hour, Year 2038, Study Corridor Intersections ....	4-22
Table 4-6: No-Build LOS and V/C, PM Peak Hour , Year 2038, Study Corridor Intersections....	4-23
Table 4-7: Preferred Alternative LOS and V/C, AM Peak Hour, Year 2038, Study Corridor Intersections .....	4-25
Table 4-8: Preferred Alternative LOS and V/C , PM Peak Hour , Year 2038, Study Corridor Intersections .....	4-26
Table 4-9: Levels of Service and V/C Ratios for Side Street Intersections in Study Corridor for the Preferred Alternative for Year 2038 for AM Peak Hour .....	4-27
Table 4-10: Levels of Service and V/C Ratios for Side Street Intersections in Study Corridor for the Preferred Alternative for Year 2038 for PM Peak Hour .....	4-28
Table 4-11: Modeled One-Hour CO Concentrations at Corridor Intersections (mg/m <sup>3</sup> ) .....	4-44
Table 4-12: Modeled Eight-Hour CO Concentrations at Corridor Intersections (mg/m <sup>3</sup> ).....	4-45
Table 4-13: Results of Mesoscale Analysis .....	4-46
Table 4-14: Calculated Change in Noise Level from Existing to 2038 Along Access Management Roadways .....	4-52
Table 4-15: Right-of-Way Impacts on Parcels with Agricultural Activity Bordering Corridor ...	4-76
Table 4-16: Estimated Right-of-Way Acquisitions on Kea'au-Pāhoa Road Under Project Alternatives.....	4-84
Table 4-17: Right of Way Acquisition and Relocations Associated With Access Management Concepts .....	4-87
Table 4-18: Estimated Changes to Driveway Access with Build Alternatives.....	4-90
Table 4-19: Summary of Permits and Approvals Needed.....	4-103
Table 4-20: Summary of Impacts and Mitigation Commitments .....	4-121
Table 6-1: Summary of Impacts and Mitigation Commitments Resulting in FONSI.....	6-7

## PURPOSE FOR FINAL ENVIRONMENTAL ASSESSMENT

The 9.5 miles of Kea'au-Pāhoa Road, State Route 130 (SR 130) between the Kea'au Bypass and Pāhoa-Kapoho Road are in need of improvement. Safety is a paramount concern, as the corridor includes several intersections that have among the highest crash rates in the state. The highway is extremely congested during peak traffic hours, and motorists are subjected to lengthy delays. Pedestrians, bicyclists, and transit users are poorly served by the existing facility.

The Hawai'i Department of Transportation (HDOT) has proposed improvements to Kea'au-Pāhoa Road to address these problems in the Final Environmental Assessment (Final EA) for the Kea'au-Pāhoa Road Improvements Project. To ensure that the community had a direct, ongoing role in influencing the outcome of the project, HDOT implemented a well-received Context Sensitive Solutions (CSS) approach. The Kea'au-Pāhoa Road Advisory Group (KPAG), which reflects a diverse group of stakeholders in the community, has collaborated with HDOT as part of the CSS effort. With the extensive community involvement for this project, HDOT was able to move forward with selection of the Preferred Alternative reflective of the community input.

The Kea'au-Pāhoa Road Improvements Project is intended to be funded with both state and federal funds and therefore, the project's Draft Environmental Assessment (Draft EA) and Final EA fulfill the requirements of the National Environmental Policy Act (NEPA) and Chapter 343 Chapter 343 of the Hawai'i Revised Statutes; Title 11, Chapter 200 of the Hawai'i Administrative Rules.

Notification on the availability of the Draft EA was provided on May 23, 2010 in the Office of Environmental Quality Control's (OEQC) *The Environmental Notice*, and copies of the Draft EA were distributed to interested parties. The Draft EA was made available:

- Online through the OEQC's website and the project website
- In hard copy form provided to local libraries and, upon request, to individuals
- Via CDs mailed to recipients

The purposes of this Final EA are:

- To document agency consultation on the project
- To respond to comments received from the community on the Draft EA
- To document the process involved in the environmental assessment
- To identify the Preferred Alternative that was selected based on community comment and minimization/mitigation of environmental impact
- To consider new issues and changes to the project since publication of the Draft EA, and
- To establish that there are no significant impacts, and that a Finding of No Significant Impact (FONSI) is appropriate so that the project can proceed.

## Agency Consultation Process

Stakeholders from county, state, federal agencies were consulted throughout the Draft EA and Final EA processes. Pre-assessment comments were solicited from agencies to help provide input and guidance on issues that should be considered in the Draft EA. A total of 15 agencies responded as shown in **Appendix B-1: Agency Consultation on the Draft EA**.

Copies of the Draft EA were sent to stakeholder agencies and comments were requested. A total of 17 agencies (one federal, 11 state, and five county) provided input on the project. No agencies cited opposition to the project. Consultation processes that are required by state and federal law have been followed on this project. They include consultation with:

- The State Historic Preservation Division (SHPD), required under Section 106 of the National Historic Preservation Act and Hawai'i Revised Statutes Chapter 6E-48. The project will have no effect on a 1930s-era Concrete Slab Bridge over Waipāhoehoe Stream, or on the Sacred Heart Catholic Church cemetery.
- The US Army Corps of Engineers (USACOE), required under Sections 401 and 404 of the Clean Water Act. USACOE determined that there are no Waters of the US under the Corps' jurisdiction in the corridor.
- The US Fish and Wildlife Service, under Section 7 of the Endangered Species Act. No threatened or endangered species were found in the study area. Species known to exist on Hawai'i Island that are of concern will be provided standard mitigation measures to protect them.

Agency consultation with these and other stakeholder agencies will continue as needed through the design and construction processes.

## Response to the Community's Comments on the Draft EA

After the Draft EA's issuance on May 23, 2010, a 60-day public review and comment period was offered through July 23, 2010 to ensure that the public and agency stakeholders had adequate opportunity to review the Draft EA and provide comments that would be included as part of the official administrative record. During the comment period, a public hearing on June 29, 2010 explained the findings of the Draft EA to the public and allowed direct verbal and written testimony on the project. Therefore, interested members of the public were afforded a range of opportunities to comment directly: via the project website, email, mailed letters, verbal testimony at the hearing, and written testimony at the hearing.

In total, 11 comment letters and emails were received from eight citizens. At the public hearing, two individuals provided written testimony and 17 people gave oral testimony. All of the comments and direct responses are shown in **Appendix B-2: Citizen Comments and Responses on the Draft EA**. Comments received from the community were addressed in the Final EA.

The community offered a wide range of comments, which are summarized here and described in greater detail in **Section 7.2: Comments and Responses on the Draft EA**. In particular:

- Commenters universally noted the urgency of the project and the need to expedite its construction to address pressing safety and congestion concerns
- Most commenters supported a four-lane-wide highway, although several commenters wanted the highway to remain two lanes wide with only Transportation Systems Management (TSM) improvements instituted (see **Chapter 2: Alternatives and Proposed Action**)
- Widespread support was shown for improving the corridor for bus travel, pedestrians, and bicycling. Crosswalks were another repeated need.
- Commenters showed mostly support but some opposition to traffic signals at major intersections. Some commenters stated signals were needed to accommodate safe traffic movements at intersections. Others were concerned signals would stop traffic frequently, increasing travel times.
- Many commenters supported roundabouts, citing their benefits and success elsewhere. Several commenters expressed skepticism or opposition, citing confusion to motorists.

## Identification of a Preferred Alternative in Final EA

A Preferred Alternative was selected by HDOT in the effort to reflect agency consultation, the community's comments and minimization of impacts. Prior to documenting the Preferred Alternative in the Final EA, HDOT presented their proposal for the Preferred Alternative to the KPAG for their input and concurrence. The KPAG supported the Preferred Alternative and made one recommendation for a change in access management to occur at Paradise Drive, resulting in traffic being redirected to Orchidland Drive and Uhaloa Avenue.

The justification for selecting the Preferred Alternative is more fully described in **Chapter 2: Alternatives and Proposed Action**. The Preferred Alternative includes the following elements, all of which will be built to current engineering standards:

- Four travel lanes (two in each direction) with a divided median for the entire length between the Kea'au bypass and Pāhoa-Kapoho Road (analyzed as Alternative 4 in the Draft EA).
- The cross section, which generally will fit within a 108-foot right of way, includes eight-foot shoulders/bikeways and a separated five-foot wide pedestrian area.
- Transit improvements, including eight new bus stop pull-out areas.
- Intersection improvements at eight intersections, including five intersections with new signals and three with roundabouts. Right turn lanes and left turn stacking lanes will be provided at intersections where warranted as analyzed in the TSM alternative.
- New construction or modification of nine subdivision roadways to improve access management along the Kea'au-Pāhoa Road corridor, also as analyzed in the TSM

alternative. Motorists will be directed to traffic-controlled intersections containing signals or roundabouts, thereby improving safety and mobility within and between the subdivisions. Access management measures include closing off intersection access points, converting some unsignalized intersections to right-in-right-out access, and extending existing cross-streets with new roads to make four-way intersections that span both sides of the highway.

Due to cost, the Preferred Alternative is expected to be implemented in phases.

## New Issues and Changes in the Final EA

The Final EA reflects new information or changes to the project since the issuance of the Draft EA. The primary changes that are reflected in the Final EA are as follows:

- The Preferred Alternative was selected. With the inclusion of new and improved roadways as part of the access management strategy described in detail in **Section 2.2.2: Access Control Under the Preferred Alternative**, additional analysis was needed to ensure the impacts of these facilities were properly assessed. Therefore, additional study of access management roads was performed for:
  - Noise impacts
  - Traffic impacts
  - Aquatic resources
  - Biological resources
  - Archaeological resources
  - Cultural impacts
- New information was incorporated throughout the Final EA to reflect updated information on community facilities, development plans, relocations, agricultural policy, and other issues raised during agency consultation and in public comments received on the project.

## Finding of No Significant Impact

Environmental impacts of the Proposed Action that have been disclosed and analyzed demonstrate that with proper mitigation, there are no significant impacts that will result from the project. **Chapter 6: Determination** provides the justification for a Negative Declaration, also referred to as a Finding of No Significant Impact (FONSI) per Chapter 343 of the Hawai'i Revised Statutes. At the state level, the FONSI has been submitted by HDOT, the "Proposing Agency" and HDOT will also serve as the "Approving Agency" that recommends a FONSI to the OEQC. At the federal level, upon release of this Final EA, a FONSI is expected from the Federal Highway Administration after a 30-day review period has been completed.

The table that follows provides a summary of impacts and mitigation measures that have contributed to the FONSI. Refer to either **Table 4-20: Summary of Impacts and Mitigation Commitments** for more details on these impacts, or the respective sections of the document listed in the table.

### Summary of Impacts and Mitigation Measures

EA Sec.	Resource/ Issue	Preferred Alternative's Impact	No-Build Alternative's Impact	Mitigation Commitments
4.1	Land Use	Consistent with all plans including Puna CDP	Not consistent with Plans	None needed
4.2	Traffic and Transportation	Greatly improved traffic operations; addresses Purpose and Need of Project	Congestion and delay in corridor worsen; Purpose and Need of Project not met	BMPs during construction to minimize delay
4.3	Social/ Community Impacts	Positive benefits to community	Increased delay and safety concerns	None needed
4.4	Air Quality	Short-term construction phase air quality impacts	None	BMPs to minimize fugitive dust and emissions from equipment
4.5	Noise	Imperceptible increase in noise on main highway compared to No-Build; Some new traffic noise in subdivisions from access changes	None	Construction noise mitigated with permit to control equipment and hours of construction
4.6.1	Flora	Minor strip acquisition of mostly disturbed vegetation; no sensitive botanical resources present	None	Landscaping to provide native, non-invasive species, benefitting biological resources in area
4.6.2	Fauna	Limited habitat; limited potential for adverse impacts on wildlife from vegetation removal at certain times of year or lighting that disorients birds.	None	Shielding of lights and limitations on times of year for vegetation removal to minimize impacts
4.6.3	Aquatic Biota	Minimal impact as habitat and resources are very limited	None	Best Management Practices (BMPs) and National Pollution Discharge Elimination System (NPDES) permit minimize impacts
4.7.1	Surface/ Groundwater	Surface waters very limited in area due to geology. No underground injection.	None	Runoff treatment through BMPs. National Pollution Discharge Elimination System (NPDES) permit
4.7.2	Wetlands	No jurisdictional wetland affected, one small non-jurisdictional area with some wetland characteristics potentially affected	None	Impact minimized as much as possible. Treatment of runoff.
4.7.3	Floodplains & Hydrology	No floodplains mapped in area; drainage will be improved.	Existing flooding problems not improved	Drainage treatments to detain and dispose of runoff. Culverts and bridges improved as needed
4.8	Natural Hazards	Unknown potential for affecting lava tubes. Improved capacity for evacuation.	No effect on lava tubes. Limited capacity for evacuation that will decline over time.	Archaeological monitoring during construction to avoid or minimize effects on breaching lava tubes.

EA Sec.	Resource/ Issue	Preferred Alternative's Impact	No-Build Alternative's Impact	Mitigation Commitments
4.9	Archaeological Resources, Historic Resources and Cultural Practices	No effect on known archaeological or historic resources. Limited potential for affecting unknown resources. Impacts on cultural practices at Maku'u Farmers market minimized.	None	Resources avoided. Archaeological monitoring during construction. A barrier will protect cemetery from construction in adjacent highway right-of-way. Ancient trails will be masked and buffered.
4.10	Parks and Recreation	None	None	None
4.11	Agricultural Lands	Minimal impacts on small strips of land	None	Coordination will take place with the Natural Resources Conservation Service. Work with agricultural property owners to ensure no problems with access changes.
4.12	Visual Environment	Changes to visual character of area. Roundabouts will provide landscaping and aesthetic opportunities.	None	Context Sensitive Solutions (CSS) process involved the community to ensure facility appropriate for area. Landscaping with native species. Streetlights shielded to avoid light pollution per County code.
4.13	Utilities	Relocations of utility poles; water lines end up under roadway; relocation of hydrants.	None	Coordination with utilities and customers to pay for relocations and minimize disruption.
4.14	Hazardous Materials	Very limited potential impacts from hazardous materials.	None	Standard procedures followed if contamination is encountered.
4.15	Right of Way, Relocations, and Access Changes	24.6 acres acquired in 329 parcels for Kea'au-Pāhoa Road itself. Access management measures require acquisition of 5.48 acres in 145 parcels. No relocations. Up to 133 driveways have access limited to right-in-right-out.	None	Fair and just compensation for property acquisition per Uniform Relocation Assistance and Real Property Acquisition Act of 1970.
4.16	Construction Impacts	Construction impacts on air, noise, surface waters, vegetation, erosion, traffic, property access, utilities, cultural resources, etc.	None	Best Management Practices. Construction program will limit night work, provide adequate for nearby/impacted properties, and entail outreach with public.
4.18	Coastal Zone Management Consistency	Consistent with Coastal Zone Management program goals.	None	Mitigative measures cited throughout Final EA.
4.19	Indirect/ Cumulative Impacts	Minimal induced growth and traffic. Cumulative effects on vegetation, wildlife, aesthetics, natural/cultural resources, community cohesion, past right-of-way impacts.	Little direct contribution to indirect or cumulative effects, though increasing congestion and delay.	Mitigative measures cited throughout Final EA.

## CHAPTER 1: PURPOSE AND NEED FOR PROJECT

The Federal Highway Administration (FHWA) in cooperation with the State of Hawai'i Department of Transportation (HDOT) is proposing to improve approximately 9.5 miles of Kea'au-Pāhoa Road, State Route 130 (SR 130). The project corridor includes existing Kea'au-Pāhoa Road, currently a two-lane roadway, from the terminus of the existing four-lane Kea'au Bypass (approximately milepost 2.0) to its intersection with Pāhoa-Kapoho Road (approximately milepost 11.5), as shown in **Figure 1-1: Project Study Area**. Five alternatives have been considered in this document to improve Kea'au-Pāhoa Road. These alternatives and the Proposed Action are outlined in **Chapter 2: Alternatives**.

This Final EA has been prepared to comply with the National Environmental Policy Act (NEPA) of 1969; Chapter 343 of the Hawaii Revised Statutes (HRS); Title 11, Chapter 200 of the Hawai'i Administrative Rules (HAR); and FHWA and Federal Transit Administration Joint Regulations, Environmental Impact and Related Procedures [23 Code of Federal Regulations 771]. Compliance with federal laws is required because of the use of federal funds for construction.

This Final EA addresses comments and responses that were received on the Draft EA, and has made updates and corrections as needed since publication of the Draft EA.

HDOT is anticipating federal funding for the following phases of the project: design, right-of-way, and construction. The Kea'au-Pāhoa Road Improvements, Project # STP-0130(27), will be placed within the federally-required State Transportation Improvement Program (STIP). Currently, the first phase of design is programmed in the Hawaii Department of Transportation, Statewide Transportation Improvement Program (STIP) for Federal Fiscal Year 2012 (October 1, 2011 – September 30, 2012).

Prior to the EA process, HDOT worked extensively with the affected communities to implement a Context Sensitive Solutions (CSS) process. The goal of the CSS effort was to provide an opportunity for community involvement at the earliest stages of the project. The Kea'au-Pāhoa Advisory Group (KPAG) was convened from a diverse group of local stakeholders. As part of the CSS process, the KPAG identified a full range of alternatives, addressed community concerns with those alternatives, and built consensus for the project. The KPAG is described in greater detail in **Section 1.3: Community Participation in Determination of Project Purpose and Need**. The Purpose and Need statement that follows demonstrates the importance of this project and is largely based on the Purpose and Need statement produced by the KPAG.

### 1.1 Purpose and Need for Action

Kea'au-Pāhoa Road (SR 130) is a rural highway functionally classified as a minor arterial. The Federal classification system is a management tool used to assign jurisdictional responsibility, allocate funds, and establish appropriate design standards. This minor arterial is designated as an important highway in a large district, where typical trip lengths are several miles long, and the corridor connects multiple rural, agricultural and urban land uses. The highway is owned by



Source:  
DeLorme 3-D TopoQuads



the State of Hawai'i and is on the Federal Aid Highway system. Local roads, mostly serving residential subdivisions, intersect this highway at over 23 locations. Kea'au-Pāhoa Road serves the Puna District on the Island of Hawai'i. Puna is predominantly rural in character, but it was also platted many years ago for residential development and traffic continues to grow. The area is not fully built out, and it is expected that over the next twenty years, the population will likely more than double, which will further exacerbate the existing traffic congestion. Many trips that begin or end in Puna go to Hilo, which is the primary center for employment and shopping in the region at the present time.

The Puna Regional Circulation Plan (PRCP) (completed in 2005 but never formally adopted) and the Puna Community Development Plan of 2008 (PCDP) identify the need for safety and capacity improvements on this road. The PCDP also calls for a land use scenario known as the "Village Center Concept," which would bring more neighborhood oriented retail and employment into the area, thus relieving the need for some travel out of the district. The PCDP also calls for increased ridesharing and mass transit service, and for an alternate route (known as the Puna Makai Alternate Route, or PMAR) to address both capacity needs and emergency evacuation. Improvements along SR 130 should consider and complement these strategies.

SR 130 is used primarily by residents for commuting to schools, shopping centers, and businesses which may be located outside of Puna. Most residents use some section of the highway on a daily basis and they are acutely aware when congestion occurs and where the greatest highway dangers lie. A few residents use the highway shoulder for biking, running and walking. The Hawaii County bus system, Hele-On, uses the highway to transport its passengers to and from various locations in the Kea'au to Pāhoa area.

SR 130 is also used by agriculture vehicles, school buses and delivery trucks. Non-residents using the highway include truck drivers making deliveries, 'ohana visiting relatives or graveyards, and those who come to the area for recreation and to shop at the Maku'u Farmer's Market and other commercial areas. Visitors using the highway also include tourists who are sightseeing and/or visiting the volcano area at Kalapana to see where the lava flows into the sea.

### **1.1.1 Community Needs**

The KPAG recognized a number of community needs:

- The population base and rate of growth in Puna has been increasing rapidly.
- People take pride in living in Puna, for which a common response is "Malāma Puna." Residents prefer to keep the rural and unique features of the area which they describe as "paradise." The community has many shared values regarding its lifestyle and freedom of movement.
- Any changes should not result in a "this could be anywhere" look; care needs to be taken to not over-design the highway so that it interferes with its rural character and sense of place.

- Improvements on SR 130, whether for safety or capacity or both, need to remain within state-owned right-of-way as much as possible and avoid encroaching onto adjacent property.
- One of the greatest needs of the Puna region is to create a new alternate road. An alternate road provides emergency evacuation, and a different roadway for travel within the district and to Hilo. Improvements for SR 130 are not a substitute for the alternate road, and planning should include connections to a potential alternate road that could be built within the twenty year time horizon.
- Driver behavior is important. Proper driving etiquette includes: a) allowing others to merge; b) providing proper signals; c) making lane changes safely; and, d) driving at a safe speed. As commonly stated, "Drive with aloha." Signage and the design of highway improvements should assist drivers to practice good driving habits.
- Enforcement should be part of the safety program.

### 1.1.2 Project Purpose

To address the regional and community needs cited above, KPAG identified the most important purposes of the Kea'au-Pāhoa Road Improvements. These have been described as:

- Improve Safety. The foremost purpose of the proposed action is to increase safety for all travelers between Kea'au and Pāhoa. The design of the project from a geometric and traffic safety standpoint should address vehicle conflict points along the highway, including intersections and turning points. See **Section 1.1.2.1: Safety** below.
- Provide Mobility and Relieve Congestion. Another primary purpose of this project involves improving regional mobility, local mobility and access, and reducing traffic congestion within the Puna District. See **Section 1.1.2.2: Mobility and Congestion** below.
- Improve Travel for Alternative Modes. An important purpose of this project is to accommodate the transit system, bicyclists and pedestrians, to provide a more balanced transportation system. See **Section 1.1.2.3: Alternative Modes** below.
- Address Future Traffic Increases. Improvements that increase accessibility, mobility and safety for local and regional traffic, including vehicular and non-vehicular modes of travel should be adequate for the next 20 to 30 years. See **Section 1.1.2.4: Future Traffic Increases** below.

In addition to the needs identified by KPAG, there are several other secondary needs that the project proposes to address. Section 6002 of the Safe, Accountable, Flexible Efficient

Transportation Equity Act: A Legacy for Users (SAFETEA-LU) of 2005 (23 USC 139) outlines additional purposes that are relevant to this project:

- Support Future Land Use Objectives. The PCDP, adopted in 2008, envisions a future land use concept concentrating future development into village and town centers to serve the local Puna community and address past sprawl and Hilo-centric patterns of travel.
- Enable Civil Defense, Emergency Travel, and Evacuations. Until an alternate parallel route to Kea'au-Pāhoa Road can be constructed, for now, it provides the only route into and out of Lower Puna. This means that it would serve as the primary evacuation route for Civil Defense needs and it also is the primary route first responders use to reach local subdivisions and transport people to Hilo Medical Center, the region's only hospital. See **Section 1.1.2.6: Civil Defense, Emergency Travel, and Evacuations.**

The following discussion elaborates on these purposes further. The analyses of traffic are based upon a design year of 2038. Refer to **Section 3.2: Traffic and Transportation** for an explanation of why 2038 was used.

### 1.1.2.1 Safety

The Kea'au-Pāhoa Road Corridor has very high crash rates, much higher than the state average. The need to improve safety and reduce the numbers and rates of crashes is a compelling one that has driven much of the public concern for improvements in this corridor. Many residents and visitors perceive Kea'au-Pāhoa Road as a dangerous facility and in many cases, travelers will travel additional distances to avoid making certain traffic movements like left turns because of the perceived danger.

A major safety issue on Kea'au-Pāhoa Road stems from the lack of gaps, or openings in traffic, to accommodate turning or crossing vehicles. There are no gaps because there are no forms of traffic control such as signals or roundabouts that would produce openings in the flow. Heavy volumes results in an almost continuous flow of traffic during peak hours, and in some off-peak conditions as well. Vehicles attempting to turn to or from Kea'au-Pāhoa Road or cross the highway are confronted with a challenge to find an opening, and make risky maneuvers as a result.

HDOT collects crash statistics statewide. Crash statistics reflect only major crashes that are reported to HDOT. Major crashes include those resulting in death, bodily injury, and/or property damage exceeding \$3,000 in cost.

FHWA has initiated a Highway Safety Improvement Program (HSIP) as part of Section 1401 of SAFETEA-LU. As part of this program, FHWA has requested all states to determine the locations within each state that have accident rates in the top five percentile statewide, covering both intersections and highway segments. "Five Percent" reports are produced annually.

In HDOT's 2008 Five Percent Report to FHWA, 79 intersections throughout the State of Hawai'i on the State Highway System had at least three crashes per year for each of the past three years. The top five percentile of these 79 high-crash locations statewide is four intersections,

all four of which are located on the Island of Hawai'i, in the Puna District, and three of which are located along Kea'au-Pāhoa Road: at Ainaloa Boulevard, at Kahakai Boulevard, and at Old Pāhoa Road. Traffic signals were identified in the report as measures to address the first two intersections.

**Table 1-1: Top Five Percent Intersections in Hawaii With Most Severe Safety Needs** summarizes the intersections cited in the 2008 HSIP Five Percent Report for Hawai'i.

**Table 1-1: Top Five Percent Intersections in Hawaii With Most Severe Safety Needs**

Location	Potential Remedies	Estimated Costs	Implementation Impediments	Comments
Volcano Rd @ Old Volcano Rd	n/a	n/a	Will monitor this intersection upon completion of widening project in this area.	n/a
Kea'au-Pāhoa Rd @ Ainaloa Blvd	Traffic Signal Installation recommended	\$600,000	n/a	Proposed HSIP FY 07
Kea'au-Pāhoa Rd @ Kahakai Blvd	Traffic Signal Installation recommended	\$450,000	n/a	Proposed HSIP FY 06
Kea'au-Pāhoa Rd @ Old Pāhoa Rd & Old Government Rd	Project at Kahakai intersection (above) should have positive influence on this location.	n/a	Will monitor this intersection upon completion of project at Kahakai intersection (above).	Cost benefit analysis favors Kahakai Blvd

Source: FHWA, accessed at <http://safety.fhwa.dot.gov/hsip/fivepercent/2008/08hi.htm>

Available crash data from the years 2004 through 2007 has been analyzed as part of the traffic study provided in **Appendix C: Traffic Study**. The following discussion summarizes portions of that report.

**Table 1-2: General Summary of Crashes on Kea'au-Pāhoa Road 2004 - 2007** provides an overview of the crashes that occurred within that four-year period and backs up the Five Percent Report that there is an urgent need to reduce crashes in the corridor. There were a total of 411 crashes, ten fatalities, and 435 injuries in that time period. Since the corridor is approximately 9.5 miles long, that means there are an average of approximately 11 crashes per mile per year, or about one per month per mile of road. Crashes, however, are not distributed evenly along the corridor, but rather are clustered at intersections and other critical locations.

**Table 1-2: General Summary of Crashes on Kea'au-Pāhoa Road 2004 - 2007**

Item	Number
Total number of crashes	411
Total vehicles involved	778
Total with motorcycles involved	7
Total with bicycles involved	2
Total with pedestrians involved	3
Total number of persons injured	435
Total number of persons killed	10

Source: HDOT, as described in **Appendix C: Traffic Study**

The majority of crashes along Kea'au-Pāhoa Road between 2004 to 2007 were located at intersections, specifically 219 crashes out of the 318 total, or 69 percent. A major issue at intersections are gaps, which are not frequent enough and hard for motorists to judge. The rate of crashes shown in the table is the number of crashes per million vehicles entering the intersection, and is the best determinant for showing which locations have the most need for improvement rather than the total number of crashes, since higher-volume locations would be expected to have the highest number of crashes as well. Data was not available to indicate an average statewide rate of crashes at intersections for comparison. However, a rate above 1.0 is usually considered worthy of more detailed review to determine if countermeasures can be identified and implemented. The intersections with the greatest need for improvement are Ainaloa Blvd., Kahakai Blvd., Old Pāhoa Road, Maku'u Drive, Paradise Drive, Orchidland Drive and Pāhoa-Kapoho Road.

As the table also shows, 66 percent of the crashes had either injuries or fatalities. Among intersections having five or more total crashes, the intersections with the highest percentages of crashes with injuries or fatalities were at Maku'u Drive, Pōhaku Place, Shower Drive and Ainaloa Boulevard.

**Table 1-3: Summary of Intersection Crashes on Kea'au-Pāhoa Road, 2004-2007** breaks down the number and severity of crashes.

The rate of crashes shown in the table is the number of crashes per million vehicles entering the intersection, and is the best determinant for showing which locations have the most need for improvement rather than the total number of crashes, since higher-volume locations would be expected to have the highest number of crashes as well. Data was not available to indicate an average statewide rate of crashes at intersections for comparison. However, a rate above 1.0 is usually considered worthy of more detailed review to determine if countermeasures can be identified and implemented. The intersections with the greatest need for improvement are Ainaloa Blvd., Kahakai Blvd., Old Pāhoa Road, Maku'u Drive, Paradise Drive, Orchidland Drive and Pāhoa-Kapoho Road.

**Table 1-3: Summary of Intersection Crashes on Kea'au-Pāhoa Road, 2004-2007**

Intersection of Kea'au-Pāhoa Road at*	Total Crashes	Crash Rate**	Crashes With Injuries	Number of Injuries	Fatal Crashes	Number of Fatalities	Percent Crashes with Injuries or Fatalities
Ainaloa Blvd.	49	2.49	30	53	0	0	61%
Kahakai Blvd.	31	2.45	17	37	0	0	55%
Old Pāhoa Road	40	2.10	21	36	0	0	53%
Maku'u Drive	33	1.57	26	55	0	0	79%
Paradise Drive	27	1.20	17	30	0	0	63%
Orchidland Dr.	21	0.91	11	21	0	0	52%
Pāhoa-Kapoho Road	16	0.83	7	14	0	0	44%
Nanawale Homestead Rd. (Post Office Road)	4	0.62	4	5	1	1	100%
Shower Drive	17	0.48	11	26	0	0	65%
Kaloli Drive	16	0.56	9	15	1	1	56%
Pōhaku Place	9	0.33	6	6	1	1	78%
Aulii Street	4	0.21	3	4	1	1	100%
Kaluahine Street	3	0.16	0	0	0	0	0%
Pōhaku Circle	3	0.12	2	2	0	0	67%
Unnamed Rd.	2	0.31	1	1	0	0	50%
Ilima Street	2	0.11	1	2	0	0	50%
Ka Ohuwalu	2	0.11	2	3	0	0	100%
Kea'au Transfer Station	5	0.14	2	2	0	0	40%
Paved Road	2	0.06	1	1	0	0	50%
Poni Moi Ave. (29 <sup>th</sup> Ave.)	1	0.04	1	2	0	0	100%
Puakalo (30 <sup>th</sup> Ave.)	2	0.07	2	2	0	0	100%
<b>Totals</b>	<b>289</b>	<b>n/a</b>	<b>192</b>	<b>317</b>	<b>4</b>	<b>4</b>	<b>66%</b>

\*Only intersections that had crashes from 2004 - 2007 are shown in this table.

\*\*Crash Rate is in number of crashes per million vehicles entering intersection

Source: **Appendix C: Traffic Study**

As the table also shows, 66 percent of the crashes had either injuries or fatalities. Among intersections having five or more total crashes, the intersections with the highest percentages of crashes with injuries or fatalities were at Maku'u Drive, Pōhaku Place, Shower Drive and Ainaloa Boulevard.

The segments of roadway between intersections also have some dangerous locations for motorists. **Table 1-4: Summary of Kea'au-Pāhoa Road Crashes by Segment, 2004 - 2007** provides a breakdown of crashes in roadway segments between intersections.

**Table 1-4: Summary of Kea'au-Pāhoa Road Crashes by Segment, 2004 - 2007**

From	To	Crash Rate*	Total Crashes	Crashes with Injuries	Number of Injuries	Crashes with Fatalities	Fatalities	Percent with Injuries or Fatalities
Opukahaia	Shower	65.0	45	22	47	1	1	51%
Shower	Pōhaku Place	51.4	8	6	17	1	1	88%
Pōhaku Place	Kaloli	84.3	11	5	6	0	0	45%
Kaloli	Pōhaku Circle	55.4	4	3	3	0	0	75%
Pōhaku Circle	Orchidland	77.6	9	6	9	0	0	67%
Orchidland	Paradise	34.0	2	2	4	0	0	100%
Paradise	Aulii	55.3	4	4	6	0	0	100%
Aulii	Maku'u	47.2	6	2	4	0	0	33%
Maku'u	Ilima	41.9	1	0	0	0	0	0%
Ilima	Ainaloa	26.5	1	1	1	0	0	100%
Ainaloa	Ka Ohuwalu	27.5	5	4	8	0	0	80%
Ka Ohuwalu	Kaluahine	23.1	3	1	2	1	3	67%
Kaluahine	Old Pāhoa	43.4	10	6	7	1	1	70%
Old Pāhoa	Kahakai	105.5	2	2	5	0	0	100%
Kahakai	Nanawale (Post Ofc. Rd)	86.2	3	1	1	0	0	33%
Nanawale (Post Ofc. Rd)	Unnamed	150.1	3	2	2	0	0	67%
Unnamed	Kapoho	134.6	5	2	2	0	0	40%
Totals		57.0	122	68	124	4	6	59%

Source: HDOT

\*Crash Rate is in number of crashes per hundred million vehicle miles of travel

As **Table 1-4: Summary of Kea'au-Pāhoa Road Crashes by Segment, 2004 - 2007** also shows, 59 percent of the accidents between intersections involved injuries or fatalities.

One deficiency of the existing two-lane Kea'au-Pāhoa Road is the relative lack of opportunities for traffic to pass other vehicles. Even in the portions of the corridor striped as a passing zone, heavy traffic volumes preclude motorists from passing slower-moving vehicles during most hours of the day. Motorist frustration with slower-moving vehicles may result in dangerous passing maneuvers, and potential head-on collisions.

The improvements to Kea'au-Pāhoa Road will have a pronounced effect on improving safety in the corridor. The traffic analysis in **Appendix C: Traffic Study** has conservatively calculated a crash reduction figure of at least 25 percent with the Build alternatives, and it is likely that this reduction could be higher. The overall estimate is that at least 22 accidents a year and 25 injuries per year could be avoided with improvements to Kea'au-Pāhoa Road.

Improved safety will result from a number of factors:

- Safer turning movements at traffic-controlled intersections (either a signal or a roundabout)
- Control of access and elimination of left-turn movements away from traffic controlled points with divided medians.
- Provision of turn lanes and acceleration lanes that will offer a refuge for turning traffic and safer turning movements.
- Consistent, improved shoulder areas that will enable bicycles and pedestrians to travel a safe distance from motor vehicles. The shoulders will provide a safer area for disabled vehicles to get out of the stream of traffic.
- Improved opportunity for vehicles of different speeds to pass each other and maintain a safe travel distance apart from each other.

### **1.1.2.2 Mobility and Congestion**

As the only route into and out of Lower Puna, existing congestion on Kea'au-Pāhoa Road already greatly limits mobility, and future traffic volumes are only slated to increase further. Because many lower Puna residents presently travel to Hilo or locations in Puna closer to Hilo for medical care, shopping, work, school, and other needs, Kea'au-Pāhoa Road is of great importance to provide mobility for these basic life needs. The PCDP will try to direct future development towards village and town centers that reduce the area's dependence on the Hilo area and thereby increase Puna's ability to serve these life needs. There will also be future efforts by the County to provide an alternative parallel route, though the timeframe and funding for such a route is indeterminate. Nonetheless, there are already thousands of homes in lower Puna subdivisions, and for the foreseeable future, Kea'au-Pāhoa Road will continue to provide the daily mobility needed by these residents.

Considering the corridor and all intersection approaches, an estimated 480 person-hours of delay from congestion is experienced by travelers in the corridor and at cross-streets during the AM and PM peak hours each weekday (2006 figures), using a national average occupancy of 1.6 persons per vehicle. Strictly from growth in traffic, this level of delay is expected to increase to 4771 person-hours of delay during the AM and PM peak hours each weekday in the design year 2038 (20 years after completion of the entire corridor) if nothing is done to address congestion. If nothing is done to increase capacity in the corridor, congested conditions are likely to spread to a larger portion of the day as volumes increase and motorists choose to travel during non-peak hours.

Level of Service (LOS) is used to describe the overall performance of intersections and roadway segments and cover a scale from A - F. Section 3.2: Traffic and Transportation in the Draft EA explains the concept of Level of Service in much greater detail. In very basic terms, a LOS of A is the optimal performance, with minimal traffic, and LOS F means the roadway or intersection is over capacity and is experiencing heavy delays, slow speeds, and stop-and-go conditions. For Peak Hour conditions, a LOS D is considered acceptable and LOS C is considered desirable.

Another way of considering traffic congestion and operations is the ratio of volume to capacity (V/C) of a roadway. As the volume of traffic approaches the capacity of the road, the V/C gets closer to a value of 1.0. Once volumes have exceeded capacity, V/C is greater than 1.0 and the roadway is in a gridlock condition.

Section 3.2: Traffic and Transportation in the Draft EA also describes the concept of V/C in greater detail.

For the purposes of the traffic analyses, the direction “westbound” means towards Kea'au and Hilo, and the direction “eastbound” is towards Pāhoa and Kalapana. For cross-streets, “northbound” is heading towards the ocean (makai) and “southbound” is heading inland (mauka). The assessment of future-year traffic assumes that the Puna Makai Alternate Route (PMAR) has not been constructed.

As is demonstrated in **Table 1-5: Existing (2006) Roadway Segment Volumes, Level of Service and Capacity**, the existing Kea'au-Pāhoa corridor already experiences heavy congestion during AM and PM peak hours. The worst conditions (LOS E or LOS F or a V/C ratio greater than 0.85) are shown in **bold** in the table. The PM peak hour is most acute, with above-capacity congestion and a LOS F for Pāhoa-bound (eastbound) traffic between the beginning of the project near the merge in Kea'au (Opukahaia Street area) and Pōhaku Circle. Near-capacity conditions (LOS E) are experienced between Pōhaku Circle and Auli'i Drive. The AM peak hour traffic heading towards Kea'au also experiences extreme congestion between Kaloli Drive and Shower Drive (LOS F), and LOS E conditions between Kaloli Drive and Pōhaku Circle. Beyond Shower Drive, the AM congestion is mitigated through the use of the temporary shoulder lane as a travel lane (which will be made permanent as part of the Shoulders Conversion project, see **Section 1.2.2.1: The Kea'au-Pāhoa Road Shoulder Lane Conversion Project.**)

**Table 1-5: Existing (2006) Roadway Segment Volumes, Level of Service and Capacity**

From	To	AM Peak Hour						PM Peak Hour					
		Volume Ebd	Volume Wbd	Ebd V/C	Wbd V/C	Ebd LOS	Wbd LOS	Volume Ebd	Volume Wbd	Ebd V/C	Wbd V/C	Ebd LOS	Wbd LOS
Opukahaia	Transfer Sta	687	2143*	0.49	0.79*	C	D*	1662	740	<b>1.18</b>	0.52	<b>F</b>	C
Transfer Sta	Shower	653	2115*	0.46	0.78*	C	D*	1573	672	<b>1.12</b>	0.48	<b>F</b>	C
Shower	Pōhaku Pl	618	1436	0.44	<b>1.02</b>	C	<b>F</b>	1522	638	<b>1.08</b>	0.45	<b>F</b>	C
Pōhaku Pl	Kaloli Dr.	595	1417	0.42	<b>1.00</b>	C	<b>F</b>	1415	682	<b>1.00</b>	0.48	<b>F</b>	C
Kaloli Dr.	Pōhaku Cr.	491	941	0.44	0.83	C	<b>E</b>	1139	547	<b>1.01</b>	0.48	<b>F</b>	C
Pōhaku Cr.	Orchidland	536	849	0.38	0.60	C	D	1186	556	0.84	0.39	<b>E</b>	C
Orchidland	Paradise	512	954	0.36	0.68	C	D	1180	670	0.84	0.48	<b>E</b>	C
Paradise	Auli'i	527	827	0.47	0.73	C	D	1015	519	<b>0.90</b>	0.46	<b>E</b>	C
Auli'i	Maku'u	491	809	0.35	0.57	C	D	865	536	0.61	0.38	D	C
Maku'u	Ilima	557	837	0.40	0.59	C	D	923	506	0.65	0.36	D	C
Ilima	Ainaloa	558	880	0.40	0.62	C	D	884	536	0.63	0.38	D	C
Ainaloa	Ka Ohuwalu	459	671	0.33	0.48	C	C	761	494	0.54	0.35	C	C
Ka Ohuwalu	Kaluahine	550	674	0.49	0.60	C	D	724	501	0.64	0.44	D	C
Kaluahine	Old Pāhoa	556	661	0.39	0.47	C	C	693	481	0.49	0.34	C	C
Old Pāhoa	Kahakai	402	627	0.29	0.44	B	C	576	377	0.41	0.27	C	B
Kahakai	Nanawale (Post Ofc.)	378	445	0.34	0.39	C	C	369	340	0.33	0.30	C	C
Nanawale (Post Ofc.)	Unnamed	328	405	0.29	0.36	B	C	360	279	0.32	0.25	C	B
Unnamed	Kapoho	322	416	0.29	0.37	B	C	319	285	0.28	0.25	B	B

\*Includes temporary use of shoulder as a travel lane during AM peak hour

Note: LOS worse than LOS D, or V/C ratios greater than 0.85 are displayed in **bold** text.

Source: Roger Dyar, P.E., from HDOT Data

If nothing is done to increase the capacity of the corridor between now and the design year of 2038, the LOS along the corridor is expected to become markedly worse, as shown in **Table 1-6: Volumes, Level of Service and Capacity, 2038 No-Build Conditions, Between Intersections**. In the AM peak hour in 2038, heading towards Kea'au, the corridor will be operating poorly (LOS E or LOS F) for the entire length between Old Pāhoa Road and Shower Drive. Furthermore, even in what is considered the "off peak" direction for the AM hour (towards Pāhoa), much of the corridor between Pōhaku Place and Old Pāhoa Road will be have congested conditions (LOS E or LOS F) and operate poorly. Therefore, mobility in the corridor will be greatly limited for a much longer portion of the day, even in what is not today considered "peak conditions" or in the "peak direction."

A similar, if even more extreme level of congestion is anticipated in the PM Peak Hour in 2038, as the entire corridor heading towards Pāhoa will operate at a LOS F (above capacity) from Old Pāhoa Road back to Shower Drive. Even the segment of roadway between Opukahaia Street and Shower Drive, which has two travel lanes in the peak hour (resulting from the Shoulder Lane Conversion Project) will operate at LOS E because of the lengthy backup ahead of it. It is likely that the Kea'au Bypass will also be adversely impacted by congestion further ahead. The off-peak direction (heading towards Kea'au) will even experience five segments operating at LOS E, approaching capacity.

The performance of many corridor intersections themselves is already poor today, and slated to deteriorate further without improvements. With the exception of the Pāhoa-Kapoho Road intersection, none of the project intersections are currently signalized. (The Shower Drive intersection will be provided a signal as part of the Shoulders Conversion Project). Most intersections have turn lanes that are not adequate in length to accommodate turning vehicles, either along Kea'au-Pāhoa Road, or on cross streets. High traffic levels only add to the problem. In many cases, a particular movement, especially left turns, is especially pronounced as operating at a poor LOS.

As **Table 1-7: Existing LOS and V/C, AM Peak Hour, Year 2006, Study Corridor Intersections** demonstrates, many cross-street intersections have a challenge in navigating turns or through movements during the AM peak hour. The intersections of Kea'au-Pāhoa Road with the Kea'au Transfer Station, Shower/Pōhaku Drive, Pōhaku Place, Kaloli Drive, Orchidland Drive, Ainaloa Boulevard, and Kahakai Boulevard all have movements from the cross streets that operate at an LOS F, meaning that it is extremely difficult for these cross-streets to get a break in traffic to turn, particularly for left turns. Turning traffic will often back up as the first vehicle waits for an opening. Maku'u Drive, Paradise Drive, Auli'i Street and Old Pāhoa Road have cross-street movements functioning at LOS E, which is only marginally better and essentially at capacity. Since traffic on Kea'au-Pāhoa Road has the right-of-way over the stopped traffic at the cross streets, these intersections do not generally limit capacity for through traffic along Kea'au-Pāhoa Road itself, though in one case, the combined westbound left turn and through movement at Ilima Street is over capacity.

**Table 1-6: Volumes, Level of Service and Capacity, 2038 No-Build Conditions, Between Intersections**

From	To	AM Peak Hour						PM Peak Hour					
		Volume Ebd	Volume Wbd	Ebd V/C	Wbd V/C	Ebd LOS	Wbd LOS	Volume Ebd	Volume Wbd	Ebd V/C	Wbd V/C	Ebd LOS	Wbd LOS
Opukahaia	Transfer Sta	837	2646	0.25	0.78	B	D	2792	1249	0.82	0.37	<b>E</b>	C
Transfer Sta	Shower	857	2614	0.61	0.77	D	D	3137	1235	0.93	0.36	<b>E</b>	C
Shower	Pōhaku Pl	900	2001	0.64	1.42	D	<b>F</b>	2409	1082	1.71	0.77	<b>F</b>	D
Pōhaku Pl	Kaloli Dr.	1144	2156	0.81	1.53	<b>E</b>	<b>F</b>	2391	1074	1.70	0.76	<b>F</b>	D
Kaloli Dr.	Pōhaku Cr.	1211	1841	1.07	1.63	<b>F</b>	<b>F</b>	1990	980	1.41	0.87	<b>F</b>	<b>E</b>
Pōhaku Cr.	Orchidland	1295	2093	0.92	1.48	<b>E</b>	<b>F</b>	2158	971	1.53	0.69	<b>F</b>	D
Orchidland	Paradise	1488	2183	1.06	1.55	<b>F</b>	<b>F</b>	2114	1120	1.50	0.79	<b>F</b>	<b>E</b>
Paradise	Auli'i	1167	1705	1.03	1.51	<b>F</b>	<b>F</b>	1944	952	1.72	0.84	<b>F</b>	<b>E</b>
Auli'i	Maku'u	1287	1705	0.91	1.21	<b>E</b>	<b>F</b>	1885	1047	1.34	0.74	<b>F</b>	D
Maku'u	Ilima	1109	1554	0.79	1.10	D	<b>F</b>	1792	891	1.27	0.63	<b>F</b>	D
Ilima	Ainaloa	1233	1734	0.87	1.23	<b>E</b>	<b>F</b>	1792	1052	1.27	0.75	<b>F</b>	D
Ainaloa	Ka Ohuwalu	1393	1666	0.99	1.18	<b>E</b>	<b>F</b>	1678	1118	1.19	0.79	<b>F</b>	<b>E</b>
Ka Ohuwalu	Kaluahine	1303	1697	1.16	1.50	<b>F</b>	<b>F</b>	1568	1038	1.39	0.92	<b>F</b>	<b>E</b>
Kaluahine	Old Pāhoa	1274	1697	0.90	1.20	<b>E</b>	<b>F</b>	1757	1038	1.25	0.74	<b>F</b>	D
Old Pāhoa	Kahakai	687	1190	0.49	0.84	C	<b>E</b>	944	774	0.67	0.55	D	C
Kahakai	Nanawale (Post Ofc.)	543	641	0.48	0.57	C	D	486	508	0.43	0.45	C	C
Nanawale (Post Ofc.)	Unnamed	444	601	0.39	0.53	C	C	453	400	0.40	0.35	C	C
Unnamed	Kapoho	459	582	0.41	0.52	C	C	466	366	0.41	0.32	C	C

Note: LOS worse than LOS D are displayed in **bold** text.

Source: Roger Dyar, P.E., from HDOT Data

**Table 1-7: Existing LOS and V/C, AM Peak Hour, Year 2006, Study Corridor Intersections**

Intersection with Kea'au-Pāhoa Road			Individual Traffic Movements											
Cross Street	Traffic Control	Overall LOS	Eastbound			Westbound			Northbound			Southbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Opukahaia St.	Stop			0.47		A	0.71		C		C			
Kea'au Transfer Station	Stop		C	0.44			0.71					F		F
Shower Drive	Stop		C	0.41		A	0.96		F			F		
Pōhaku Place	Stop			0.42		A	0.64		F		F			
Kaloli Drive	Stop		B	0.32			0.64					F		
Pōhaku Circle	Stop			0.33		A	0.57		C					
Orchidland Dr.	Stop			0.32	0.05	A	0.59		F					
Paradise Drive	Stop		A	0.29			0.40	0.03				E		
Auli'i Street	Stop			0.35	0.01	A	0.54		E					
Maku'u Drive	Stop		B	0.28			0.39	0.17				E		
Ilima Street	Stop			0.38		<b>1.06</b>			D		D			
Ainaloa Blvd.	Stop			0.30	0.08	A	0.41		F					
Ka Ohuwalu	Stop		A	0.39			0.46					C		C
Kaluahine St.	Stop		A	0.36		A	0.45		D			C		
Old Pāhoa Rd.	Stop			0.23	0.15	A	0.35		E		E			
Kahakai Blvd.	Stop		A	0.17			0.24	0.06				F		
Nanawale Homestead Rd (Post Office Rd.)	Stop		A			A			C			C		
Unnamed Road	Stop		A			A			A			A		
Kapoho Rd.	Signal	C	D	C	C	C	C	C	A	A		B	B	

Notes: LOS worse than LOS D, or V/C ratios greater than 0.85 are displayed in **bold** text.

Where a number is given for an individual movement, HCM does not provide a LOS Value, in which case the value displayed is the v/c ratio.

Traffic movements that do not exist are shaded in grey.

Source: SSFM International and Roger Dyar, P.E., from HDOT Data.

**Table 1-8: Existing LOS and V/C, PM Peak Hour, Year 2006, Study Corridor Intersections** demonstrates a similar situation in the PM Peak hour. Opukahaia Street, the Kea'au Transfer Station, Shower Drive/Pōhaku Drive, Pōhaku Place, Kaloli Drive, Orchidland Drive, and Paradise Drive all have movements over capacity, at Level of Service F, greatly hindering the mobility of turning traffic from these cross-streets. Pōhaku Circle, Maku'u Drive, Ainaloa Boulevard, and Old Pāhoa Road all have movements functioning at LOS E. Again, the intersections do not generally create problems for through traffic on Kea'au-Pāhoa Road itself, although the eastbound approach to the intersection at Opukahaia Street is over capacity, a function of high volumes leaving Kea'au within a single travel lane.

These challenging conditions for turning or crossing traffic result in motorists often having to make risky maneuvers.

As poor as the intersections perform currently, the operations at intersections in 2038 will be even more deficient. As seen in **Table 1-9: No-Build LOS and V/C, AM Peak Hour, Year 2038, Study Corridor Intersections**, the AM peak hour has LOS E or worse and/or V/C ratios over 0.85 for the westbound direction for the seven mile distance between Kaluahine Drive and Opukahaia Street. The only exception is one approach to Maku'u Drive, which would operate at an acceptable level of service. Almost all side street approaches between Kaluahine Drive and Opukahaia Street will operate at LOS E or worse for the AM peak hour.

The next table, **Table 1-10: No-Build LOS and V/C, PM Peak Hour , Year 2038, Study Corridor Intersections**, shows that the PM peak hour has even greater congestion problems in the eastbound direction. From Opukahaia Street to Kaluahine Street, the V/C ratios for the eastbound movements are all above 0.85, with all but two being over 1.0. Almost every side street movement has LOS E or worse in the PM Peak hour. In essence, it will be extremely difficult for cross-street traffic to safely turn onto Kea'au-Pāhoa Road in a reasonable amount of time.

As discussed in greater detail in **Section 4.2: Traffic and Transportation**, there will also be congestion in interim years (2018, 2028) as well. The proposed improvements in the corridor will greatly alleviate regional mobility by reducing congestion in the corridor.

**Table 1-8: Existing LOS and V/C, PM Peak Hour, Year 2006, Study Corridor Intersections**

Intersection with Kea'au-Pāhoa Road			Individual Traffic Movements											
Cross Street	Traffic Control	Overall LOS	Eastbound			Westbound			Northbound			Southbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Opukahaia St.	Stop			<b>1.09</b>		C	0.49		F		F			
Kea'au Transfer Station	Stop		A	1.03			0.48					F		F
Shower Drive	Stop		A	0.96		B	0.41		F			D		
Pōhaku Place	Stop			1.01		B	0.44		F		F			
Kaloli Drive	Stop		B	0.73			0.37					F		
Pōhaku Circle	Stop			0.75		B	0.36		E					
Orchidland Dr.	Stop			0.71	0.08	B	0.37		F					
Paradise Drive	Stop		A	0.62			0.30	0.04				F		
Auli'i Street	Stop			0.65	0.02	B	0.35		E					
Maku'u Drive	Stop		A	0.48			0.28	0.05				E		
Ilima Street	Stop			0.61		0.89			D		D			
Ainaloa Blvd.	Stop			0.42	0.16	B	0.27		E					
Ka Ohuwalu	Stop		A	0.50			0.33					C		C
Kaluahine St.	Stop		A	0.48		A	0.32		B			C		
Old Pāhoa Rd.	Stop			0.27	0.19	B	0.17		E		E			
Kahakai Blvd.	Stop		A	0.21			0.16	0.06				D		
Nanawale Homestead Rd (Post Office Rd.)	Stop		A			A			C			A		
Unnamed Road	Stop		A			A			A			C		
Kapoho Rd.	Signal	B	C	C	C	C	C	C	A	A		B	B	

Notes: LOS worse than LOS D, or V/C ratios greater than 0.85 are displayed in **bold** text.

Where a number is given for an individual movement, HCM does not provide a LOS Value, in which case the value displayed is the v/c ratio.

Traffic movements that do not exist are shaded in grey.

Source: SSFM International and Roger Dyar, P.E., from HDOT Data

**Table 1-9: No-Build LOS and V/C, AM Peak Hour, Year 2038, Study Corridor Intersections**

Intersection with Kea'au-Pāhoa Road			Individual Traffic Movements											
Cross Street	Traffic Control	Overall LOS	Eastbound			Westbound			Northbound			Southbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Opukahaia St.	Stop			0.60		B	<b>0.88</b>		D		D			
Kea'au Transfer Station	Stop		E	0.58			<b>0.87</b>					F		F
Shower Drive	Signal*	F	A	A	A	A	F		D			F		
Pōhaku Place	Stop			0.61		B	<b>1.44</b>		F		F			
Kaloli Drive	Stop		F	0.62			<b>1.24</b>					F		F
Pōhaku Circle	Stop			0.83		B	<b>1.40</b>		F		F			
Orchidland Dr.	Stop			0.76	0.11	C	<b>1.36</b>		F		F			
Paradise Drive	Stop		F	0.82			<b>1.07</b>	0.08				F		F
Auli'i Street	Stop			0.77	0.02	B	<b>1.19</b>		F		F			
Maku'u Drive	Stop		D	0.73			0.73	0.33				F		F
Ilima Street	Stop			0.75			<b>3.61</b>		F		F			
Ainaloa Blvd.	Stop			0.68	0.18	C	<b>1.03</b>		F		F			
Ka Ohuwalu	Stop		C	<b>0.93</b>			<b>1.15</b>					F		F
Kaluahine St.	Stop		A	<b>0.86</b>	0.02	B	<b>1.11</b>		F		F	F		F
Old Pāhoa Rd.	Stop			0.53	0.34	C	0.66		F		F			
Kahakai Blvd.	Stop		B	0.29			0.35	0.09				F		F
Nanawale Homestead Rd (Post Office Rd.)	Stop		0.69			0.70			F			F		
Unnamed Road	Stop		0.55			0.63			A			A		
Kapoho Rd.	Signal	F	C	D	C	E	F	D	C	B		B	F	

Notes: LOS worse than LOS D, or V/C ratios greater than 0.85 are displayed in **bold** text.

Where a number is given for an individual movement, HCM does not provide a LOS Value, in which case the value displayed is the v/c ratio.

Traffic movements that do not exist are shaded in grey.

\*Installed as part of the Shoulders Conversion Project.

Source: SSFM International and Roger Dyar, P.E., from HDOT Data

**Table 1-10: No-Build LOS and V/C, PM Peak Hour , Year 2038, Study Corridor Intersections**

Intersection with Kea'au-Pāhoa Road			Individual Traffic Movements											
Cross Street	Traffic Control	Overall LOS	Eastbound			Westbound			Northbound			Southbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Opukahaia St.	Stop			<b>1.22</b>		E	0.41		F		F			
Kea'au Transfer Station	Stop		B	<b>0.90</b>			0.41					F		F
Shower Drive	Signal*	F	F	F		D	C		E			F		
Pōhaku Place	Stop			<b>1.59</b>		D	0.70		F		F			
Kaloli Drive	Stop		E	<b>1.23</b>			0.65					F		F
Pōhaku Circle	Stop			<b>1.32</b>		C	0.64		F		F			
Orchidland Dr.	Stop			<b>1.28</b>	0.14	F	0.62		F		F			
Paradise Drive	Stop		D	<b>1.12</b>			0.55	0.08				F		F
Auli'i Street	Stop			<b>1.25</b>	0.04	C	0.68		F		F			
Maku'u Drive	Stop		C	<b>1.05</b>			0.55	0.11				F		F
Ilima Street	Stop			<b>1.18</b>		<b>4.11</b>			F		F			
Ainaloa Blvd.	Stop			<b>0.86</b>	0.32	E	0.61		F		F			
Ka Ohuwalu	Stop		B	<b>1.10</b>			0.75					F		F
Kaluahine St.	Stop		B	<b>1.02</b>	0.01	A	0.69		E			F		
Old Pāhoa Rd.	Stop			0.60	0.43	E	0.36		F		F			
Kahakai Blvd.	Stop		B	0.34			0.25	0.09				F		F
Nanawale Homestead Rd (Post Office Rd.)	Stop		0.50			0.44			F			B		
Unnamed Road	Stop		0.44			0.38			A			C		
Kapoho Rd.	Signal	C	C	C	B	C	C	C	B	B		B	C	

Notes: LOS worse than LOS D, or V/C ratios greater than 0.85 are displayed in **bold** text.

Where a number is given for an individual movement, HCM does not provide a LOS Value, in which case the value displayed is the v/c ratio.

Traffic movements that do not exist are shaded in grey.

\*Installed as part of the Shoulders Conversion Project.

Source: SSFM International and Roger Dyar, P.E., from HDOT Data

### 1.1.2.3 Alternative Modes

Kea'au-Pāhoa Road serves more than simply motor vehicle traffic; it is an important route for transit, bicyclists, pedestrians, agricultural vehicles, and even scooters. Dangerous conditions, heavy congestion, and unpredictable delays will compromise the ability of these alternative modes to effectively function along Kea'au-Pāhoa Road unless improvements are made.

The County of Hawai'i's Mass Transit Agency (MTA) operates its Hele-On buses on Kea'au-Pāhoa Road for its Hilo to Pāhoa Route, a heavily used service. The current bus service in the corridor includes 11 trips on weekdays in both directions between Hilo and Pāhoa. Four trips are provided in each direction on Saturdays. Eight of the weekday runs are with a 33 passenger bus, and three are with a 47 passenger bus.

With free fares for riders, ridership on the Hele-On system has been increasing. According to the statistics cited in the Draft EA (July, 2009) shown in **Table 1-11: Ridership Increase on Hele-On Bus Routes, 2008-2009**, ridership on the Hele-On system overall has increased 18.49% from July, 2008 to July, 2009. In July, 2009 there were 13,053 riders on the Hilo to Pāhoa route, an increase of 26.49% over the same month in 2008. In terms of overall numbers of passengers, the Hilo to Pāhoa Route is the second-most heavily used service island-wide, only exceeded by the East Hawai'i - South Kohala route, which shuttles workers in East Hawai'i to Kohala resorts.

**Table 1-11: Ridership Increase on Hele-On Bus Routes, 2008-2009**

Route	July, 2009 Monthly Riders	July, 2008 Monthly Riders	Percent Change
Intra Hilo	8,961	5,380	66.56%
Intra Kona	4,796	2,879	66.59%
Kona/Hilo	4,237	3,645	16.24%
Honoka'a/Hilo	807	755	6.89%
<b>Pāhoa/Hilo</b>	<b>13,053</b>	<b>10,319</b>	<b>26.49%</b>
Volcano/Hilo	1,176	939	25.24%
Kau/Hilo	2,362	2,078	13.67%
Kau/South Kohala	1,174	1,765	-33.48%
Kau/Kona	2,539	1,135	123.70%
Waimea	2,940	2,354	24.89%
East Hawai'i/South Kohala	22,512	23,357	-3.62%
North Kohala/South Kohala	1,084	1,611	-32.71%
North Kohala/Kona	972	491	97.96%
Hilo /Waimea	581	0	n/a
<b>Total Bus Ridership</b>	<b>67,194</b>	<b>56,708</b>	<b>18.49%</b>

Source: County of Hawai'i Mass Transit Agency, July 2009 Statistics, accessed 11/10/09 at <http://www.heleonbus.org/transit-info-and-statistics/bus-ridership/2009%20-%20july%20monthly%20report.pdf>

Presently, there are no amenities for passengers boarding or disembarking from buses in the corridor. Passengers wait for and depart from buses on the roadway shoulder. The MTA and

HDOT are considering designated bus pullouts and bus stops at several locations with plans for improvements for passenger safety and comfort.

Bus pullouts and improved amenities for transit users will greatly improve the safety, comfort, schedule reliability, and viability of transit service in the corridor. Improvements will also enable the County's Mass Transit Agency to provide increased routes and service frequencies, and viable transit hubs. Other forms of transit, such as paratransit and school buses will benefit as well.

Because parallel roadways only travel relatively short distances, Kea'au-Pāhoa Road also serves pedestrians and bicycles as well in much higher levels than might be expected for a rural area. While the existing Kea'au-Pāhoa Road corridor does not provide a safe or welcoming environment for bicycles or pedestrians to use the corridor, there is a modest amount of pedestrian and bicycling travel along the roadway shoulders. Much of the pedestrian activity comes from accessing transit service in the corridor.

The grades in the corridor are generally flat to moderate, and therefore the corridor would be an attractive route for bicyclists if conditions were safer. While shoulders in the corridor are generally provided for much of the study area, they vary in width and quality for non-motorized travel.

The current use of the Kea'au-bound shoulder as a temporary AM Peak Hour travel lane precludes safe travel for bicycles or pedestrians in this area. The Shoulder Improvements project will remedy this problem with a new travel lane and shoulder in the Kea'au-bound direction. However, it will create a similarly dangerous condition in the Pāhoa-bound direction as that shoulder will be improved to be used as a temporary travel lane in the PM Peak Hour.

In addition to pedestrians and bicyclists using the shoulders, there also is regular use of the shoulders by scooters and mopeds. Scooters and mopeds are usually limited to a top speed of about 35 mph and therefore cannot maintain the operating speeds of other motor vehicle traffic.

All these different users of Kea'au-Pāhoa Road will benefit from improvements to the corridor. Transit will be better served by bus pull-outs at eight intersections, which will afford safer operations in picking up and dropping off passengers. Pedestrians will be accommodated by facilities off the side of the highway. Bicycles will have defined shoulder/bikeway areas that will provide greater separation with motorized traffic and a consistent travel area. Scooters and mopeds will also benefit from these shoulder areas.

#### **1.1.2.4 Future Traffic Increases**

The Puna makai area is expected to experience steady growth in coming decades because of the availability of affordable, buildable undeveloped property, especially in the large subdivisions that flank Kea'au-Pāhoa Road. Traffic volumes and overall Vehicle Miles Traveled (VMT) are expected to increase. Given the existing levels of congestion and past trends of growth, addressing future traffic levels is clearly an urgent need for the area. The Kea'au-Pāhoa Road project is an important element in meeting this need.

The project team prepared traffic forecasts for future years in the Kea'au-Pāhoa Road corridor based on a number of data sources, including the PCDP, the PRCP, the 2000 Census, the Hawai'i County 2030 Traffic Demand Model, HDOT Traffic Counts (2002), traffic counts taken for the project in 2006, and population forecasts produced for the PCDP. A travel demand model for future year volumes was developed starting with traffic counts from 2002 and 2006, and modified to account for the very high level of growth in the Puna District.

The analyses of traffic are based upon a design year of 2038. Refer to **Section 3.2: Traffic and Transportation** for an explanation of why 2038 was used.

Between the base year of 2006 and the design year 2038, overall traffic in the corridor is anticipated to increase 2.34% annually, assuming no Puna Makai Alternative Route (PMAR) is constructed in that intervening time. (See **Section 1.2.3: Related Actions** for more information.) From 2008 to 2038, a 2.34% annual increase, compounded over time, translates into exactly a 100 percent increase, or a full doubling in traffic. If a two-lane PMAR were constructed for the entire proposed length, the corridor would increase in volume 1.74% per year, resulting in a 67.7 percent increase in traffic compounded over thirty years from 2008 to 2038.

**Table 1-12: Estimated Average Daily Traffic (ADT) on Keaau - Paho Road, 2006-2038**  
Illustrates the existing and forecasted Average Daily Traffic (ADT) within segments of roadway between 2006 and 2038.

**Table 1-12: Estimated Average Daily Traffic (ADT) on Keaau - Pāhoa Road, 2006-2038**

From	To	Bi-Directional				Percent Change 2006 to 2038
		2006 ADT	2018 ADT	2028 ADT	2038 ADT	
Kea'au Bypass	Kea'au Transfer Station	22,588	31,900	41,000	50,400	223%
Kea'au Transfer Station	Shower Drive	24,148	31,500	39,300	49,800	206%
Shower Drive	Pōhaku Place	18,355	24,400	30,900	38,800	211%
Pōhaku Place	Kaloli Drive	18,348	24,300	30,800	38,500	210%
Kaloli Drive	Pōhaku Circle	18,055	22,800	27,700	33,000	183%
Pōhaku Circle	Orchidland Drive	15,233	20,500	26,200	32,700	215%
Orchidland Drive	Paradise Drive	15,191	20,300	25,800	32,000	211%
Paradise Drive	Auli'i Street	13,263	17,500	21,900	27,200	205%
Auli'i Street	Maku'u Drive	13,257	17,400	21,900	27,200	205%
Maku'u Drive	Ilima Street	12,985	16,000	19,100	23,700	183%
Ilima Street	Ainaloa Boulevard	12,985	16,000	19,100	23,700	183%
Ainaloa Boulevard	Ka Ohuwalu Drive	12,575	15,600	18,700	23,300	185%
Ka Ohuwalu Drive	Kaluahine Place	12,620	15,800	19,100	23,600	187%
Kaluahine Place	Old Pāhoa Road	12,650	11,000	16,100	23,600	187%
Old Pāhoa Road	Kahakai Boulevard	5,958	7,400	10,600	16,000	269%
Kahakai Boulevard	Nanawale Homestead Rd. (Post Office Rd.)	4,467	6,200	8,200	10,800	242%
Nanawale Homestead Rd. (Post Office Rd.)	Unnamed Road	4,434	6,000	7,800	10,100	228%
Unnamed Road	Pāhoa-Kapoho Road	6,283	7,900	8,900	10,400	166%
<b>Average Daily Traffic, Full Corridor</b>		<b>13,600</b>	<b>n/a</b>	<b>n/a</b>	<b>29,950</b>	<b>220%</b>

Sources: Wilbur Smith Associates, Kea'au -Pāhoa Road Corridor Traffic Forecasting Report, November 9, 2009 (2018 and 2028 data) and Roger Dyar, P.E. (2006 and 2038 data) from HDOT Data

\*Assumes no Puna Makai Alternate Route is constructed.

Clearly, there will be heavy demand for travel on Kea'au-Pāhoa Road in the future. The project will be an important way to address these future capacity needs.

### 1.1.2.5 Support Future Land Use Objectives

The PCDP recognizes that current land use in the Puna District has been strongly influenced by past actions, and that the current trends of spread-out rapid growth and dependency on the Hilo area for services and employment are unsustainable over the long-term. **Section 3.1.3.3: Puna Community Development Plan (PCDP)** outlines in detail the PCDP's plans for future development to be concentrated in a collection of Village and Town Centers. The vision for these Village and Town Centers is for them to serve the immediate area in a live-work-play capacity, and reduce the dependency on automobile access to these centers.

Greater mobility through the lower Puna District from improvements to Kea'au-Pāhoa Road will increase the viability of these Village and Town Centers' ability to serve the larger community,

especially for motorists and users of alternative modes like transit and bicycling. The PCDP calls for Mass Transportation options to be improved, with a greater percentage of commuters using mass transit. Improvements to Kea'au-Pāhoa Road will support this goal.

The PCDP calls for improvements to Kea'au-Pāhoa Road that increase capacity and also integrate multi-modal travel, emphasize safety and traffic calming over efficient travel speed, and incorporate aesthetic features that are compatible with Puna's character into the road design. All of these objectives are supported by the proposed project.

The PCDP calls for an improved roadway network, with emergency and evacuation routes, connectivity between subdivisions, and an alternative, redundant route parallel to Kea'au-Pāhoa Road (the Puna Makai Alternative Route, or PMAR). A number of commenters on the Draft EA stated their opinions on the urgent need for PMAR. In general, the proposed improvements to Kea'au-Pāhoa Road will be complementary toward this goal and not preclude any implementation of PMAR.

#### **1.1.2.6 Civil Defense, Emergency Travel, and Evacuations**

Emergency response in the study area is often hindered by congestion along the roadway during peak hours. Improved shoulders and additional travel lanes will assist emergency responders in getting around traffic and traveling through the corridor.

In the event of a natural disaster such as a lava flow, earthquake, etc., it may be necessary for large numbers of people to evacuate the area. Kea'au-Pāhoa Road is the only evacuation route available for much of Lower Puna at this time. In addition, a multi-lane facility such as those under consideration for Alternatives 3, 4, and 5 would permit a temporary contra-flow configuration during an emergency situation to accommodate even greater volumes in the direction of evacuating vehicles.

The future consideration of a Puna Makai Alternate Route (PMAR) will eventually improve the situation for evacuations if it is built, but for the foreseeable future, improvements to Kea'au-Pāhoa Road will be critical to address this situation.

#### **1.1.3 Other Goals and Objectives**

The following elements were also identified by KPAG as issues that need to be resolved as part of a successful solution to the problems within the study area:

- Improve highway operations so that the highway will continue to serve as a effective rural minor arterial; the classification of minor arterial is a federal aid definition and in no means diminishes the very major use of the road in the region and the importance of safe usage for all users;
- Be cost-conscious when making recommendations for changes;
- Consider underground relocation of electrical utilities along the route;
- Improve drainage along the route, and correct where there are known drainage problems;

- Support the overall quality of life for the Puna community, including more pleasant travel;
- Improvements should be consistent with County land use and community plans, including the General Plan, Puna Community Development Plan (PCDP) and the Hawai'i Long-Range Land Transportation Plan (HLRLTP);
- Support early and effective interagency and community involvement;
- Improve the reliability of access to and from Kea'au and Pāhoa.

## **1.2 Project History**

### **1.2.1 Past Planning for Project**

Improvements along Kea'au-Pāhoa Road have been proposed for decades as the area's residential development and population has grown and traffic levels have steadily increased. There have been incremental improvements. Much of the current alignment between the Kea'au Bypass and the Pāhoa Bypass dates to the 1960s as improvements were made to flood-prone county roads. Planning and environmental studies for a bypass of Pāhoa town were performed in the 1970s and the bypass was constructed in 1990. Planning and environmental studies for the bypass of Kea'au town were performed in the 1990s with completion of the bypass in 1999.

The Puna Regional Circulation Plan (PRCP), produced in 2005 (but never formally adopted), identified five key problems that affect transportation and the quality of life. These problems included the lack of emergency bypass routes, the Puna District's relatively high motor vehicle fatality rate, the region's rapid growth, the lack of provisions for equal access to transportation, and the auto-dependency created by existing land use patterns.

The PRCP called for improved traffic safety by improving intersections and safe routes to school. It recommended improved accommodation of peak-hour traffic for commuters with wider roads, an alternate parallel route, connectivity between subdivisions, transportation demand management, bike paths, and a variety of transit improvements. Connectivity between different modes was emphasized and mixed-use developments that would serve transit and pedestrians were recommended. A major element of the PRCP was widening of Kea'au-Pāhoa road to 4 lanes between Kea'au and Pāhoa as well as widening Highway 11 to four lanes wide between Kea'au and Kurtistown.

The Puna Community Development Plan (CDP) was first issued in 1995 and updated in 2008. In 1995, the plan called for study of feasibility of widening Highway 130 to a four-lane arterial between the Pāhoa Bypass and planned Kea'au Bypass, and to eliminate frontage access. The 2008 plan introduced a plan for land use changes that would provide destinations within Puna (Village/Town Centers concept). The 2008 PCDP also called for a variety of transportation improvements, including traffic demand management, mass transit, constructing alternative routes, and improvements to highways. For Highway 130 specifically, it called for increasing

the capacity of the highway to four lanes between Kea'au Bypass and Ainaloa Boulevard, reducing the speed limit in this segment to 45 mph, various intersection improvements, studying safety for pedestrians/traffic calming, and implementing interim improvements described below in **Section 1.2.2: Interim Improvements**.

As noted earlier, HDOT recognized the value in getting community involvement into the planning stages of this project through a Context Sensitive Solutions (CSS) process. The community was solicited for representatives to serve on the Kea'au-Pāhoa Advisory Group (KPAG) in 2008. KPAG first met in August of 2008 and the group met a total of ten times as of the end of 2010 and they will continue to meet until the EA process is completed. KPAG considered traffic counts/forecasts and the environmental review process. The group looked at a wide range of alternative options, then built consensus on the set of reasonable alternatives through an evaluation process of ranking and screening criteria. The CSS process undertaken by the KPAG ultimately identified the reasonable alternatives (studied in this EA) that met the community needs and values, with an emphasis on safety, quality of life, and the environment. KPAG also came to a consensus on a purpose and need statement for this project. See **Section 1.3: Community Participation in Determination of Project Purpose and Need** along with **Section 7.1: Community Participation and CSS Process** for additional details of this process.

## **1.2.2 Interim Improvements**

To address the pressing short term needs for safety and operational improvements on Kea'au-Pāhoa Road within the study area, HDOT is pursuing improvements. These improvements will address more immediate needs that can be performed for low cost, in a faster timeframe than the project under study in this EA. Therefore, these interim improvements should be considered complementary actions to the proposed action, but are not part of the alternatives in the EA. This EA assumes that the quick fix improvements will have already been implemented before the improvements outlined in Chapter 2 have been initiated. Where necessary, HDOT is performing separate environmental review for the quick fix improvements under NEPA and Hawai'i Chapter 343.

The primary interim improvements under consideration include the Kea'au-Pāhoa Road Shoulder Lane Conversion Project, and a group of other improvements described below.

### **1.2.2.1 The Kea'au-Pāhoa Road Shoulder Lane Conversion Project**

A Final Environmental Assessment was issued in April, 2010 for the Kea'au-Pāhoa Road Shoulder Lane Conversion project, Kea'au Bypass Road to Shower Drive, Project No. 130-B-01-02, which is slated for completion in 2012. The Shoulder Lane Conversion project calls for:

- A new lane to be constructed on Kea'au-Pāhoa Road between Shower Drive and the Kea'au Bypass heading in the Hilo-bound direction, and a 10-foot shoulder will be added. Therefore, there will be two Hilo-bound travel lanes available 24 hours a day, with a shoulder that functions exclusively as a shoulder.

- The shoulder in the Pāhoa-bound direction to be improved and made continuous between the Kea'au Bypass and Shower Drive. Therefore, during the PM peak hour only, the Pāhoa-bound shoulder would be opened as a second travel lane to handle peak volumes. There would only be one Pāhoa-bound travel lane in off-peak times.
- To accommodate the wider cross-section, the Waipāhoehoe Bridge would be widened.
- An abandoned 1930s-era concrete bridge immediately upstream of the Waipāhoehoe Bridge would be demolished to improve drainage in the area.
- A traffic signal would be installed at the intersection of Kea'au-Pāhoa Road and Shower/Pōhaku Drives.

### **1.2.2.2 Other Interim Improvements**

Several “quick fix” actions are being considered by HDOT to improve safety in the corridor prior to the full build-out of the Kea'au-Pāhoa Road Improvements suggested in this EA:

- Reducing speed limits on one mile of the Pāhoa Bypass to create a uniform 45 mph limit
- Seeking funding to install left-turn acceleration pockets at problem intersections
- Interim bus stops as per EA's recommendations outlined in **Section 4.2.7: Transit**
- Improved signage, striping, and channelization at Kahakai Boulevard (starting late 2010)
- Interim access modifications at Route 130/Old Pāhoa Road intersection

### **1.2.3 Related Actions**

As recognized by the PRCP and PCDP, there has been a pressing need within the growing Puna District for an alternative roadway under Hawai'i County's jurisdiction to provide redundancy with Kea'au-Pāhoa Road. Besides the acute congestion resulting from only a single access highway in lower Puna, it is possible that hazards such as traffic accidents, lava flows, hurricanes, and flooding could cause closure of SR 130 between Kea'au and Pāhoa. In the case of such closures, an alternative county route may be warranted.

When funds become available, the County of Hawai'i intends to pursue a separate study, the Puna Makai Alternative Route (PMAR). PMAR will require extensive study of options for constructing such an alternative facility makai of Kea'au-Pāhoa Road to connect Puna Makai and the Hilo area. The timeframe for the PMAR study and any construction is indeterminate at this time. While that highway would clearly complement this project, it is not part of the proposed action. Nothing in the alternatives studied in this EA will preclude constructing PMAR.

## **1.3 Community Participation in Determination of Project Purpose and Need**

As noted above, HDOT and the consultant team are currently conducting a rigorous community participation program over a two-year period for the proposed project. From a community issues perspective, this effort is important because development of the proposed project

included a representative group of community leaders in the KPAG. Further, it also means that a portion of the community was aware of the project processes due to the networks of members of the KPAG.

Highlights of the community participation program that has occurred thus far are as follows:

- A project website, <http://keaaau-pahoa.com/> provides an overview of the project, notices about KPAG meetings, KPAG meeting summaries, KPAG presentation/handout materials, and an opportunity for the public to comment or make inquiries about issues related to the project.
- A public meeting was held at the onset of the project in April 2008 at the Kea'au Community Center. The project approach was presented, including the process for developing alternatives, the use of the Context Sensitive Solutions approach in project development, and the overall public involvement program that included the KPAG.
- Between August 2008 and October 2010, KPAG and the project team held ten meetings, one of which occurred over a two-day period. These meetings were designed to ensure that community values were incorporated in the understanding the purpose and need of the project, in the evaluation of criteria for weighing the range of alternatives, and in the identification of alternatives for the project corridor.
- Two public meetings were held in April 2009 at the Pāhoa Intermediate/High School and Kea'au Elementary School to present the findings of the KPAG process to date.

KPAG meetings have continued throughout the EA process.

The use of the Context Sensitive Solutions, or CSS, approach was fundamental in designing and implementing the community participation program. The core principles of CSS apply to transportation processes, outcomes and decision making, and include:

- Strive towards a shared stakeholder vision to provide a basis for decisions,
- Demonstrate a comprehensive understanding of contexts,
- Foster continuing communication and collaboration to achieve consensus, and
- Exercise flexibility and creativity to shape effective transportation solutions, while preserving and enhancing community and natural environments.

In keeping with the CSS approach, the project team and KPAG worked on understanding how participants feel about their community, how they use the roadway system and what is the purpose and need for the proposed project.

**Table 1-13: Summary of KPAG's Purpose and Need for the Proposed Project** presents the categories of purpose and need for the proposed project that emerged in KPAG meetings. These categories, as well as the criteria and ways to measure the needs, were unanimously approved by the KPAG in December 2008.

As the KPAG worked with the project team, a series of alternatives emerged, as discussed in greater detail in **Chapter 2: Alternatives**.

**Table 1-13: Summary of KPAG's Purpose and Need for the Proposed Project**

Categories of Purpose and Need	Criteria	Ways to Measure
<b>Improve roadway safety</b>	<ul style="list-style-type: none"> <li>• Reduce the number of accidents and their severity</li> <li>• Reduce the number of points of conflict at intersections</li> <li>• Improve merge movements</li> <li>• Improve or eliminate movements out of driveways</li> </ul>	<ul style="list-style-type: none"> <li>• Number of accidents</li> <li>• Number of driveways</li> <li>• Adequate distance for Merge movements</li> <li>• Reduced number of driveway left turns</li> <li>• Use on and off ramps for side streets entering the main road</li> </ul>
<b>Configure the road for safe use by transit vehicles and school buses, bicyclists, pedestrians and agriculture vehicles</b>	<ul style="list-style-type: none"> <li>• Increased transit ridership and level of transit service</li> <li>• Increased use of the corridor by bicyclists and pedestrians</li> <li>• Create safe and attractive bus waiting areas that are user-friendly and barrier free</li> </ul>	<ul style="list-style-type: none"> <li>• Number and percent of transit riders</li> <li>• Number and percent of bicycle riders</li> <li>• Number of improved bus waiting areas</li> <li>• Number of barrier free staging areas</li> </ul>
<b>Improve corridor mobility and capacity to meet future demand</b>	<ul style="list-style-type: none"> <li>• Ability to accommodate future average daily use of the corridor</li> <li>• Ability to accommodate traffic during future peak periods</li> <li>• Reduction in delay</li> <li>• Improved levels of service</li> <li>• Equity</li> <li>• Efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Level of Service (LOS)</li> <li>• Travel Time</li> <li>• Delay Time</li> <li>• Number of daily vehicles (AADT)</li> <li>• Number of vehicles in AM and PM peaks</li> <li>• LOS is improved for different segments of the community</li> </ul>
<b>Respect the natural beauty of Puna</b>	<ul style="list-style-type: none"> <li>• Preserve scenic vistas <ul style="list-style-type: none"> <li>○ towards Mauna Kea</li> <li>○ at the Catholic Church</li> <li>○ towards the ocean</li> </ul> </li> <li>• Preserve canopy trees</li> <li>• Bury utility lines</li> <li>• Use materials and landscape plantings that are sensitive to the area</li> </ul>	<ul style="list-style-type: none"> <li>• Vistas are retained</li> <li>• Landscape materials include canopy trees</li> <li>• Choice of materials and plants are endorsed by community</li> <li>• Number of utility poles are reduced</li> </ul>
<b>Complement creation of an alternate road that can be used both as an additional travel route and for emergency use</b>	<ul style="list-style-type: none"> <li>• Improve access for emergency vehicles</li> <li>• Create connections between Highway 130 and any new alternate route</li> <li>• Reserve right-of-way for other means of travel</li> <li>• Create redundancy for temporary closures</li> </ul>	<ul style="list-style-type: none"> <li>• Successful completion of a second route in Puna district by County that creates redundancy</li> <li>• Emergency vehicles have lanes available for their use during emergencies</li> <li>• Intersections improved for use by emergency vehicles</li> </ul>

## 1.4 Environmental Justice

Project team efforts to engage minority and low income groups in the planning and alternatives development for the proposed project are discussed in **Section 3.3.2.3: Incorporation of Title VI and Environmental Justice Requirements into the Proposed Project**. The anticipated effects of the project on Environmental Justice communities are discussed in **Section 4.3.3: Impacts on Environmental Justice Communities**.

## CHAPTER 2: ALTERNATIVES AND PROPOSED ACTION

The section that follows covers the alternatives that will be evaluated for their environmental impacts in **Chapter 4: Environmental Impacts and Mitigation Measures**. It also identifies alternatives that were considered during the planning phase of the project, then eliminated from further consideration.

The discussions that follow focus primarily on a description of the alternatives themselves. The relative performance of the alternatives from the standpoint of safety, mobility and traffic operations are found in the discussions found in **Section 4.2: Traffic and Transportation**. Specifically, the reader is suggested to refer to the comparative discussion of Safety in **Section 4.2.4: Safety**, and a discussion of the mobility of all alternatives, specifically Level of Service, is discussed at length in **Section 4.2.1: Roadway LOS Between Intersections**, in **Section 4.2.2: Intersection LOS** and in **Section 4.2.3: Roundabouts**.

Where the term “Build Alternatives” has been used, it collectively refers to the Preferred Alternative as well as Alternatives 3 through 5 as were discussed in the Draft EA.

The Proposed Action is to build the Preferred Alternative, so the term “Preferred Alternative” is used in the discussion that follows to represent the “Proposed Action”, and the two terms are interchangeable.

### 2.1 Selection of a Preferred Alternative

Based on public input and evaluation of the alternatives' impacts in the Draft EA, HDOT has decided that the Preferred Alternative includes a four-lane divided roadway facility from the Kea'au bypass to Pāhoa-Kapoho Road (Alternative 4 in the Draft EA) in conjunction with all of the other improvements included within the TSM Alternative (Alternative 2). The Preferred Alternative, which constitutes the Proposed Action for this project, is described below in **Section 2.2: Proposed Action – Four Lane Highway With Associated Access Management Improvements**. The Alternatives not selected as the Proposed Action are discussed later in this chapter in **Section 2.3: Alternatives Considered in Draft EA but not Selected as**.

The justification for selecting the Preferred Alternative comes from a number of considerations:

- Widening the corridor to four lanes in width received the most favorable comments from the public and from agencies.
- The Preferred Alternative will provide satisfactory mobility, congestion relief, and improved safety and best address the Purpose and Need of the project that is justified relative to the impacts it would create.
  - Including only the TSM improvements by themselves without widening the highway to four lanes (Alternative 2) would produce much less impact on the surrounding corridor compared to the Preferred Alternative, as the scale of new construction would be greatly minimized. However, from the standpoint of traffic mobility and congestion, Alternative 2 would not meet the Purpose and

Need of the Project, and many of the existing traffic capacity problems would persist even after construction.

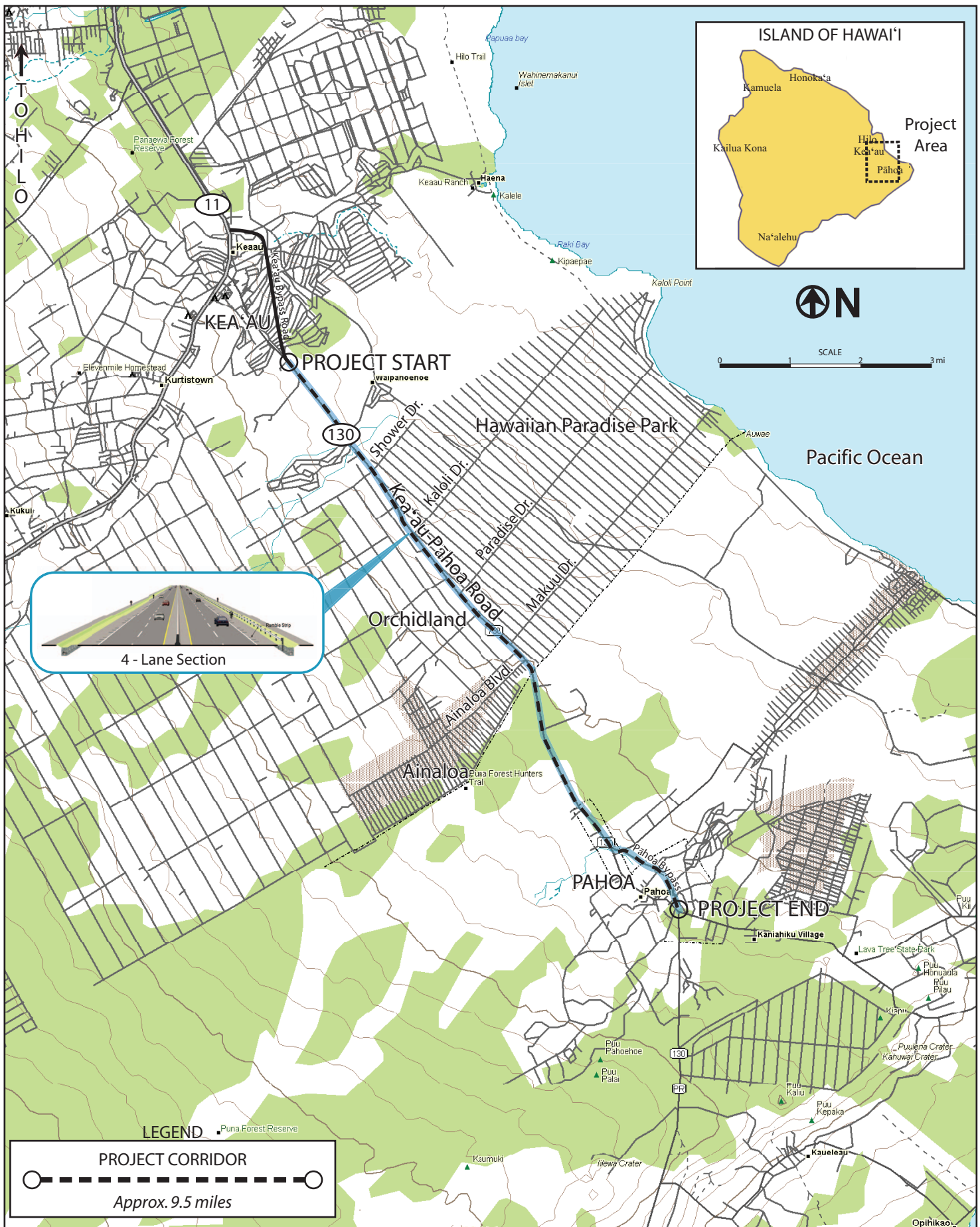
- Alternative 3 would widen the portion of the corridor closer to Kea'au but would retain only two lanes in the segment of the corridor between Ainaloa Boulevard and Pāhoa-Kapoho Road, and some traffic capacity problems would persist even after construction.
- Alternative 5 would provide superior traffic operations. However, the provision of a six-lane-wide cross section between the Kea'au Bypass and Paradise Drive was considered to be out of scale with the surrounding community and would create greater impacts on adjoining properties. The incremental improvement in traffic operations over the Preferred Alternative is not justified given that the Preferred Alternative would provide satisfactory operations.
- The Preferred Alternative will incorporate access management and traffic control measures that will greatly improve safety and overall mobility. Access management will tie the subdivisions across Kea'au-Pāhoa Road together and direct travel to safe locations (signals or roundabouts) where left turns and cross-highway movements can be better controlled.
- The Preferred Alternative will provide provisions for improved use of the corridor by transit passengers, bicycles, and pedestrians.

## 2.2 Proposed Action – Four Lane Highway With Associated Access Management Improvements

As shown in **Figure 2-1: Preferred Alternative**, the Preferred Alternative would construct a highway that contains a four-lane divided cross section between the end of the Kea'au Bypass and Pāhoa-Kapoho Road. **Appendix A: Roadway Design Plans** shows detailed design of the Preferred Alternative. The Preferred Alternative essentially combines Alternative 4 with the TSM measures (Alternative 2) as both were defined in the Draft EA.

The Preferred Alternative will incorporate designs that contain Context Sensitive features, in an effort to make the future roadway as compatible as possible with the surrounding communities. While many of the elements will not be designed until the final design stage, these features would incorporate the community's preferences and include landscaping (with preference for non-invasive native species) and context sensitive designs of walls/structures, etc. If practicable, design exceptions may be considered on a case-by-case basis where protection of an important community or cultural feature constrains the design.

The Preferred Alternative assumes a design year of 2038. Refer to **Section 3.2: Traffic and Transportation** for an explanation of why 2038 was used.



### Preferred Alternative - Build Alternative 4 - 4 Lanes Entire Length

Kea'au-Pāhoā Road Improvements Environmental Assessment, Kea'au to Pāhoā, Project No. STP-0130(27)  
State of Hawai'i, Department of Transportation

### Figure 2-1

Source:  
DeLorme 3-D TopoQuads



The design of the Preferred Alternative is currently at a conceptual level. Decisions about curve radii, grades, slopes, etc. will be finalized during final design. The design of the highway will be consistent with HDOT standards and the design standards of the American Association of State Highway Transportation Officials (AASHTO).

### 2.2.1 Preferred Alternative Cross Section

**Figure 2-2: Typical Cross Section** shows the conceptual cross-section for the four-lane roadway. This cross-section is only representative and could vary in specific locations, such as where turn lanes are provided. Alternative designs that include context-sensitive elements like landscaping or other decorative features may be considered where appropriate. The concrete median barrier shown is for conceptual purposes to represent some type of median treatment. The specific type of median treatment will be specified during the later stages of design.

For the Preferred Alternative, travel lanes would be 12 feet wide, and a full eight foot shoulder/bikeway area would be provided in both directions. Outside of intersection areas, an impervious median with a raised barrier would divide the four-lane highway and generally be 10 feet wide, but could vary in width. Grass-lined border swale areas (typically eight feet wide) would buffer a five-foot wide pedestrian area from the roadway traffic, and contain an impervious bottom to collect drainage. Some additional pedestrian accommodations may be needed at bus pull-outs to meet requirements of the ADA. A guard rail may or may not be provided at the inside edge of the border area as specific conditions (utility poles, access driveways, etc.) dictate.

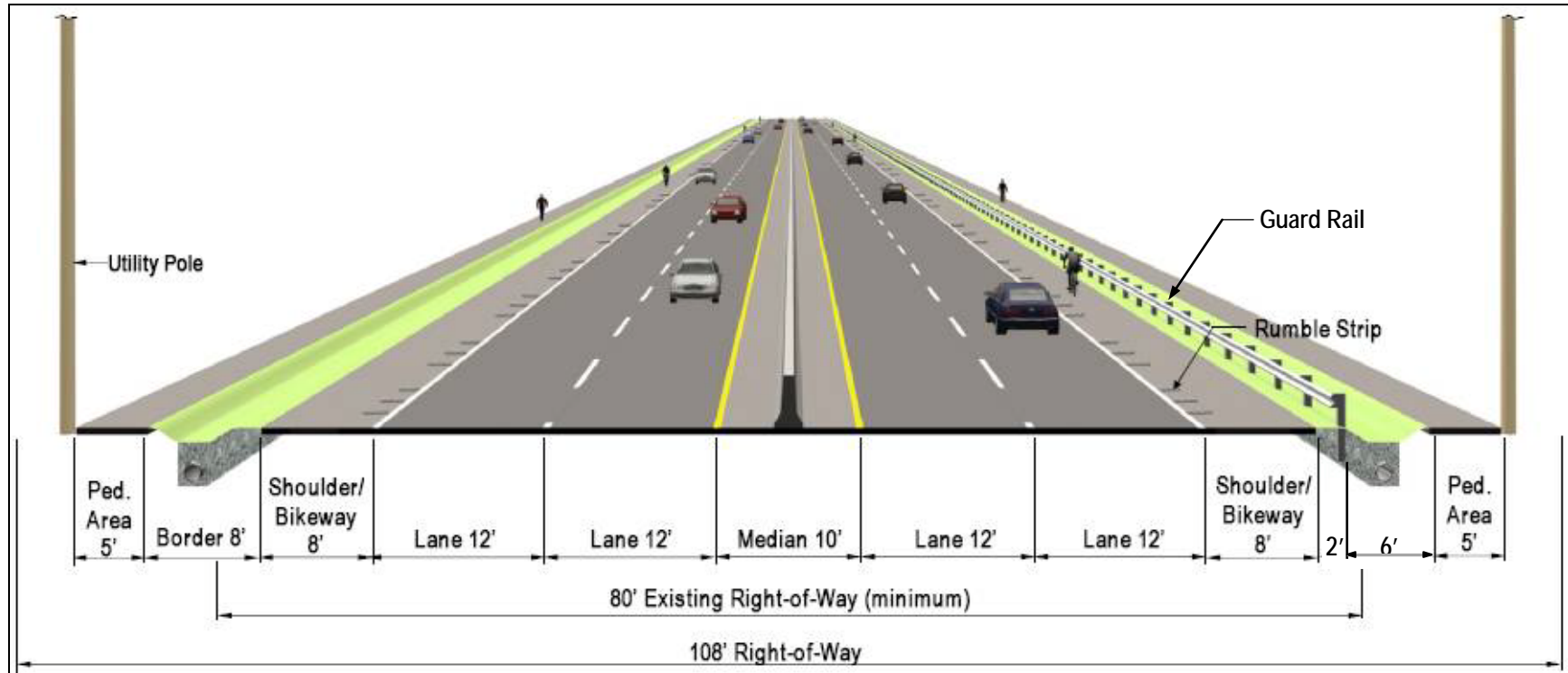
While the existing right-of-way varies in width between roughly 80 feet and 100 feet in width, the four-lane roadway would generally fit within a 108-foot right-of-way. The right-of-way needs would vary along the corridor and the right-of-way could be wider in places where the grade of the highway requires slopes to the sides of the highway to be wider than normal.

### 2.2.2 Access Control Under the Preferred Alternative

One of the major problems compromising safety on Kea'au-Pāhoa Road is the uncontrolled access along the corridor. An important element of the Preferred Alternative will be to limit the number of access points along the most intensively-developed portion of the corridor. When the Hawaiian Paradise Park and Orchidland subdivisions were developed, none of the access streets were connected across the highway and this has resulted in a large number of three-way intersections (T-intersections). There may also be a large number of driveways that will become right-in/right-out only access points. By consolidating access points to a smaller number of traffic-controlled intersections (which will use traffic signals or roundabouts), the Preferred Alternative will greatly improve safety, particularly for those vehicles that wish to make a left turn to/from a cross-street and need to cross opposing flows of traffic.

The access management changes that are proposed will support the PCDP's goals of Village and Town Centers by providing improved, direct access to those areas from Kea'au-Pāhoa Road. Refer to **Section 3.1.3.3: Puna Community Development Plan (PCDP)** for more information.

**Figure 2-2: Typical Cross Section Under Preferred Alternative**



Note: Not to scale. Representative view; features such as guardrails may or may not be provided as needed on either or both sides at any given location.

One effect of limiting access is that travelers will often incur some longer trips than they do today, and may need to make U-turns at a controlled intersection or otherwise modify their routes to get to their destination.

**Figure 2-3: Access Management Changes Along Kea'au-Pāhoa Road** shows the access management strategy under the Preferred Alternative.

There may be additional modifications to access along the roadway to improve safety besides simply modifying intersections. This could include consolidating driveways where possible, closing other minor intersections, and realigning other cross-streets. Decisions on these additional measures would be considered during final design.

The four-lane roadway would contain a median barrier that would limit movements across the highway. Left turns or cross-road traffic movements would be controlled at specified intersections (which could have signals or no signal as discussed in **Section 2.2.3.1: Signalized Intersections**). Driveway access along the highway would be limited to right turns in and right turns out of the driveway. Access from the other direction would require travel to a signalized intersection or roundabout, where a U-turn could be performed safely.

Under the Preferred Alternative, the design will accommodate permitted U-Turns at nine locations where intersection improvements with traffic signals are warranted. Refer to **Figure 2-4: U-Turn Options Under Project Alternatives** for conceptual diagrams showing how U-turns would be accommodated under the four-lane cross section.

By changing access from full access today to right turns in and out of driveways, it is estimated that the Preferred Alternative would affect the direct access of 133 driveways (serving 152 parcels) along Kea'au-Pāhoa Road.

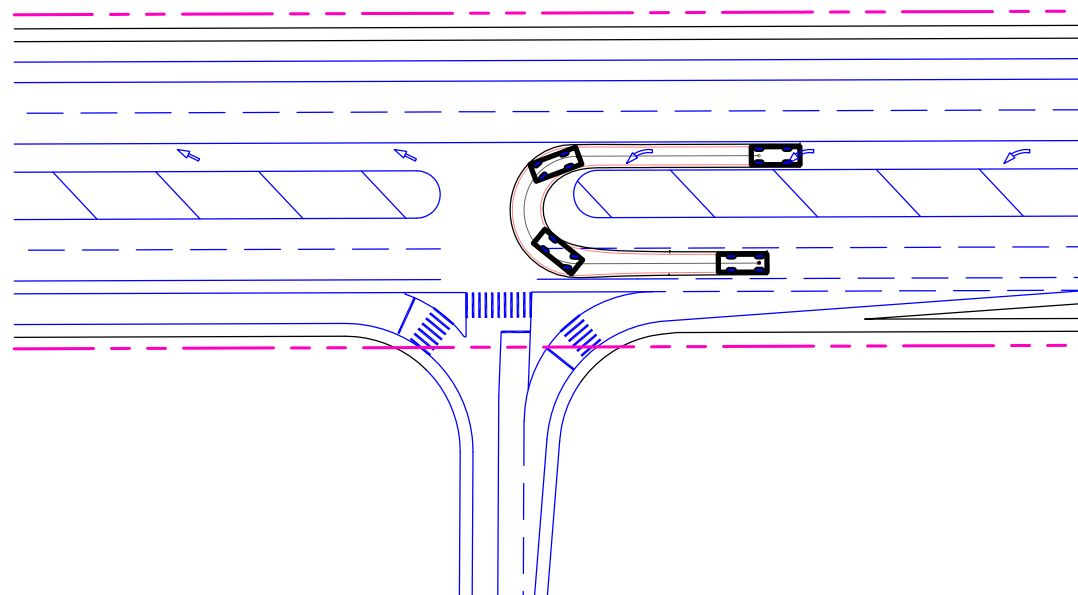
The strategy for controlling access would close off some accesses, build new roadways, and improve current substandard roads to county standards, paved, with a 50-foot right-of-way. The locations and features include:

- A new two-lane Kaloli Drive extension constructed to county standards would extend opposite Kaloli Drive about 620 feet to connect with Pōhaku Circle, traversing two vacant properties. The Kaloli Drive intersection now would be a four-way intersection, and be served with a traffic signal or roundabout. The new Kaloli Drive extension would serve traffic that now uses Pōhaku Place and Pōhaku Circle. About a half mile of Pōhaku Circle between Pōhaku Place and the extension of Kaloli Drive would be brought up to County standards.

Figure 2-3: Access Management Changes Along Kea'au-Pāhoa Road

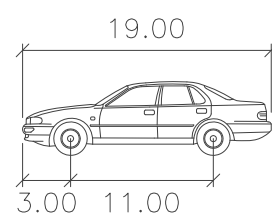


Note: Image not to scale. Refer to **Appendix A-3: TSM Alternative Access Management Plan** for more details and sheets that are referred to in this figure.

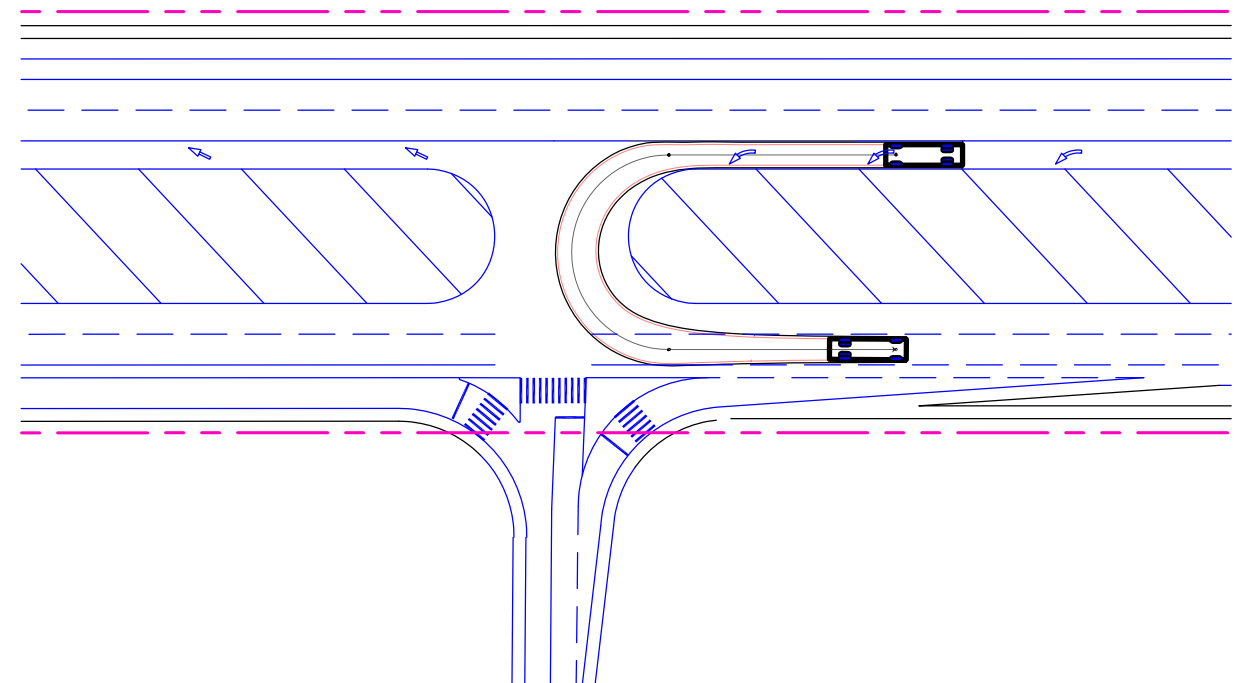


### U-TURN CAR – 4 LANE OPTION

SCALE: 1" = 75'

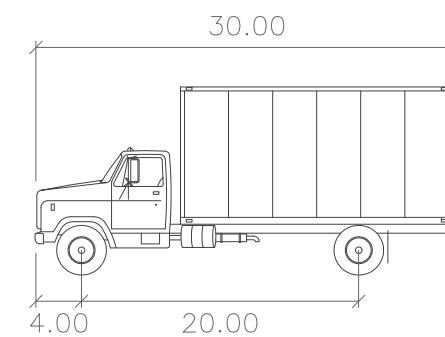


P	feet
Width	: 7.00
Track	: 6.00
Lock to Lock Time	: 6.0
Steering Angle	: 31.6



### U-TURN Single Unit Truck-4 LANE OPTION

SCALE: 1" = 75'



SU	feet
Width	: 8.00
Track	: 8.00
Lock to Lock Time	: 6.0
Steering Angle	: 31.8

**SSFM**  
INTERNATIONAL  
SSFM INTERNATIONAL, INC.  
501 Sumner Street, Suite 620  
Honolulu, Hawaii 96817

### U-TURN OPTIONS

FIGURE 2-4

- To improve the Kaloli Drive intersection's operations, Uala Avenue (31<sup>st</sup> Avenue) would be turned into a cul-de-sac just before its intersection with Kaloli Drive. To provide properties on Uala/31st Avenue with access to Kaloli Drive (and Kea'au-Pāhoa Road), a new connector road about 700 feet in length would be constructed between Uala/31<sup>st</sup> Avenue and Puakalo Avenue (30<sup>th</sup> Avenue). There may be the need to upgrade some subdivision roads to county standards depending on traffic volumes. This will be determined during final design.
- The intersection of Puakalo Avenue (30<sup>th</sup> Avenue) and Kea'au-Pāhoa Road would be converted to a right-in-right-out configuration for Puakalo/30<sup>th</sup> Avenue traffic. Travelers that now make a left turn to or from Puakalo/30<sup>th</sup> Avenue would use Kaloli Drive and the traffic control provided at that intersection.
- The intersection of Pōhaku Place and Kea'au-Pāhoa Road would be converted to a right-in-right-out configuration for Pōhaku Place traffic. Travelers that now make a left turn to or from Pōhaku Place would use the new Kaloli Drive extension via Pōhaku Circle (described above).
- The intersection of Pōhaku Circle and Kea'au-Pāhoa Road would be converted to a right-in-right-out configuration for Pōhaku Circle traffic. Travelers that now make a left turn to or from Pōhaku Circle would use the new Kaloli Drive extension described above.
- A new two-lane Orchidland Drive extension constructed to county standards would extend opposite Orchidland Drive about 320 feet to connect with 'Uhaloa Avenue (32<sup>nd</sup> Avenue), traversing one vacant property. The Orchidland Drive intersection now would be a four-way intersection, and be served with a traffic signal or roundabout. The new roadway would improve access between Hawaiian Paradise Park and the Orchidland subdivision, and enhance the village center proposed for the commercial area on Orchidland Drive. There may be the need to upgrade some subdivision roads to county standards depending on traffic volumes. This will be determined during final design.
- 'Uhaloa Avenue (32<sup>nd</sup> Avenue) would be improved to county standards (60-foot right-of-way) between the extension of Orchidland Drive (described above) and Paradise Drive, a distance of approximately 0.3 miles.
- Paradise Drive would be converted to a one-way makai-bound street for a portion of the block between Kea'au-Pāhoa Road and 'Uhaloa Avenue (32<sup>nd</sup> Avenue). The intersection of Paradise Drive and Kea'au-Pāhoa Road would be limited to a right-in movement onto Paradise Drive only; traffic seeking to enter or exit the Hawaiian Paradise Park Subdivision from other directions would utilize the combination of 'Uhaloa (32<sup>nd</sup>) Avenue and the extension of Orchidland Drive described above with the traffic signal at Orchidland Drive. This configuration would allow emergency vehicles arriving from the Pāhoa direction to enter Hawaiian Paradise Park directly from Kea'au-Pāhoa Road.
- Between Auli'i Street and Ilima Street, 34<sup>th</sup> Avenue will be upgraded to county standards for a distance of about 0.8 miles to serve access changes at Auli'i Street and Ilima Street, described below.

- The intersection of Auli'i Street would be converted to right-in-right-out access. Traffic that now makes left turns to or from Auli'i Street would use the controlled intersection at Maku'u Drive (extended, as described below) via 34<sup>th</sup> Avenue.
- A new two-lane Maku'u Drive extension constructed to county standards would extend opposite Maku'u Drive about 1,050 feet to connect with an upgraded 34<sup>th</sup> Avenue, traversing two vacant properties. The Maku'u Drive intersection now would be a four-way intersection, and be served with a traffic signal or roundabout. The new roadway would serve traffic that now uses Auli'i Street and Ilima Street.
- Ilima Street would be closed off with a cul-de-sac at Kea'au-Pāhoa Road. Traffic that currently uses Ilima Street to access Kea'au-Pāhoa Road would use the improved traffic controlled intersection at the extension of Maku'u Drive (about 600 feet away) via upgraded 34<sup>th</sup> Avenue.
- Old Pāhoa Road (at the north end of Pāhoa near Pāhoa Marketplace) would be converted to right-in-right-out access, while Kahakai Boulevard would be re-opened as a full four-way intersection with a signal or roundabout providing traffic control. Traffic that now makes left turns to or from Old Pāhoa Road would use Kahakai as an alternative access to/from the Pāhoa Marketplace and Pāhoa Village. An additional option in this area may be to provide a direct right-turn access from Pāhoa-bound Kea'au-Pāhoa Road into the Pāhoa Marketplace using the "old" roadway that runs directly in front of the shopping center. The feasibility of such a design would depend on a deceleration/turn lane in the area that permits this traffic movement to be made safely.

These access management improvements would provide benefits by shifting left-turning traffic from uncontrolled intersections to traffic-controlled intersections (signal or roundabout.) **Table 2-1: Reduction in Intersection Turning Movements at Right-In-Right-Out Intersections** shows the reduction in traffic when five intersections are converted to right-in-right-out configurations under the Preferred Alternative.

**Table 2-1: Reduction in Intersection Turning Movements at Right-In-Right-Out Intersections**

<b>Right-In-Right-Out Intersection of Kea'au- Pāhoa Road at</b>	<b>Total Turning Movements Eliminated in Year 2018 (Vehicles per Day)</b>	<b>Total Turning Movements Eliminated in Design Year 2038 (Vehicles per Day)</b>
Pōhaku Place	535	635
Pōhaku Circle	140	190
Auli'i Street	330	390
Ilima Street	65	65
Old Pāhoa Road	3,850	4,015
<b>Total 5 Intersections</b>	<b>4,920</b>	<b>5,295</b>

Source: SSFM International and Traffic Study (Appendix C in Draft EA).

### New Issues or Clarification of Issues for Final EA

The intersection of Kahakai Boulevard with Kea'au-Pāhoa Road was modified in November, 2010 to open a cul-de-sac and allow right-in-right-out access from the mauka leg of Kahakai Boulevard to/from the Kalapana-bound lanes of the Pāhoa Bypass. This improvement was initiated by the developer of the Woodlands Center shopping center adjacent to this intersection. A number of commenters on the Draft EA expressed concerns with this intersection and the effects on traffic caused by the opening of the shopping center.

In the Draft EA, two segments were shown as part of the access management concepts that differ with this Final EA:

- As noted above, Paradise Drive will be modified to have right-turn-access-only into Hawaiian Paradise Park. Traffic that uses Paradise Drive will instead use the Orchidland Drive extension and Uhaloa Avenue described above. Paradise Drive originally was proposed to have full access with an extension to 34<sup>th</sup> Avenue, and this change was made at the request of the KPAG as a way to consolidate accesses and minimize the number of signals in a short segment.
- 34<sup>th</sup> Avenue was originally proposed to be improved between Orchidland Drive and Ilima Street, for a distance of about 1.5 miles, to tie together several access points from Kea'au-Pāhoa Road. This improvement has been scaled back to now only improve 0.8 miles between Ilima Street and Auli'i Street as described above. This change has been prompted by the removal of a Paradise Drive connection and by concerns about cultural resources in the segment of 34<sup>th</sup> Avenue removed from further improvement.

**Table 2-1: Reduction in Intersection Turning Movements at Right-In-Right-Out Intersections** above has been modified to reflect the changes in access management noted above.

### 2.2.3 Traffic Control Improvements Under the Preferred Alternative

As part of the Preferred Alternative (as well as the other Alternatives), a traffic analysis was performed to determine locations where intersection improvements with traffic signals, roundabouts, or simple stop sign controls are warranted. An analysis of roundabouts discussed in **Section 4.2.3: Roundabouts** notes that the Draft EA recommended that under the TSM Alternative (and Alternative 3 as well), based on the traffic volumes in 2038, a roundabout could be considered in place of a traffic signal at Kahakai Boulevard, but other locations may be viable for improvements prior to 2038. Therefore traffic analyses took the added step of determining in what future years roundabouts would be feasible.

The public has shown strong support for implementation of roundabouts. Therefore, under the Preferred Alternative, it is proposed to implement roundabouts during the first phases of construction at Ainaloa Boulevard, Old Pāhoa Road, and Kahakai Boulevard, while these segments of roadway still contain two-lane segments. All of these locations are high accident locations and lend themselves well to use of a roundabout. Under the anticipated phasing for the project, it will be a longer term period before construction progresses to the point that these segments of roadway are widened to four lanes. After the roundabouts have been in

operation for some time, if HDOT policy changes to allow two-lane roundabouts, those locations could be widened into two-lane roundabouts or else converted to traffic signals as appropriate.

### 2.2.3.1 Signalized Intersections

Under the Preferred Alternative, (as well other alternatives studied), signalized intersections are warranted in the design year 2038 at:

- Shower/Pōhaku Drives (signal already committed in Shoulder Improvements project)
- Kaloli Drive
- Orchidland Drive
- Maku'u Drive
- Pāhoa- Kapoho Road (signal already in place)

Several other intersections (Kahakai Boulevard, Ainaloa Boulevard, and Old Pāhoa Road) have traffic volumes that could justify signals, but they are proposed for roundabouts, see **Section 2.2.3.3: Roundabouts**.

Traffic signals have both benefits and shortcomings. Some benefits of providing traffic signals at intersections:

- Signals are an established method of controlling traffic in an intersection that is readily understood by the public
- Signals provide a visual cue that can be seen from a distance (a light)
- Signals can be optimized for different traffic demand levels during different hours and can be equipped with actuators that are triggered by passing vehicles
- Signals can offer protected phases (arrows) for turning traffic
- Traffic on the lower-volume local street has a safe progression to turn or go through the intersection when the main highway is stopped by a red light
- Signals create gaps in traffic beyond the intersection because some of the traffic on the main highway must stop, thereby benefiting turning traffic at other intersections not served by a signal
- Signalized intersections can generally accommodate large vehicle turning movements well
- Signalized intersections may sometimes require less space than a roundabout

Shortcomings of intersections served by traffic signals are:

- Intersections with signals may require multiple turn lanes (which in turn could require additional space) if the signal cannot optimally handle the volumes otherwise
- Signals require a portion of the vehicles passing through the intersection to stop, including some on the main highway
- Signals require maintenance and use electricity in their operation. They could lose power in the event of unforeseen events like a bad storm
- Compared to roundabouts, signalized intersections have a greater number of conflict points between vehicles traveling in different paths

Signalized intersections will provide safe crossing for vehicles, and full access would be provided, including U-turns where needed. The 10-foot median would widen in the transitional approach to intersections to accommodate turn lanes.

In the circumstance that would need the most widening, specifically a four-way intersection with widening for turn lanes on both sides of the roadway mainline, the overall cross-section would typically become approximately 30 feet wider. This is a result of providing a 14- or 15-foot left-turn lane for each approach (in place of the 10-foot median), plus a right-turn lane added to the outside of each approach.

In contrast, at a T-intersection (3-way intersection with cross street only on one side of the intersection), the cross-section would be approximately 17 feet wider in total from a left-turn lane in the median on one approach and a right-turn lane on the other approach.

Shoulders/bikeways would be continuous through all intersections to ensure safe travel for bicycles. Pedestrian areas would be continuous through all intersections to ensure safe travel for pedestrians. Bus pullout areas may have different amenities as noted above.

#### **New Issues or Clarification of Issues for Final EA**

Text has been added to the discussion above that describes both benefits and shortcomings of signals.

#### **2.2.3.2 Stop Sign Controlled Intersections**

Under the Preferred Alternative, with the exception of several low-volume streets that are to be closed off with a cul-de-sac, all cross-streets not mentioned in **Section 2.2.3.1: Signalized Intersections** would contain intersections that are not controlled with a traffic signal or roundabout. These locations would not warrant such traffic control because of lower traffic volumes or because a nearby intersection is controlled. All stop sign controlled intersections will have stop sign control on the cross-street. Traffic along Kea'au-Pāhoa Road would not be required to stop at these locations.

Stop-sign-controlled intersections have both benefits and shortcomings. Some benefits of providing stop signs for lower volume crossroads:

- At low-volume cross streets, there is no restriction in the progression of any of the traffic on the main highway
- Stop signs require no electricity and little maintenance

Shortcomings of having local cross-streets controlled by stop signs are:

- Traffic on the cross-street never gets the right-of-way over traffic on the main highway; cross-street traffic will always have to stop and yield to the main highway
- Stop-sign controlled intersections may have higher crash rates than a traffic-controlled location like a signal or roundabout

Some stop sign controlled intersections may have a median that prevents left turns, thereby restricting traffic movement to right-in right-out access. Other stop sign controlled intersections would be allowed full access across the highway.

Roadway dimensions and features at stop sign controlled intersections would be similar to those described above for signalized intersections.

### **New Issues or Clarification of Issues for Final EA**

Text has been added to the discussion above that describes both benefits and shortcomings of stop-sign-controlled intersections.

### **2.2.3.3 Roundabouts**

Used all over the world, a roundabout is a type of circular intersection that requires entering traffic to yield to traffic already within the circle. When they are feasible to be constructed, modern roundabouts can be a viable measure to control intersection traffic in place of a conventional signalized intersection.

Roundabouts have some demonstrable benefits over signalized intersections:

- More than 90% reduction in fatalities (Transportation Research Board, 2001)
- 76% reduction in injuries (Transportation Research Board, 2007)
- 35% reduction in all crashes (Transportation Research Board, 2007)
- Slower speeds are generally safer for pedestrians
- Typically less delay than a signalized intersection
- Reduced pollution and energy use from fewer stops, hard acceleration and less idling
- No signal to maintain
- May require less right-of-way (though not always the case)
- Aesthetically pleasing and offer options for landscaping

Roundabouts do have some shortcomings compared to conventional signals:

- The public is less familiar with roundabouts than signals and may need more education in their use
- They may pose challenges for large trucks or buses to negotiate the roundabout if not designed appropriately
- They may require more right-of-way (but not always the case)
- They could require special accommodations for bicyclists or the blind due to traffic that has fewer breaks. Navigating a roundabout could be more difficult for these users than a conventional intersection.
- They may require longer walking distances for pedestrians
- They may not function well if traffic volumes are not balanced between the different approaches
- They may not be appropriate when terrain is not level
- They may limit access to properties in the immediate proximity of the intersection

The roundabouts analysis (See **Section 4.2.3: Roundabouts** below and the Draft EA's Appendix C Traffic Study) considered six intersections for the feasibility of roundabouts in place of a conventional traffic signal to accommodate traffic in the design year 2038. HDOT guidelines presently state that "until the agency and motorist gain greater experience, it is the policy of the department to generally limit consideration to modern single-lane roundabouts only. While modern multi-lane roundabouts can accommodate high volumes of traffic, there are inherent operational and design complexities with modern multi-lane roundabouts."

While HDOT policy currently limits roundabouts to a road with a two-lane cross-section, the findings of the traffic study determined that none of the intersections in the corridor would fall into that category by 2038 because of traffic capacity needs. Therefore, the analysis performed for roundabouts has taken the added step of analyzing roundabouts in the year 2018 as well as 2038, as there could be benefits to implementing roundabouts on a shorter timeframe than 2038.

For this reason, under the Preferred Alternative, it is proposed to implement roundabouts during the first phases of construction at Ainaloa Boulevard, Old Pāhoa Road, and Kahakai Boulevard, while these segments of roadway still contain two-lane segments. All of these locations are high accident locations (as noted in **Section 1.1.2.1: Safety**) and lend themselves well to use of a roundabout. Under the anticipated phasing for the project, it may be some years in the future before construction progresses to the point that these segments of roadway are widened to four lanes. After the roundabouts have been in operation for some time, if HDOT policy changes to allow two-lane roundabouts, those locations could be widened into two-lane roundabouts or else converted to traffic signals as appropriate.

### **New Issues or Clarification of Issues for Final EA**

Text has been added to the discussion above that describes both benefits and shortcomings of roundabouts.

There was both support for and opposition to roundabouts by commenters on the Draft EA. One commenter opposed to roundabouts compared them to much older traffic circles such as those provided in Washington, DC or other east-coast cities; traffic circles function differently and are much larger in radius and often have multiple lanes, requiring motorists to navigate a difficult course. They are not comparable to the roundabouts proposed at the three intersections where they would be provided. Modern roundabouts would be designed according to national standards and have demonstrated success throughout the United States.

Several commenters noted the need to educate the public about use of roundabouts and posed concerns about confusion. HDOT will promote information on travel in a roundabout as part of general public outreach on this project. Furthermore, roundabouts will be provided with standard traffic signs that will explain to motorists where and how they should yield, merge, etc.

In its comments on the Draft EA, the Hawai'i County Department of Planning asked for clarification on HDOT's Roundabouts policy as the text incorrectly implied that the justification for not allowing multi-lane roundabouts was due to safety concerns. The text above has been

modified to directly quote the policy, which notes agency and driver unfamiliarity with multi-lane roundabouts, and the complexity of such roundabouts.

## 2.2.4 Turn Lanes

Some of the intersections in the corridor have adequate turn lanes and others need new or lengthened turn lanes. As part of Preferred Alternative 4, turn lane additions and/or lengthening and other intersection improvements can be made at locations with available right-of-way and minimal construction impacts. Widening certain cross-streets may improve traffic operations, with or without new traffic signals or roundabouts. **Table 2-2: Turn Lane Additions or Lengthening Under the Preferred Alternative** indicates the locations where turn lanes (with a taper transition area) would be added or lengthened. Acceleration lanes would also be provided for turning traffic exiting intersections in these locations.

**Table 2-2: Turn Lane Additions or Lengthening Under the Preferred Alternative**

Intersection	Traffic Control	Travel Direction	Modification	Length (ft.), Including Tapers
Shower Drive	Committed Signal*	Mauka	New right turn lane	430
Kaloli Drive	New Signal	Mauka	New right turn lane	430
Orchidland Drive	New Signal	Makai	New right turn lane	305
Maku'u Drive	New Signal	Mauka	New right turn lane	455
Ainaloa Boulevard	New Signal/Roundabout	Makai	New left turn lane	455
Ka Ohuwalu Drive	Stop Sign	Mauka	New right turn lane	230
Old Pāhoa Road	New Signal/Roundabout	Makai	New right turn lane	630
Kahakai Boulevard	New Signal/Roundabout	Mauka	New right turn lane	430
Nanawale Homestead Rd. (Post Office Rd.)	Stop Sign	Mauka	New right turn lane	355
Pāhoa-Kapoho Road	Existing Signal	Makai	Lengthen existing left turn lane	430
		Mauka	New right turn lane	430

\*Will already be in place as part of Shoulder Improvements Project

### New Issues or Clarification of Issues for Final EA

In its comments on the Draft EA, the Hawai'i County Department of Planning asked for clarification of the traffic control at Kaloli Drive in the preceding table. The table has been revised to show a new signal proposed at this location.

## 2.2.5 Transit Improvements

Transit improvements such as the installation of bus stops, bus pull-outs, park and ride lots and other measures designed to increase transit usage and decrease the number of automobiles using the corridor. Locations for bus pull-outs/bus stops in the Preferred Alternative were selected after consultation with the Hawai'i County Mass Transit Agency. Bus pull-outs with

bus stops are proposed under the Preferred Alternative along both sides of the roadway corridor near:

- Shower Drive
- Kaloli Drive
- Pōhaku Circle (Pāhoa - bound direction only)
- Orchidland Drive
- Paradise Drive
- Maku'u Drive
- Ainaloa Boulevard
- Maku'u Farmer's Market

### **New Issues or Clarification of Issues for Final EA**

A number of commenters on the Draft EA expressed support for improving conditions for transit in the corridor.

A commenter on the Draft EA requested passenger rail service between Hilo and Kalapana. While rail would help address the needs of some travelers, it would not achieve the primary purpose and need of the project, which is to improve safety and capacity along Kea'au-Pāhoa Road. A rail solution is beyond the scope of this project.

## **2.2.6 Land Use Strategies Identified in the PCDP**

The Preferred Alternative assumes "Village Centers" and "Town Centers" are developed as per the Puna Community Development Plan. Refer to **Section 3.1.3.3: Puna Community Development Plan (PCDP)** for more detailed information on what these developments would entail. A series of village oriented development centers might result in lower overall traffic volumes in the corridor, and therefore better traffic operations with less roadway construction.

An assessment of the timing and implementation of the likely village and town centers was performed to enable assumptions of traffic generated by the centers under the TSM and other alternatives. (Colliers Monroe Friedlander Consulting, 2010). This assessment was updated for clarification from the assessment presented in the Draft EA based on comments received from the County of Hawai'i Department of Planning. The assessment sought to determine what conditions would be necessary to encourage the village and town center developments, what comparable neighborhoods in Hawai'i have had similar developments, and how many years it would take for the centers to initiate development and be fully built out. This assessment was based on population growth, housing sales, economic growth projections, available infrastructure, public support, financing availability, and other factors.

**Table 2-3: Estimated Development Timeline for Commercial Centers in PCDP** indicates the estimated progression of development for the various targeted markets identified in the Puna CDP. The anticipated timeline of development will follow various stages:

- no development,

**Table 2-3: Estimated Development Timeline for Commercial Centers in PCDP**

PCDP Market	PCDP Proposed Center* (see Sec. 3.1.1.3.3)	Estimated Commercial Development Timeline				
		5 years	10 years	15 years	20 years	25 years
<b>Kea'au</b>	Regional Town Center	Neighborhood Centers	Neighborhood Centers	Community Centers	Community Centers	Community Centers
<b>Pāhoa</b>	Regional Town Center	Small Commercial Centers	Neighborhood Centers	Neighborhood Centers	Community Centers	Community Centers
<b>Hawaiian Paradise Park</b>	1- Regional Town Center, 1-Community Village Center 1-Neighborhood Village Center	No Development	Limited owner user development	Small Commercial	Neighborhood Centers	Community Centers
<b>Orchidland</b>	Neighborhood Village Center	Small Commercial Centers	Small Commercial Centers	Neighborhood Centers	Neighborhood Centers	Neighborhood Centers
<b>Hawaiian Acres</b>	Community Village Center (in Kurtistown)	No Development	Limited owner user development	Small Commercial Centers	Neighborhood Centers	Neighborhood Centers
<b>Ainaloa</b>	Community Village Center	No Development	Limited owner user development	Small Commercial Centers	Neighborhood Centers	Neighborhood Centers
<b>Hawaiian Beaches</b>	Neighborhood Village Center	No Development	No Development	Limited owner user development	Small Commercial	Small Commercial
<b>Nanawale</b>	Future location subject to Community Review	No Development	No Development	Limited owner user development	Small Commercial Centers	Small Commercial Centers
<b>Leilani Estates</b>	Future Location Subject to Community Review	No Development	No Development	Limited owner user development	Small Commercial Centers	Small Commercial Centers
<b>Kapoho</b>	Future Location Subject to Community Review	No Development	No Development	Limited owner user development	Small Commercial Centers	Small Commercial Centers

\*Key: Regional Town Center = >30 acres, up to 250,000 sq. ft.; Community Village Center = 10-30 acres, up to 150,000 sq. ft.; Neighborhood Center = <10 acres, up to 50,000 sq. ft. Source: Colliers Monroe Friedlander Consulting, 2010 and PCDP, 2008.

- limited owner-user development (business owners develop facilities for their own operations),
- limited owner user development and small commercial development (expansion of services offered by existing businesses or new businesses develop next to existing ones).
- Neighborhood centers
- regional center projects once the population base and market demand reach appropriate levels.

The Puna trade area is widely dispersed over a large geographic area, and as a result a village center concept would best be applied to only those areas with the heaviest resident population density. Areas such as Kea'au and Pāhoa best meet those pre-conditions in order to elicit commercial development interest. However, as the table illustrates, it is likely that much of the development suggested in the PCDP might be at least 15 to 20 years into the future, with full build out to the levels prescribed by the PCDP occurring far beyond that.

#### **New Issues or Clarification of Issues for Final EA**

A number of commenters on the Draft EA requested that the project be consistent with the vision for Puna's future land use promoted in the Puna CDP.

In its comments on the Draft EA, the County of Hawai'i Department of Planning asked for clarification on some of the terminology used in this section, specifically "limited owner user development, small commercial." The discussion in this section has been revised to clarify the terminology.

In addition, in its comments, the Department of Planning suggested that some of the descriptions of land use in the table above were inaccurate and also requested a copy of the report that was used as the foundation for this discussion. The table intends to address future development market demand, rather than existing development as noted by the Department. The table and the report have been updated and the discussion above was modified to address the concern. The Department of Planning has been sent a copy of the report, per their request.

### **2.2.7 Phasing of Preferred Alternative**

The timeline for construction of the Preferred Alternative is still to be determined during the final design phase, and will be dictated by the availability of funds and resources. Construction phasing will start soon after final design, with an expected duration over a longer term. It is expected that construction will address the most immediate safety needs in the earliest phases of construction, with a focus on implementing signals/roundabouts and turn lanes at intersections, along with the access management measures and transit improvements. Capacity improvements that widen the highway to four lanes will be staged where the most immediate capacity needs are present.

## 2.3 Alternatives Considered in Draft EA but not Selected as Preferred Alternative

The discussion that follows covers the other alternatives that were considered in the Draft EA but not selected as the Preferred Alternative.

### 2.3.1 Alternative 1 - No-Build Alternative

The No-Build Alternative would generally keep the existing facility in its existing condition, and only includes any improvements that are already programmed and funded. While the No-Build Alternative would not fulfill the Purpose and Need for the project, it is always included in EA documents as a baseline condition for comparison to other alternatives.

As noted in **Section 1.2.2, Interim Improvements**, a number of actions are programmed and funded to improve Kea'au-Pāhoa Road prior to the full construction of the project as outlined in this EA. These improvements are considered as part of the No-Build Alternative. These interim improvements include the Kea'au-Pāhoa Shoulder Lane Conversion project, which would make the improvements outlined in **Table 2-4: Improvements in Kea'au-Pāhoa Shoulder Lane Conversion Project**.

The No-Build Alternative also includes interim plans for improved signage, striping, and channelization at Kahakai Boulevard.

**Table 2-4: Improvements in Kea'au-Pāhoa Shoulder Lane Conversion Project**

Construct a new Kea'au-bound shoulder lane and a second Kea'au-bound travel lane available for use 24 hours a day
Improve the Pāhoa-bound shoulder such that it would serve as a temporary travel lane during the PM Peak hours (along with the existing Pāhoa-bound travel lane)
Provide a traffic signal at the intersection of Shower Drive/Pōhaku Drive and Kea'au-Pāhoa Road.
To accommodate the wider cross-section, the Waipāhoehoe Bridge would be widened.
An abandoned 1930s-era concrete bridge immediately upstream of the Waipāhoehoe Bridge would be demolished to improve drainage in the area

Source: HDOT

### 2.3.2 Alternative 2 - TSM Alternative

A Transportation Systems Management (TSM) alternative provides another measure for comparison to the "Build Alternatives" as it considers low-cost and low-impact improvements that could be implemented easily and quickly with minimal levels of construction, probably within five years versus a longer-term period for the Preferred Alternative. All the elements of the TSM Alternative have been incorporated into the Preferred Alternative. The TSM

Alternative differs from the Preferred Alternative in that TSM would make localized improvements at intersections but not add additional travel lanes.

Actions that were evaluated under the TSM alternative include the following:

- Traffic control: Signals or Roundabouts (see **Section 2.2.3: Traffic Control Improvements Under the Preferred Alternative**)
- Turn Lanes (see **Section 2.2.4: Turn Lanes**)
- Access Management (See **Section 2.2.2: Access Control Under the Preferred Alternative**)
- Transit Improvements (See **Section 2.2.5: Transit Improvements**)
- Widening the Kea'au-bound approach of the Shower/Pōhaku Drive intersection to benefit from the widening performed under the Shoulder Lane Conversion Project.

**Figure 2-4: U-Turn Options Under Project Alternatives** provided a schematic view of how the two-lane TSM alternative would accommodate U-turn movements.

#### **New Issues or Clarification of Issues for Final EA**

In its comments on the Draft EA, the Hawai'i County Department of Planning asked for clarification of the provision of the access management measures under the TSM alternative, and if they would be provided under all Build Alternatives, as this point was not clear in the Draft EA. The access management measures would be included under Alternatives 3 and 5, as well as the Preferred Alternative.

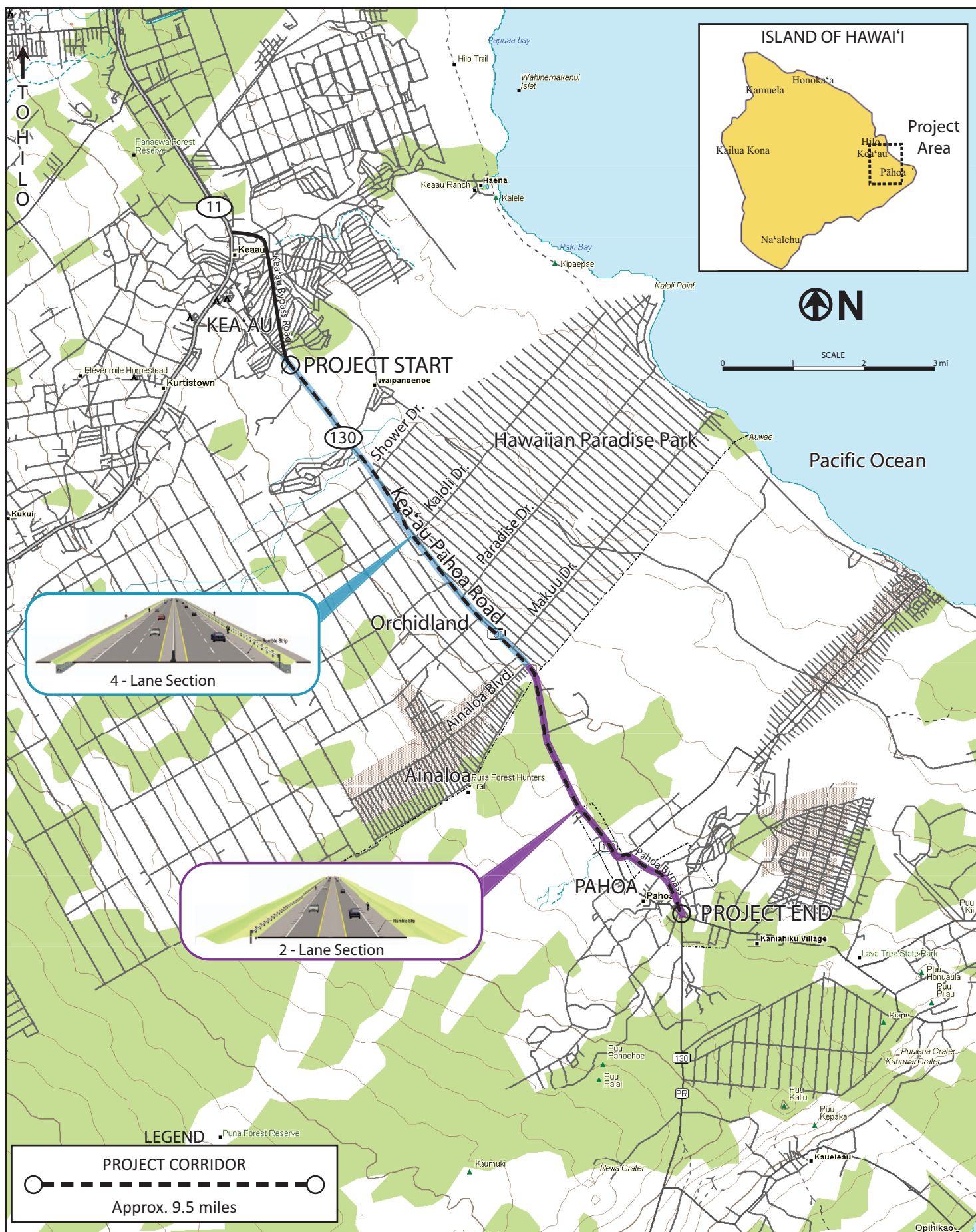
### **2.3.3 Build Alternatives 3 and 5**

Alternatives 3 and 5, the other "Build Alternatives" that were not selected as the Preferred Alternative, would widen the highway to varying levels to address the Purpose and Need for this project. The Build Alternatives assume a design year of 2038. As with the Preferred Alternative, all definitions and representations of the designs should be considered conceptual.

#### **2.3.3.1 Alternative 3 - Four-/Two-Lane Section**

Alternative 3 (see **Figure 2-5: Alternative 3**) would widen the highway to contain a four-lane divided cross section between the end of the Kea'au Bypass and Ainaloa Boulevard. The segment from Ainaloa Boulevard to Pāhoa-Kapoho Road would remain with two travel lanes. Appendix A: Roadway Design Plans in the Draft EA showed detailed design of Alternative 3. Signalization, roundabouts, landscaping, access control, median treatments, and access management would be identical to those described for the Preferred Alternative. The two-lane highway segment would or would not contain a median depending on specific conditions at any given location.

**Figure 2-2: Typical Cross Section** above showed the conceptual cross-section for the four-lane segment, which is identical to the configuration of the Preferred Alternative. **Figure 2-6: Typical Cross Section for Two-Lane Segments** shows the conceptual cross section for the two

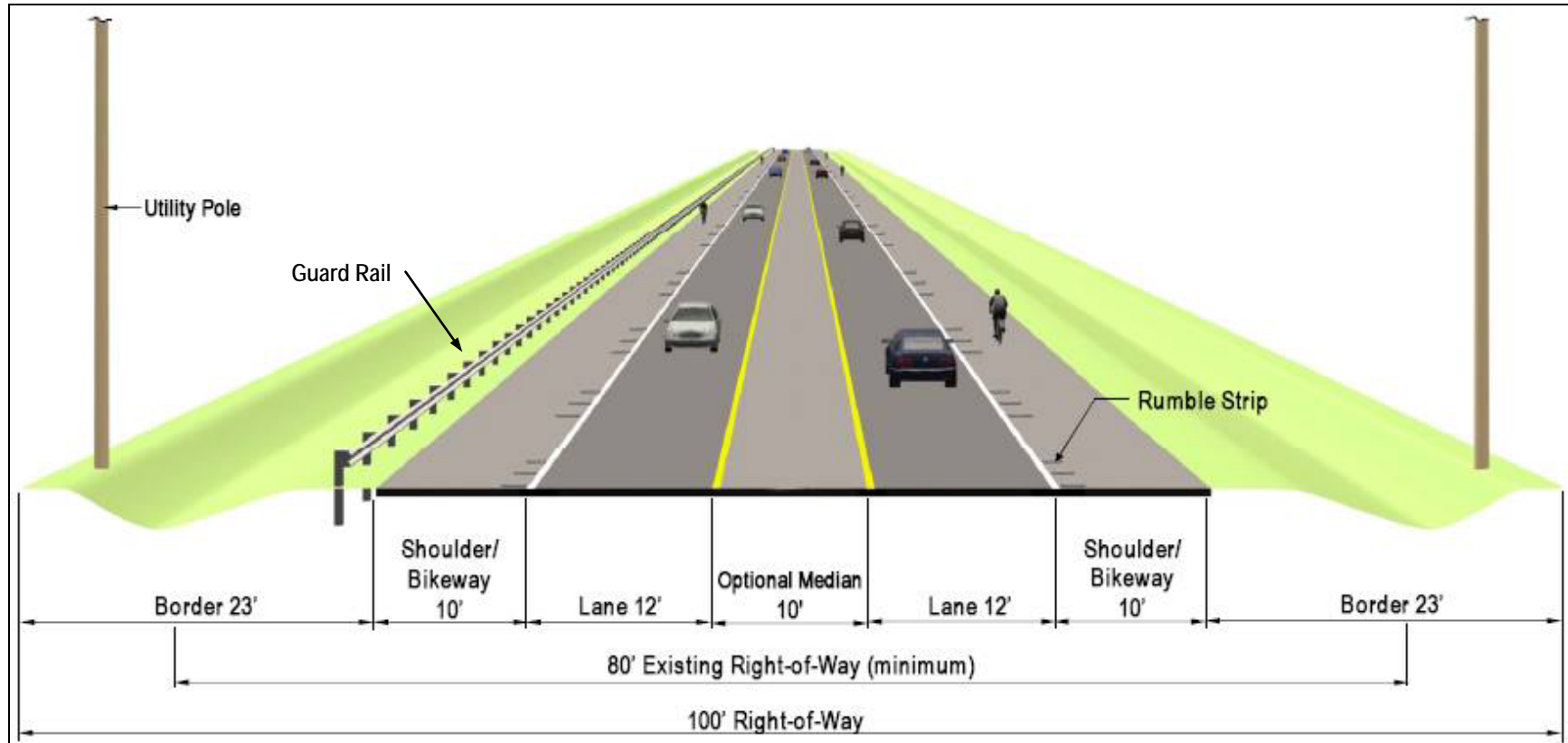


### Figure 2-5

Source:  
DeLorme 3-D TopoQuads



**Figure 2-6: Typical Cross Section for Two-Lane Segments**



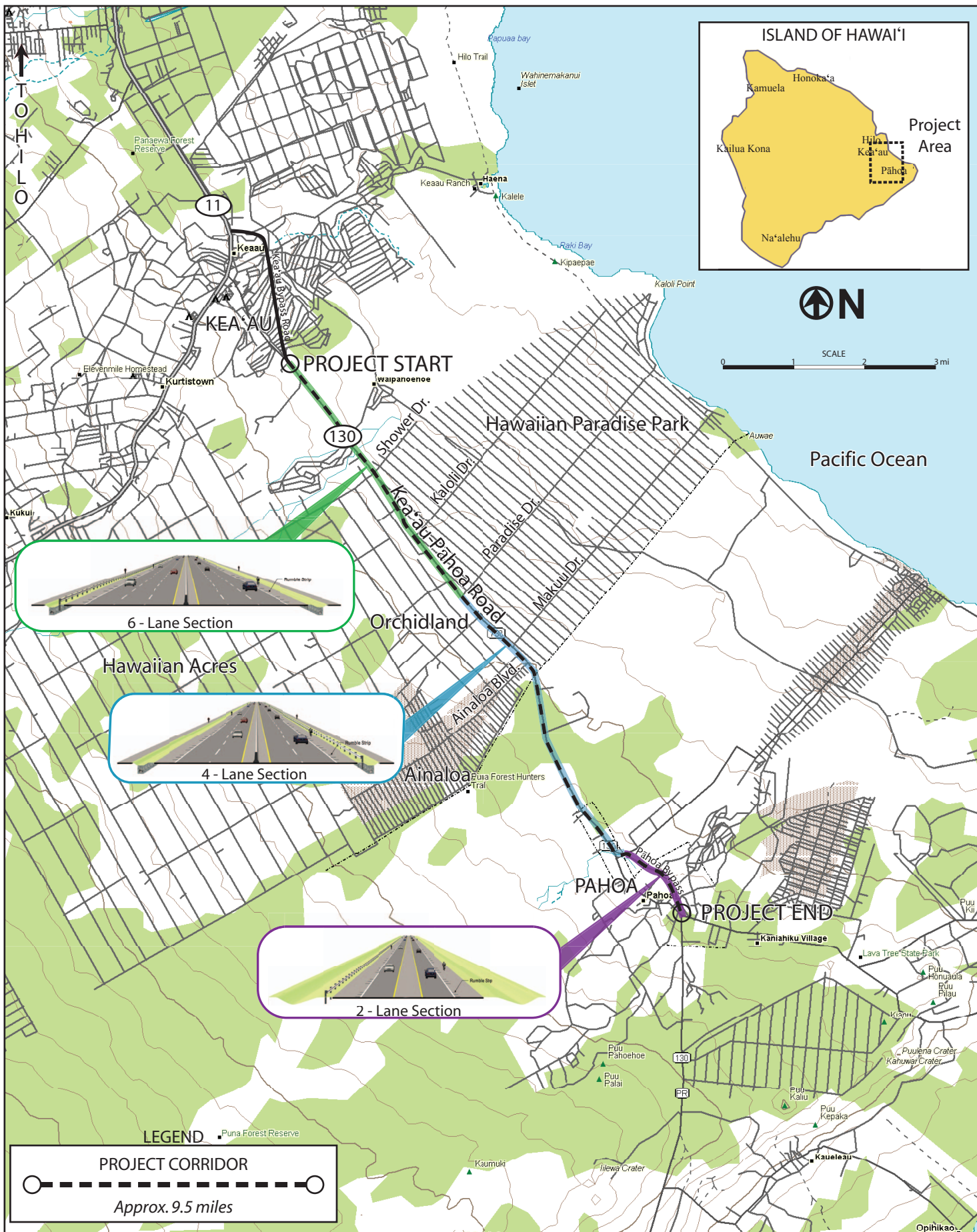
Note: Not to scale. Representative view; features such as guardrails may or may not be provided as needed on either or both sides at any given location.

lane roadway. The two-lane segment between Ainaloa Boulevard and Pāhoa-Kapoho Road would contain a 100-foot right-of-way with a wider buffer area to the sides.

### **2.3.3.2 Alternative 5 - Six-/Four-/Two-Lane Section**

Alternative 5 (refer to **Figure 2-7: Alternative 5**) would construct a highway that contains a six-lane divided cross section between the end of the Kea'au Bypass and Paradise Drive and a four-lane divided highway between Paradise Drive and Kahakai Boulevard. The segment from Kahakai Boulevard and Pāhoa-Kapoho Road would remain two lanes wide, but would have safety improvements at intersections and access points. Appendix A: Roadway Design Plans in the Draft EA showed detailed design of Alternative 5. Signalization, roundabouts, landscaping, access control, median treatments, and access management would be identical to those described for the Preferred Alternative. The two-lane highway segment would or would not contain a median depending on specific conditions at any given location.

**Figure 2-8: Typical Cross Section for Six-Lane Segment** below shows the conceptual cross-section for the six-lane roadway, **Figure 2-2: Typical Cross Section** above showed the conceptual cross section for the four-lane roadway, and **Figure 2-6: Typical Cross Section for Two-Lane Segments** below showed the conceptual cross section for the two-lane roadway. The six-lane segment between Kea'au and Paradise Drive would require 132 feet of right-of-way. As described earlier, the four-lane segment would require 108 feet of right-of-way, and the two-lane segment would contain a 100-foot right-of-way with a wider buffer to the sides.

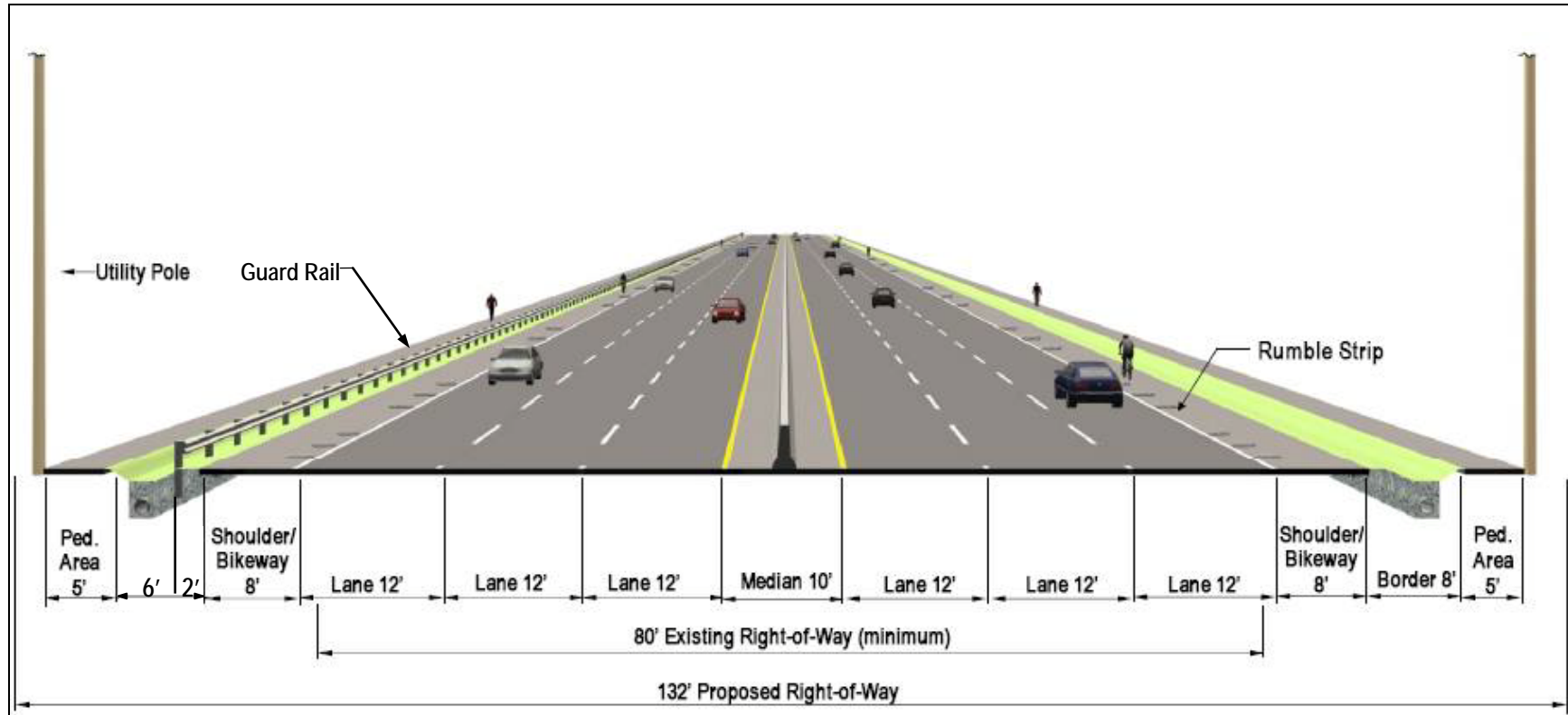


**Figure 2-7**

Source:  
DeLorme 3-D TopoQuads



**Figure 2-8: Typical Cross Section for Six-Lane Segment**



Note: Not to scale. Representative view; features such as guardrails may or may not be provided as needed on either or both sides at any given location.

## 2.4 Project Cost Estimates

The overall cost of the project is only one factor that was considered as part of the decision-making process for selecting a Preferred Alternative, along with the Purpose and Need for the project and environmental impacts. Nonetheless, cost is an important consideration. **Table 2-5: Preliminary Estimated Project Construction Costs for Alternatives, 2011 Dollars** provides estimates for constructing the project. The cost estimates provided do not include engineering costs or right-of-way acquisition costs, nor do they cover operational and maintenance costs once the improved Kea'au-Pāhoa Road is fully open for public use. In addition to the main highway, they also consider improvements from the access management measures recommended in **Section 2.2.2: Access Control Under the Preferred Alternative**, which would be included in all alternatives. As the table shows, the TSM Alternative is estimated to cost approximately \$30.3 million to construct, whereas the three Build Alternatives would range between approximately \$124 million and \$146 million. The Preferred Alternative is in the middle of this range, with an estimated cost of from about \$136 million to \$139 million. These figures are in current-year dollars.

**Table 2-5: Preliminary Estimated Project Construction Costs for Alternatives, 2011 Dollars**

Element	Preferred Alternative	TSM Alternative	Alternative 3	Alternative 5
Construction* of KP Road Alignment	<b>\$118,150,000</b>	\$19,900,000	\$107,270,000	\$125,880,000
Construction* of Access Management Roadways	<b>\$10,400,000</b>	\$10,400,000	\$10,400,000	\$10,400,000
Utility Relocations along Kea'au-Pāhoa Road**	<b>\$7,000,000 to \$10,000,000</b>	n/a	\$6,000,000 to \$9,000,000	\$7,000,000 to \$10,000,000
TOTALS***	<b>\$135,550,000 to \$138,550,000</b>	\$30,300,000	\$123,670,000 to \$126,670,000	\$143,280,000 to \$146,280,000

\*Includes 15% contingencies, site electrical and signalized intersections, Force Account Allowances, Archaeological Monitoring and 5% cost escalation

\*\* Assumes relocation of utility poles but not moving any new utilities underground. Cost range provided due to different possible types of poles. See **Section 4.13: Utilities** for more information.

\*\*\*Estimates do not include engineering, right-of-way, operational or maintenance costs

Source: SSFM International

## 2.5 Alternatives Considered Prior to Draft EA But Not Analyzed

As described above in greater detail in **Chapter 1: Purpose and Need for Project**, prior to the EA process, HDOT worked extensively with the affected communities to implement a Context Sensitive Solutions (CSS) process. The Kea'au-Pāhoa Advisory Group (KPAG) identified a full range of alternatives to be carried forward into this Environmental Assessment.

A universe of alternatives was discussed at KPAG meetings of the and at Public information meetings (PIMs). This universe of alternatives was then analyzed and some were consolidated and carried forward whereas others were not carried forward. All decisions to retain or eliminate alternatives from consideration came from KPAG and PIM input and/or from professional engineering judgment on the part of HDOT and its consultants. All of the rejected alternatives discussed in this section were discussed at KPAG meetings and public information meetings.

The elements not carried forward into the EA process and the explanations for why they were not carried forward are described next.

### Selected Treatments for Transit, Bicycle and Pedestrian Use of Kea'au-Pāhoa Road

- Create a bus lane only. This was eliminated because it did not increase the capacity of the corridor; furthermore, it was not consistent with purpose and need.
- Add a 12-foot multi-use path separated from roadway by 10-foot landscaping. This was eliminated due to the need of additional right-of-way. KPAG Members wanted to minimize impacts of right-of-way acquisitions on adjacent landowners.
- Create a High Occupancy Vehicle (HOV) lane or contra-flow lane during peak hours. This was eliminated because it did not sufficiently increase the capacity of the corridor; furthermore, it was not consistent with purpose and need.

### Turning Movements, Merges and Intersections

- Left hand merge lanes at u-turns, if signalized. This was eliminated due to the need for additional right-of-way. KPAG Members wanted to minimize the right-of-way acquisitions.
- Frontage Roads in residential sections were eliminated from further consideration because of the right-of-way impacts, but the access control strategy outlined in **Section 2.2.2: Access Control Under the Preferred Alternative** contains many of the same benefits and would provide superior opportunities for mobility between subdivisions and is thus considered a superior treatment.

### Widening Alternatives

- Four-lane widening from Kea'au Bypass to Shower Drive. This was eliminated because it did not sufficiently increase the capacity of the corridor (the segment was too short); thus, it was not consistent with purpose and need.

- Four-lane widening from Kea'au Bypass to Paradise Drive. This was eliminated because it did not sufficiently increase the capacity of the corridor; thus, it was not consistent with purpose and need.
- Widen Hilo bound side only. This was eliminated because it did not increase the capacity of the corridor; thus, it was not consistent with purpose and need.
- Add a lane in middle for contraflow during peak hours only. This was eliminated because it did not increase sufficiently the capacity of the corridor; furthermore, this was not consistent with purpose and need. This would also be costly to maintain on a daily basis.
- A three-lane section (one travel lane in each direction with a two-way-left-turn-lane in the middle). This was eliminated because it did not increase the capacity of the corridor and would pose safety concerns with the operation of the middle turn lane.

#### Other

- Underground utilities. This was considered too expensive to construct. KPAG Members felt money would be wisely spent on other aspects of the project.
- Utilities in berms on side. This would be expensive to construct. KPAG Members felt money would be better spent on other aspects of the project.
- Scenic vistas. This was considered too expensive to construct. KPAG Members felt money would be better spent on other aspects of the project.

KPAG Members determined the various lane combinations along the corridor as presented in the preceding sections of this chapter. In segments where project alternatives are proposed to have a four-lane cross section, alternatives with three and five lanes were eliminated due to lack of capacity and impacts to right-of-way, respectively.

#### **New Issues or Clarification of Issues for Final EA**

In its comments on the Draft EA, the Hawai'i County Department of Planning asked for clarification on the decision-making process for determining that alternatives in this section of the document would not be carried forward into the Draft EA. Text has been added above to address this concern.

***THIS PAGE INTENTIONALLY LEFT BLANK***

## CHAPTER 3: AFFECTED ENVIRONMENT

### 3.1 Land Use and Zoning

#### 3.1.1 Existing Communities and Land Uses

##### Summary of Discussion in Draft EA

- Kea'au-Pāhoa Road serves Puna Makai or lower Puna, an area influenced by lava flows and defunct sugar plantations. A diversified agricultural industry is located in Puna.
- Besides the older central town centers of Kea'au and Pāhoa, the Kea'au-Pāhoa Road corridor passes between a number of large non-conforming subdivisions that were platted in the mid-20th Century, with over 50,000 lots. **Figure 3-1: Puna Subdivisions By Year of Establishment** illustrates these subdivisions.
- Despite hazards and substandard conditions, Puna is the fastest growing district on Hawai'i Island in large part from its affordability. In the 30-year period from 1970 to 2000, the Puna District's population increased six-fold from approximately 5,100 to 31,335 persons.

The demographics and population of the study area are discussed in greater detail in the Draft EA's Section 3.3.1: Population and the Draft EA's Appendix G: Social Impact Assessment.

##### New Issues or Clarification of Issues for Final EA

The study area for the Preferred Alternative has been revised to include local streets within the Hawaiian Paradise Park and Orchidland subdivisions, as noted in **Section 2.2.2: Access Control Under the Preferred Alternative**. These areas were studied in the Draft EA as part of the TSM Alternative.

#### 3.1.2 State Land Use Designations

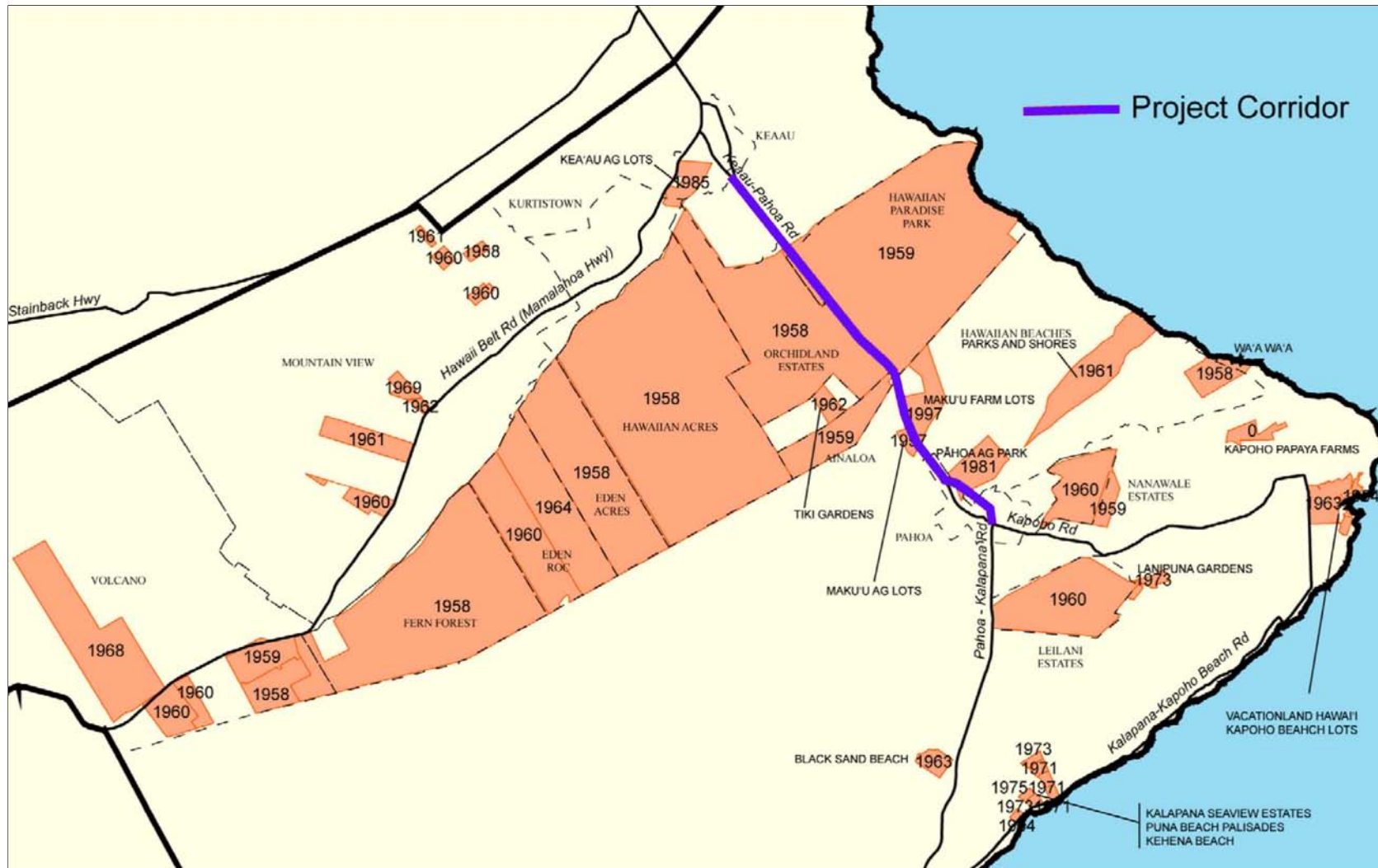
##### Summary of Discussion in Draft EA

- Approximately 55 percent of Puna's lands are in the State Agriculture Land Use District, followed by 43 percent in the State Conservation District. Only two percent of Puna's land area is designated Urban, and a miniscule 0.04 percent is designated Rural. (2005 Hawai'i County General Plan, Table 14-1).
- Kea'au-Pāhoa Road is an existing permitted use in an Agricultural area. The County has oversight of Urban areas, and would permit a public roadway in an Urban area.

##### New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

**Figure 3-1: Puna Subdivisions By Year of Establishment**



Source: Adapted from Townscape, Inc. Puna Regional Circulation Plan, 2005.

### **3.1.3 Hawai'i County Plans and Policies**

Hawai'i County has a three-tiered comprehensive planning system: 1) the General Plan, 2) short and mid- range plans, and 3) tools such as the Zoning and Subdivision Codes along with the operating and capital improvement program budgets.

#### **3.1.3.1 County of Hawai'i General Plan**

##### **Summary of Discussion in Draft EA**

- The County has dictated future land use plans in the Land Use Pattern Allocation Guide (LUPAG) Map. The LUPAG Map is shown in **Figure 3-2: Hawaii County Land Use Pattern Allocation Guide (LUPAG)**.

##### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

#### **3.1.3.2 County of Hawai'i Zoning**

##### **Summary of Discussion in Draft EA**

- Virtually all of the area around Kea'au-Pāhoa Road is zoned Agricultural, at varying levels of density, as shown in Figure 3-3: County of Hawaii Zoning.

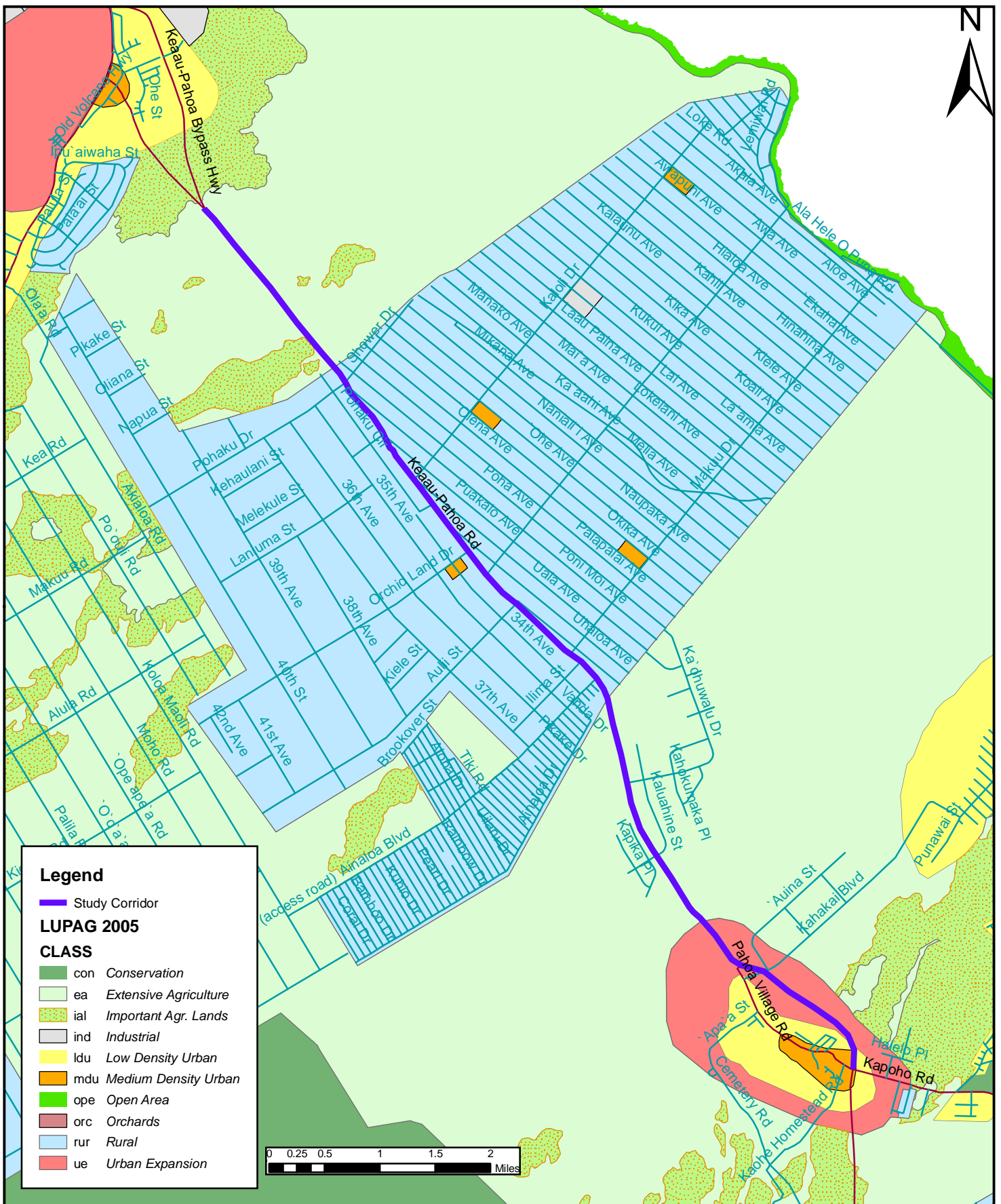
##### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

#### **3.1.3.3 Puna Community Development Plan (PCDP)**

##### **Summary of Discussion in Draft EA**

- The Puna Community Development Plan (PCDP) was adopted in September, 2008 with an extensive community participation program. The PCDP process is currently entering the implementation phase.
- The PCDP recognized that if the growth trends of the Puna District continue, dramatic long-term consequences could result from: natural hazards (see **Section 3.8: Geographic Setting and Natural Hazards**), demand for improved infrastructure, sprawl development, residential in-fill development limiting agricultural uses, and forest degradation.
- To counteract these trends, the PCDP recommends a new land use pattern along the project corridor. To redirect Puna's extensive subdivisions from their present course of development, the PCDP proposes three types of village/town centers. (See **Figure 3-4: PCDP Proposed Town and Village Center Locations**).



# Hawaii County Land Use Pattern Allocation Guide (LUPAG)

Kea'au-Pāhoa Road Improvements, Kea'au to Pāhoa, Project No. STP-0130(27)  
State of Hawai'i, Department of Transportation

Figure 3-2

Source:

Hawaii County



# County of Hawaii Zoning

*Kea 'au-Pāhoā Road Improvements, Kea 'au to Pāhoā, Project No. STP-0130(27)*  
*State of Hawai'i, Department of Transportation*

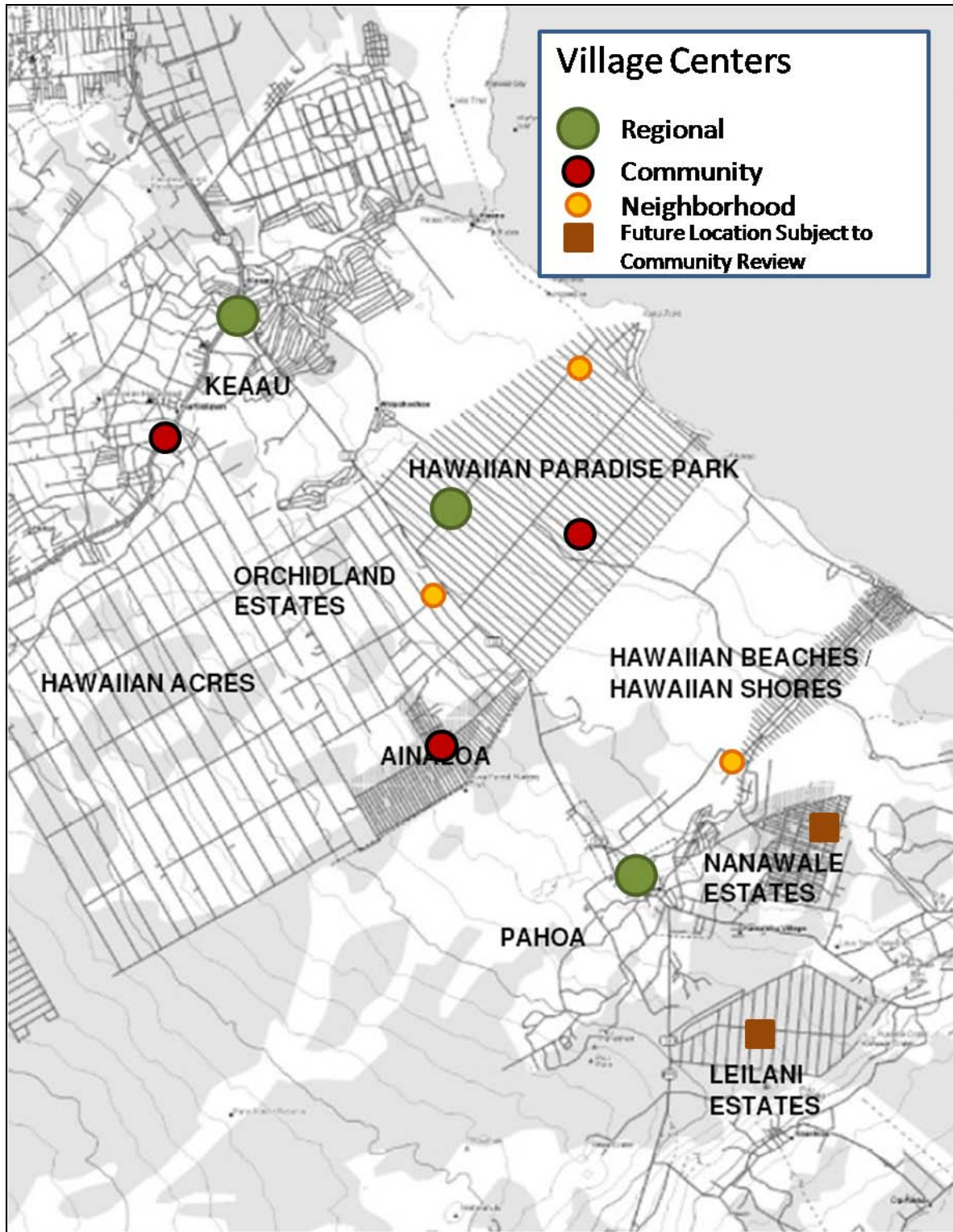
Figure 3-3

*Source:*

Hawaii County



Figure 3-4: PCDP Proposed Town and Village Center Locations



Source: Adapted from 2008 Puna Community Development Plan, Figure 3-2

- **Table 3-1: PCDP General Use and Design Criteria by Village/Town Center Type** provides more description of the PCDP's vision for the village and town centers. Refer to **Section 2.2.6: Land Use Strategies Identified in the PCDP** for more information on the estimated timeframe for these developments.
- The PCDP has recommended preliminary boundaries for these Village/Town center areas.

#### **New Issues or Clarification of Issues for Final EA**

The study area for the Preferred Alternative has been revised to include local streets within the Hawaiian Paradise Park and Orchidland subdivisions, as noted in **Section 2.2.2: Access Control Under the Preferred Alternative**. These access improvements will help support the PCDP Village and Town Center concept.

### **3.1.3.4 Puna Regional Circulation Plan (PRCP)**

#### **Summary of Discussion in Draft EA**

- The PRCP emphasized mixed-use village center developments that provide mixed land uses and services within neighborhoods. These would serve transit and pedestrians and counteract the auto-dependent focus of past land use decisions in the region.
- The PRCP examined three different land use scenarios to emphasize village center land use development while also supporting Puna's rural character: Status quo, "Town Centers", and "Village Centers". The village centers concept was recommended to reduce overall vehicle miles traveled and demand and served as a precursor to the study of the PCDP.

#### **New Issues or Clarification of Issues for Final EA**

The study area for the Preferred Alternative now has access management measures that will support this land use concept.

**Table 3-1: PCDP General Use and Design Criteria by Village/Town Center Type**

<b>Criterion</b>	<b>Regional Town Center</b>	<b>Community Village Center</b>	<b>Neighborhood Village Center</b>
<b>Service Area Population</b>	20,000 to 50,000 residents	7,000 to 15,000 residents	3,000 to 6,000 residents
<b>Typical Uses</b>	More than 40 tenant spaces for full range of retail and personal services, repair shops and other light industrial uses	20 to 40 small tenant spaces for retail and personal services, repair shops	5 to 15 small tenant spaces for convenience retail and personal services
<b>Commercial Land Area</b>	More than 30 acres	10-30 acres	Up to 10 acres
<b>Commercial Floor Area</b>	Up to 250,000 square feet aggregate, but no tenant spaces larger than 50,000 square feet.	Up to 150,000 square feet aggregate, but no tenant spaces larger than 25,000 square feet.	Up to 50,000 square feet
<b>Other Uses</b>	Regional park; schools (all grades); community hall, theater; outdoor events area; bed-and-breakfast homes and small inns; elderly or other special needs housing; transit hub; medical facility with emergency room; police and fire station; walking and bicycling paths.	Community park, elementary or middle school, community center and outdoor events area; bed-and-breakfast homes and small inns; elderly or other special needs housing; transit stop; medical clinic; walking and bicycling paths.	Neighborhood park, elementary school, multi-purpose meeting room or (minimum) place to congregate or post community notices; outdoor events area (e.g., barbeques and farmer's markets); small bed-and-breakfast homes; transit (or paratransit) stop; connections to walking and bicycling paths.
<b>Design Character</b>	Vernacular architecture that respects the historic context and scale of the community; light industrial uses on periphery to avoid building forms or activities that conflict with the pedestrian-oriented character in the Town Center core; small repair shops in Town Center core subject to performance/design criteria.	Informal, vernacular architecture that utilizes natural exterior materials and earth-tone colors and respects the context and scale of the community, especially where historic structures are present, such as in Volcano Village and the older area of Mountain View.	Informal, vernacular architecture that is small in scale and reflects a rural residential ambience, using natural exterior materials and earth-tone colors.
<b>Access</b>	Access to one or more paved roads; commercial or public uses without direct driveway access to Highway 11 or Highway 130.	Access to one or more paved roads; commercial or public uses without direct driveway access to Highway 11 or Highway 130; no "drivethru" commercial use.	Access to a paved road, except that there should be no direct access or visibility from either Highway 11 or Highway 130; no "drivethru" commercial use.

Source: 2008 Puna Community Development Plan, Table 5-1

### 3.1.4 State of Hawai'i Department of Hawaiian Homelands

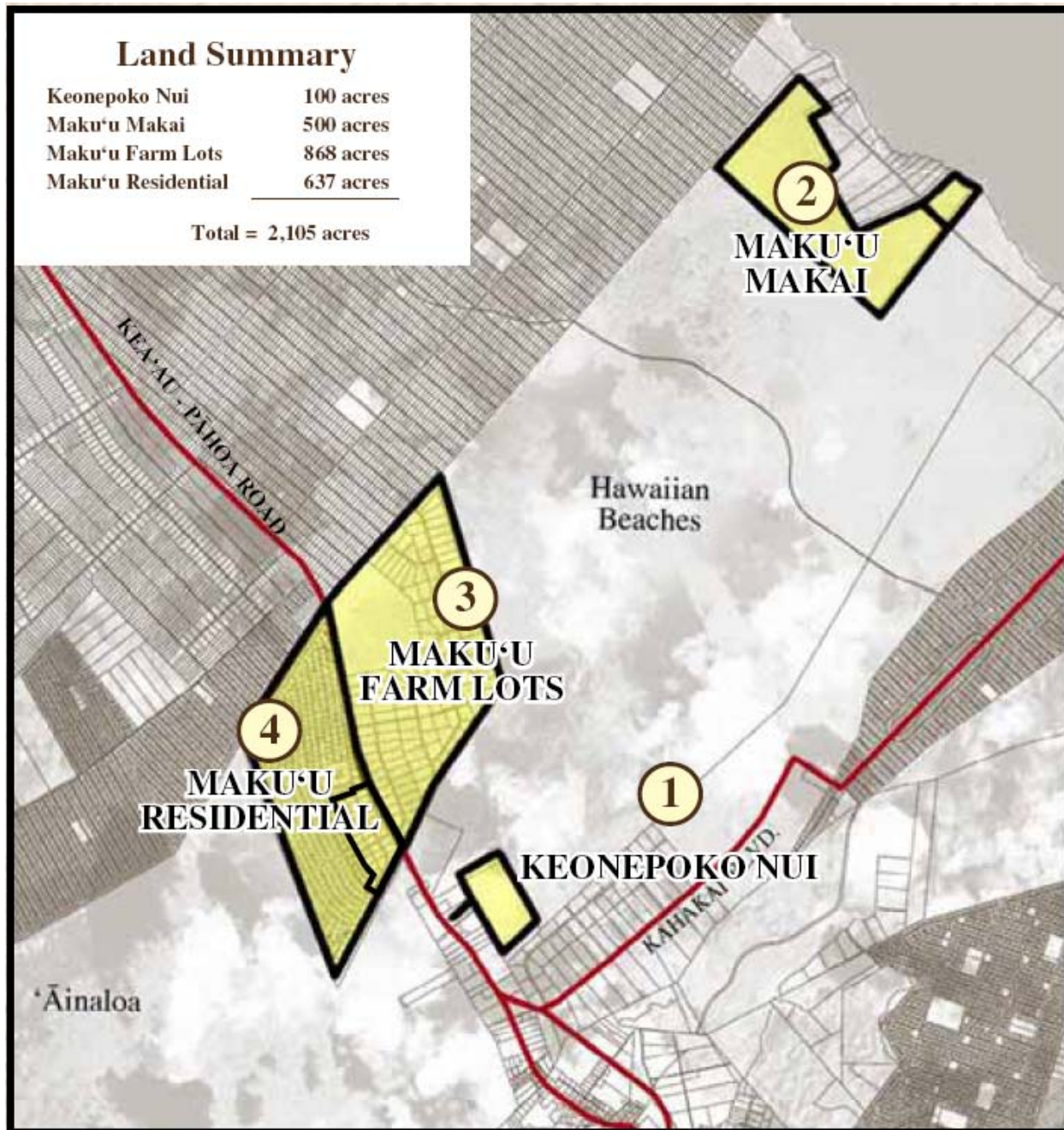
#### Summary of Discussion in Draft EA

- The State Department of Hawaiian Home Lands (DHHL) has four holdings in its Maku'u Region that are of interest, illustrated in **Figure 3-5: DHHL Lands Near Kea'au-Pāhoa Road**. Per the April, 2008 DHHL Maku'u Regional Plan, they are:
  - Keonepoko Nui, 100-acres, limited by access limitations and parcel size.
  - Maku'u Makai, 500 acres. Adjacent to Hawaiian Paradise Park subdivision. Water and sewer system needs and associated costs constrain priority development at this time.
  - Maku'u Farm Lots, 868 acres makai of and accessed from Kea'au-Pāhoa Road. Smaller arterial streets have been developed by DHHL to provide access to the developed agriculture lots. Nine acres are licensed to the Maku'u Farmers' Association (MFA).
  - Maku'u Residential, 640 acres mauka of the Maku'u Farm Lots and Kea'au-Pāhoa Road. In 1998, 50 two-acre agriculture lots were developed. Twelve will be consolidated and re-subdivided into residential lots. Most lack public water supply. Future plans call for over 700 additional residential and agricultural lots with a park, roads, drainage, water, overhead electric, road lighting, and underground telecommunications.

#### New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

Figure 3-5: DHHL Lands Near Kea'au-Pāhoa Road



Source: DHHL Maku'u Regional Plan, April 2008

## 3.2 Traffic and Transportation

### Overview

- The performance of traffic operations on roadway segments and intersections is reflected by the term Level of Service (LOS) which is a scale with ratings of A (best) to F (extreme congestion and delay). Transportation engineers and planners try to design roadways to achieve an LOS C although LOS D is acceptable during peak periods in urban areas. LOS E and LOS F are typically considered unacceptable.
- Traffic analyses studied AM and PM peak hours (7:00 AM to 8:00 AM, and 4:15 PM to 5:15 PM).
- For the purposes of the traffic analyses, “westbound” means towards Kea’au and Hilo, and “eastbound” is towards Pāhoa and Kalapana. For cross-streets, “northbound” is heading towards the ocean (makai) and “southbound” is heading inland (mauka).
- At the beginning of project planning in 2008, it was assumed that the project would be fully completed by 2018, ten years later. A design year twenty years beyond that 2018 completion date was assumed, as per FHWA guidelines so the modeling and forecasting was projected out to the year 2038. An interim year of 2028 was also used for some of the analyses.

### New Issues or Clarification of Issues for Final EA







Two commenters on the Draft EA expressed some confusion about the designation of 2038 as a design year, and expressed concern that implied the project would not be finished until 2038. The preceding bullet has been clarified from the original text in the Draft EA to make the concept of design year more clear for readers.

### 3.2.1 Existing Roadway Volumes and Level of Service

#### Summary of Discussion in Draft EA

- As noted above, the LOS for roadway operations is described by a letter scale ranging from A to F. **Figure 3-6: Representations of Level of Service Along a Multi-Lane Highway** shows illustrative images of LOS along the segments of a highway between cross-streets.
- Year 2006 traffic operations between intersections in the corridor are outlined in **Table 3-2: Volumes, Capacity and LOS Along Corridor, Existing Year (2006), AM Peak Hour** and in **Table 3-3: Volumes, Capacity and LOS Along Corridor, Existing Year (2006), PM Peak Hour**. As the tables demonstrate, both AM and PM peak hours show pronounced levels of delay between intersections.
- In the AM hour, between Kaloli Drive and Pōhaku Circle, existing traffic operates at a LOS E, which is close to capacity conditions, and would be typified by lower speeds and increased conflicts between vehicles. The traffic between Pōhaku Circle and Shower Drive operates at

**Figure 3-6: Representations of Level of Service Along a Multi-Lane Highway**

<b>Level Of Service</b>	<b>Flow Conditions</b>	<b>Technical Descriptions</b>
<b>A</b>		Highest level of service. Traffic flows freely with little or no restrictions in maneuverability. <b>No Delays</b>
<b>B</b>		Traffic flows freely, but drivers have slightly less freedom to maneuver. <b>No Delays</b>
<b>C</b>		Density becomes noticeable with ability to maneuver limited by other vehicles. <b>Minimal Delays</b>
<b>D</b>		Speed and ability to maneuver is severely restricted by increasing density of vehicles. <b>Minimal Delays</b>
<b>E</b>		Unstable traffic flow. Speeds vary greatly and are unpredictable. <b>Minimal Delays</b>
<b>F</b>		Traffic flow is unstable, with brief periods of movement, followed by forced stops. <b>Significant Delays</b>

Source: Adapted from and Courtesy of California Department of Transportation, based on 2000 Highway Capacity Manual, Exhibit 21-3, Speed-Flow Curves with LOS Criteria for Multi-Lane Highways

**Table 3-2: Volumes, Capacity and LOS Along Corridor, Existing Year (2006), AM Peak Hour**

From	To	Westbound to Kea'au				Eastbound to Pāhoa			
		Volume	Capacity	v/c	LOS	Volume	Capacity	v/c	LOS
Opukahaia Street	Transfer Station Driveway	2143*	2712*	0.79*	D*	687	1410	0.49	C
Transfer Station Driveway	Pōhaku Drive/Shower Drive	2115*	2712*	0.78*	D*	653	1410	0.46	C
Pōhaku Drive/Shower Drive	Pōhaku Place	1436	1410	1.02	F	618	1410	0.44	C
Pōhaku Place	Kaloli Drive	1417	1410	1.00	F	595	1410	0.42	C
Kaloli Drive	Pōhaku Circle (South)	941	1128	0.83	E	491	1128	0.44	C
Pōhaku Circle (South)	Orchidland Drive	849	1410	0.60	D	536	1410	0.38	C
Orchidland Drive	Paradise Drive	954	1410	0.68	D	512	1410	0.36	C
Paradise Drive	Auli'i Street	827	1128	0.73	D	527	1128	0.47	C
Auli'i Street	Maku'u Drive	809	1410	0.57	D	491	1410	0.35	C
Maku'u Drive	Ilima Street	837	1410	0.59	D	557	1410	0.40	C
Ilima Street	Ainaloa Boulevard	880	1410	0.62	D	558	1410	0.40	C
Ainaloa Boulevard	Ka Ohuwalu Drive	671	1410	0.48	C	459	1410	0.33	C
Ka Ohuwalu Drive	Kaluahine Place	674	1128	0.60	D	550	1128	0.49	C
Kaluahine Place	Old Pāhoa Road	661	1410	0.47	C	556	1410	0.39	C
Old Pāhoa Road	Kahakai Boulevard	627	1410	0.44	C	402	1410	0.29	B
Kahakai Boulevard	Nanawale Homestead (Post Office Road)	445	1128	0.39	C	378	1128	0.34	C
Nanawale Homestead	Unnamed	405	1128	0.36	C	328	1128	0.29	B
Unnamed	Kapoho Road	416	1128	0.37	C	322	1128	0.29	B

\*Includes temporary use of shoulder as a travel lane during AM peak hour

Source: SSFM International

**Table 3-3: Volumes, Capacity and LOS Along Corridor, Existing Year (2006), PM Peak Hour**

From	To	Westbound to Kea'au				Eastbound to Pāhoa			
		Volume	Capacity	v/c	LOS	Volume	Capacity	v/c	LOS
Opukahaia Street	Transfer Station Driveway	740	1410	0.52	C	1662	1410	1.18	F
Transfer Station Driveway	Pōhaku Drive/Shower Drive	672	1410	0.48	C	1573	1410	1.12	F
Pōhaku Drive/Shower Drive	Pōhaku Place	638	1410	0.45	C	1522	1410	1.08	F
Pōhaku Place	Kaloli Drive	682	1410	0.48	C	1415	1410	1.00	F
Kaloli Drive	Pōhaku Circle (South)	547	1128	0.48	C	1139	1128	1.01	F
Pōhaku Circle (South)	Orchidland Drive	556	1410	0.39	C	1186	1410	0.84	E
Orchidland Drive	Paradise Drive	670	1410	0.48	C	1180	1410	0.84	E
Paradise Drive	Auli'i Street	519	1128	0.46	C	1015	1128	0.90	E
Auli'i Street	Maku'u Drive	536	1410	0.38	C	865	1410	0.61	D
Maku'u Drive	Ilima Street	506	1410	0.36	C	923	1410	0.65	D
Ilima Street	Ainaloa Boulevard	536	1410	0.38	C	884	1410	0.63	D
Ainaloa Boulevard	Ka Ohuwalu Drive	494	1410	0.35	C	761	1410	0.54	C
Ka Ohuwalu Drive	Kaluahine Place	501	1128	0.44	C	724	1128	0.64	D
Kaluahine Place	Old Pāhoa Road	481	1410	0.34	C	693	1410	0.49	C
Old Pāhoa Road	Kahakai Boulevard	377	1410	0.27	B	576	1410	0.41	C
Kahakai Boulevard	Nanawale Homestead (Post Office Rd.)	340	1128	0.30	C	369	1128	0.33	C
Nanawale Homestead (Post Office Rd.)	Unnamed	279	1128	0.25	B	360	1128	0.32	C
Unnamed	Kapoho Road	285	1128	0.25	B	319	1128	0.28	B

Source: SSFM International

a LOS F, which is at or above capacity, and would be indicative of very low speeds, high congestion, and stop-start conditions.

- Even higher levels of congestion occur in the PM Peak Hour. From Kea'au towards Pāhoa, traffic is subjected to over-capacity stop-and-start conditions, LOS F, between the Kea'au merge and Pōhaku Circle. The traffic remains close to capacity, with slow speeds and a LOS E between Pōhaku Circle and Auli'i Street.

#### **New Issues or Clarification of Issues for Final EA**





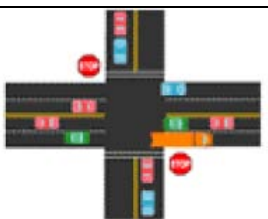

A commenter on the Draft EA noted some confusion with the name of Nanwale Homestead Road in Pāhoa. The name "Post Office Road" has been added to tables to reflect the name that many local residents commonly use for this street.

### **3.2.2 Intersection LOS**

#### **Summary of Discussion in Draft EA**

- At intersections, LOS is a product of approach delay and traffic progression. The LOS for unsignalized intersections vary by the available gap space (space between vehicles in opposing streams of traffic). The LOS for signalized intersections is affected by the traffic signal's cycle length (length of time for all phases of the signal to operate) and the number of phases, which both add additional delay.
- Roundabouts can handle high demand flow levels comparable to those accommodated by signals. Therefore, LOS criteria for signalized intersections are also used for roundabouts.
- **Figure 3-7: Representations of Levels of Service for Stop-Sign Controlled Intersections** provides a visual representation of Levels of Service at unsignalized intersections, with the main highway running from left-to-right in the illustrations, and the cross streets running up and down. As the illustrations show, once the LOS starts approaching LOS E or LOS F, there are few gaps available for the cross-street traffic to maneuver as desired. Motorists may have to wait longer for gaps, or make their turning/crossing maneuver faster than otherwise necessary under lower-volume conditions.
- As **Table 3-4: Existing LOS and V/C, AM Peak Hour, Year 2006, Study Corridor Intersections** demonstrates, during the AM peak hour, intersections of Kea'au-Pāhoa Road with the Kea'au Transfer Station, Shower/Pōhaku Drive, Pōhaku Place, Kaloli Drive, Orchidland Drive, Ainaloa Boulevard, and Kahakai Boulevard all have movements from the cross streets that operate at an LOS F, meaning that it is extremely difficult for these cross-streets to get a break in traffic to turn, particularly for left turns. Four other locations operate at a marginally better LOS E.
- **Table 3-5: Existing LOS and V/C, PM Peak Hour, Year 2006, Study Corridor Intersections** demonstrates a similar situation in the PM Peak hour. Opukahaia Street, the Kea'au

**Figure 3-7: Representations of Levels of Service for Stop-Sign Controlled Intersections**

<b>Level Of Service</b>	<b>Flow Conditions</b>	<b>Technical Descriptions</b>
<b>A</b>		<b>Short Delays</b>
<b>B</b>		<b>Short Delays</b>
<b>C</b>		<b>Minimal Delays</b>
<b>D</b>		<b>Minimal Delays</b>
<b>E</b>		<b>Significant Delays</b>
<b>F</b>		<b>Considerable Delays</b>

Source: Adapted from and Courtesy of California Department of Transportation, based on 2000 Highway Capacity Manual, Exhibit 17-2, LOS Criteria for Two Way Stop Controlled Intersections

**Table 3-4: Existing LOS and V/C, AM Peak Hour, Year 2006, Study Corridor Intersections**

Intersection with Kea'au-Pāhoa Road			Individual Traffic Movements											
Cross Street	Traffic Control	Overall LOS	Eastbound			Westbound			Northbound			Southbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Opukahaia St.	Stop			0.47		A	0.71		C		C			
Kea'au Transfer Station	Stop		C	0.44			0.71					F		F
Shower Drive	Stop		C	0.41		A	<b>0.96</b>		F			F		
Pōhaku Place	Stop			0.42		A	0.64		F		F			
Kaloli Drive	Stop		B	0.32			0.64					F		
Pōhaku Circle	Stop			0.33		A	0.57		C					
Orchidland Dr.	Stop			0.32	0.05	A	0.59		F					
Paradise Drive	Stop		A	0.29			0.40	0.03				E		
Auli'i Street	Stop			0.35	0.01	A	0.54		E					
Maku'u Drive	Stop		B	0.28			0.39	0.17				E		
Ilima Street	Stop			0.38		<b>1.06</b>			D		D			
Ainaloa Blvd.	Stop			0.30	0.08	A	0.41		F					
Ka Ohuwalu	Stop		A	0.39			0.46					C		C
Kaluahine St.	Stop		A	0.36		A	0.45		D			C		
Old Pāhoa Rd.	Stop			0.23	0.15	A	0.35		E		E			
Kahakai Blvd.	Stop		A	0.17			0.24	0.06				F		F
Nanawale Homestead Rd (Post Office Rd.)	Stop		A			A			C			C		
Unnamed Road	Stop		A			A			A			A		
Kapoho Rd.	Signal	C	D	C	C	C	C	C	A	A		B	B	

Notes: LOS worse than LOS D, or V/C ratios greater than 0.85 are displayed in **bold** text.

Where a number is given for an individual movement, HCM does not provide a LOS Value, in which case the value displayed is the v/c ratio.

Traffic movements that do not exist are shaded in grey.

Source: SSFM International and Roger Dyar, P.E., from HDOT Data

**Table 3-5: Existing LOS and V/C, PM Peak Hour, Year 2006, Study Corridor Intersections**

Intersection with Kea'au-Pāhoa Road			Individual Traffic Movements											
Cross Street	Traffic Control	Overall LOS	Eastbound			Westbound			Northbound			Southbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Opukahaia St.	Stop			<b>1.09</b>		C	0.49		F		F			
Kea'au Transfer Station	Stop		A	<b>1.03</b>			0.48					F		F
Shower Drive	Stop		A	<b>0.96</b>		B	0.41		F			D		
Pōhaku Place	Stop			<b>1.01</b>		B	0.44		F		F			
Kaloli Drive	Stop		B	0.73			0.37					F		
Pōhaku Circle	Stop			0.75		B	0.36		E					
Orchidland Dr.	Stop			0.71	0.08	B	0.37		F					
Paradise Drive	Stop		A	0.62			0.30	0.04				F		
Auli'i Street	Stop			0.65	0.02	B	0.35		E					
Maku'u Drive	Stop		A	0.48			0.28	0.05				E		
Ilima Street	Stop			0.61		<b>0.89</b>			D		D			
Ainaloa Blvd.	Stop			0.42	0.16	B	0.27		E					
Ka Ohuwalu	Stop		A	0.50			0.33					C		C
Kaluahine St.	Stop		A	0.48		A	0.32		B			C		
Old Pāhoa Rd.	Stop			0.27	0.19	B	0.17		E		E			
Kahakai Blvd.	Stop		A	0.21			0.16	0.06				D		D
Nanawale Homestead Rd (Post Office Rd.)	Stop		A			A			C			A		
Unnamed Road	Stop		A			A			A			C		
Kapoho Rd.	Signal	B	C	C	C	C	C	C	A	A		B	B	

Notes: LOS worse than LOS D, or V/C ratios greater than 0.85 are displayed in **bold** text.

Where a number is given for an individual movement, HCM does not provide a LOS Value, in which case the value displayed is the v/c ratio.

Traffic movements that do not exist are shaded in grey.

Source: SSFM International and Roger Dyar, P.E., from HDOT Data.

Transfer Station, Shower Drive/Pōhaku Drive, Pōhaku Place, Kaloli Drive, Orchidland Drive, and Paradise Drive all have movements over capacity, at Level of Service F. Four more operate at LOS E.

### New Issues or Clarification of Issues for Final EA

A commenter on the Draft EA noted some confusion with the name of Nanwale Homestead Road in Pāhoa. The name "Post Office Road" has been added to tables to reflect the name that many local residents commonly use for this street

## 3.2.3 Corridor-Wide Delay

### Summary of Discussion in Draft EA

- **Table 3-6: Total Daily Delay in Project Corridor, Kea'au-Pāhoa Road and Cross-Streets** calculates delay in the corridor for the design year 2038 TSM and Build Alternatives, assuming signals were used. It does not include any access management measures. A national average of 1.6 persons per vehicle was assumed. Delay will grow substantially from 2006 levels, but the Preferred Alternative will reduce delay by 80 percent compared to No-Build.

**Table 3-6: Total Daily Delay in Project Corridor, Kea'au-Pāhoa Road and Cross-Streets**

Year	Alternative (*)	Total Daily AM and PM Peak Hour Vehicle Delay (hrs)	Persons per vehicle	Daily Person-hours Delay
2006	Existing	300.2	1.6	480
2038	No-Build	2982.1	1.6	4771
<b>2038</b>	<b>Preferred Alternative</b>	<b>591.1</b>	<b>1.6</b>	<b>946</b>
2038	TSM Alternative	1981.0	1.6	3170
2038	Alternative 3	1005.8	1.6	1609
2038	Alternative 5	434.4	1.6	695

Source: Roger Dyar, P.E., from HDOT Data

### New Issues or Clarification of Issues for Final EA

In its comments on the Draft EA, the Hawai'i County Department of Planning asked if this analysis could be modified to reflect the influence of roundabouts on the corridor compared to traffic signals. The analysis is a very simplified consideration of delay in the corridor that focuses on the number of through lanes of traffic in the corridor and intends only to provide a level-of-magnitude comparison between the main project alternatives.

## 3.2.4 Safety

### Overview

Safety has been a recognized concern along Kea'au-Pāhoa Road, and stems from intersections, high volumes, poor access control, and differential speeds. Emergency response in the study area is often hindered by congestion along the roadway during peak hours. A detailed analysis of safety in the corridor was provided in the Draft EA's Appendix C: Traffic Study.

In total, there were 411 documented crashes along Kea'au-Pāhoa Road between the years 2004 and 2007. Of those crashes, 289 occurred at an intersection, and 122 occurred away from an intersection.

### 3.2.4.1 Intersection Safety

#### Summary of Discussion in Draft EA

- **Table 3-7: Top Five Percent Intersections in Hawaii With Most Severe Safety Needs** summarizes the four intersections in the the top five percentile of statewide high-crash locations. All four of which are in the Puna District, and three of which are located along Kea'au-Pāhoa Road: at Ainaloa Boulevard, at Kahakai Boulevard, and at Old Pāhoa Road.

**Table 3-7: Top Five Percent Intersections in Hawaii With Most Severe Safety Needs**

Location	Potential Remedies	Estimated Costs	Implementation Impediments	Comments
Volcano Rd @ Old Volcano Rd	-	-	Will monitor this intersection upon completion of widening project in this area.	-
Kea'au-Pāhoa Rd @ Ainaloa Blvd	Traffic Signal Installation recommended	\$600,000	-	Proposed HSIP FY 07
Kea'au-Pāhoa Rd @ Kahakai Blvd	Traffic Signal Installation recommended	\$450,000	-	Proposed HSIP FY 06
Kea'au-Pāhoa Rd @ Old Pāhoa Rd & Old Government Rd	Project at Kahakai intersection (above) should have positive influence on this location.	-	Will monitor this intersection upon completion of project at Kahakai intersection (above).	Cost benefit analysis favors Kahakai Blvd

Source: FHWA, accessed at <http://safety.fhwa.dot.gov/hsip/fivepercent/2008/08hi.htm>

- **Table 3-8: Kea'au - Pāhoa Road Intersection Crash Types and Rates, 2004-2007** provides information on numbers of crashes and overall rates in the study corridor between the years 2004 and 2007. The worst intersections for crashes in the corridor based on the crash rate (crashes per million vehicles entering the intersection) are at Ainaloa Boulevard, Kahakai Boulevard, Old Pāhoa Road, and Maku'u Drive.

**Table 3-8: Kea'au - Pāhoa Road Intersection Crash Types and Rates, 2004-2007**

Intersection of Kea'au-Pāhoa Road at	Non- collision	Ran off road	Fixed object	Pedes- trian	Bike	Head- on	Rear- end	Sideswipe Same Side	Sideswipe Different Side	Angle Same Side	Angle Different Side	Broad- side	Other	Total for Intersection	Crash Rate*
Kahakai Blvd.		1		1		2			1		16	9	1	31	2.49
Ainaloa Blvd.		4	2			1	2	1			19	19	1	49	2.45
Old Pāhoa Road						1	1	1	2	1	20	13	1	40	2.10
Maku'u Drive		2	1		1	1	1	1		1	13	12		33	1.57
Paradise Drive		1	2			2	3		3	1	12	3		27	1.20
Orchidland						2	1	1		1	9	6	1	21	0.91
Kapoho Rd.						1	2				10	3		16	0.83
Nanawale (Post Office Rd)							1					3		4	0.62
Kaloli Drive		3	3				2		1		2	5		16	0.56
Shower/Pōhaku	1	1					6				1	8		17	0.48
Pōhaku Place		2	1				2				3	1		9	0.33
Unnamed		1					1							2	0.31
Auli'i St.		1									1	2		4	0.21
Kaluahine St.							2			1				3	0.16
Transfer Station						1		1				3		5	0.14
Pōhaku Circle				1			2							3	0.12
Ka Ohuwalu St.											1	1		2	0.11
Ilima St.							1	1						2	0.11
Puakalo Ave. (30 <sup>th</sup> Ave.)							2							2	0.07
Paved Road						1	1							2	0.06
Poni Moi Ave. (29 <sup>th</sup> Ave.)												1		1	0.04

\*Rate Per Million Vehicles Entering Intersection

Source: HDOT

### **New Issues or Clarification of Issues for Final EA**

A commenter on the Draft EA asked if the tally of 31 crashes at Kahakai Boulevard listed **Table 3-8: Kea'au - Pāhoa Road Intersection Crash Types and Rates, 2004-2007** was incorrect, presumably because it had a higher rate than other the next row, Ainaloa Boulevard, which had a higher number of crashes (49). The value is correct. The intersection at Kahakai Boulevard has much lower traffic volumes and therefore, even with only 31 crashes, the crash rate is higher than at Ainaloa Boulevard.

A number of commenters on the Draft EA commented on the severity and frequency of crashes at corridor intersection, including some descriptions of specific incidents.

### **3.2.4.2 Roadway Segments Between Intersections**

#### **Summary of Discussion in Draft EA**

- One deficiency of the existing two-lane Kea'au-Pāhoa Road is the relative lack of opportunities for traffic to pass other vehicles either because passing is not allowed or because heavy traffic volumes preclude motorists from passing slower-moving vehicles.
- **Table 3-9: Kea'au-Pāhoa Road Crash Numbers and Rates Between Intersections, 2004-2007** and **Table 3-10: Kea'au-Pāhoa Road Crash Types, Segments Between Intersections, 2004-2007** provide information on crash rates and types in the study corridor.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

**Table 3-9: Kea'au-Pāhoa Road Crash Numbers and Rates Between Intersections, 2004-2007**

From	To	Number of Crashes	Crash Rate (per 100 million Vehicle Miles)
Opukahaia	Shower	45	65.0
Shower	Pōhaku Place	8	51.4
Pōhaku Place	Kaloli	11	84.3
Kaloli	Pōhaku Circle	4	55.4
Pōhaku Circle	Orchidland	9	77.6
Orchidland	Paradise	2	34.0
Paradise	Aulii	4	55.3
Aulii	Maku'u	6	47.2
Maku'u	Ilima	1	41.9
Ilima	Ainaloa	1	26.5
Ainaloa	Ka Ohuwalu	5	27.5
Ka Ohuwalu	Kaluahine	3	23.1
Kaluahine	Old Pāhoa	10	43.4
Old Pāhoa	Kahakai	2	105.5
Kahakai	Nanawale Homestead (Post Office Road)	3	86.2
Nanawale Homestead (Post Office Road)	Unnamed Road	3	150.1
Unnamed Road	Kapoho	5	134.6
Total/Average		122	57.0

Source: HDOT

**Table 3-10: Kea'au-Pāhoa Road Crash Types, Segments Between Intersections, 2004-2007**

From	To	Ran off Road	Rear End	Sideswipe same direction	Animal	Head on	Sideswipe opposite direction	Broad-side	Bike	Angle same dir	Guard rail	Others	Totals
Opukahaia	Shower	19	14	2	0	1	2	2	0	1	1	3	45
Shower	Pōhaku Place	0	4	1	0	1	1	0	0	0	0	1	8
Pōhaku Place	Kaloli	4	3	0	0	0	0	0	1	0	0	3	11
Kaloli	Pōhaku Circle	3	1	0	0	0	0	0	0	0	0	0	4
Pōhaku Circle	Orchidland	2	2	1	0	2	0	0	1	0	0	1	9
Orchidland	Paradise	1	0	0	0	0	0	0	0	0	0	1	2
Paradise	Aulii	1	1	0	0	0	1	0	0	0	0	1	4
Aulii	Maku'u	2	4	0	0	0	0	0	0	0	0	0	6
Maku'u	Ilima	0	0	1	0	0	0	0	0	0	0	0	1
Ilima	Ainaloa	0	1	0	0	0	0	0	0	0	0	0	1
Ainaloa	Ka Ohuwalu	0	3	1	0	0	0	0	0	0	0	1	5
Ka Ohuwalu	Kaluahine	2	0	0	0	1	0	0	0	0	0	0	3
Kaluahine	Old Pāhoa	3	2	0	0	2	0	0	1	0	0	2	10
Old Pāhoa	Kahakai	1	0	0	0	0	0	1	0	0	0	0	2
Kahakai	Nanawale (Post Office Rd)	1	0	0	0	0	0	0	0	0	1	1	3
Nanawale (Post Office Rd)	Homestead	0	1	0	0	0	0	0	0	0	1	1	3
Homestead	Kapoho	2	2	0	1	0	0	0	0	0	0	0	5
<b>Totals</b>		<b>41</b>	<b>38</b>	<b>6</b>	<b>1</b>	<b>7</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>15</b>	<b>122</b>

Source: HDOT

### **3.2.4.3 Uncontrolled Access**

#### **Summary of Discussion in Draft EA**

- The frequency of driveways along the corridor poses safety concerns on the existing two-lane road as vehicles turning into or out of driveway areas must transition into or out of high-speed highway traffic. Left turns are particularly dangerous and during peak hour conditions some motorists avoid that maneuver.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

### **3.2.5 Bicycles and Pedestrians**

#### **Summary of Discussion in Draft EA**

- While the entire existing Kea'au-Pāhoa Road corridor does not provide a welcoming environment for bicycles or pedestrians to use the corridor, there is a modest amount of pedestrian and bicycling on shoulders. Much of the pedestrian activity comes from accessing transit service in the corridor. There also is regular use of the shoulders by scooters and mopeds. Current use of the Kea'au-bound shoulder as a temporary AM Peak Hour travel lane precludes safe travel for bicycles or pedestrians in this area.

#### **New Issues or Clarification of Issues for Final EA**

A number of commenters on the EA noted a need for improved accommodations for bicycles and pedestrians, including bikeways, pedestrian areas, and crosswalks.

### **3.2.6 Transit**

#### **Summary of Discussion in Draft EA**

- The County of Hawai'i's Mass Transit Agency's (MTA) free Hele-On Bus service operates Monday through Saturday. Outside of downtown areas, the system operates on a "flag stop" method. Presently, there are no amenities for passengers boarding or disembarking from buses in the corridor, they simply use the shoulders.
- The Pāhoa/Pohoiki-Hilo Route is the route serves the study area and the rest of lower Puna. Current bus service in the corridor includes 11 trips on weekdays in both directions between Hilo and Pāhoa. Four trips are provided in each direction on Saturdays. Eight of the weekday trips are with a 33 passenger bus and three are with a 47 passenger bus. In July, 2009, the Pāhoa/Hilo route carried 13,053 passengers that month compared to 10,319 passengers in July of 2008, a 26.5% increase.

- The MTA and HDOT are considering designated improved bus stops near:
  - Shower Drive
  - Kaloli Drive
  - Pōhaku Circle (Pāhoa - bound direction only)
  - Orchidland Drive
  - Paradise Drive
  - Maku'u Drive
  - Ainaloa Boulevard
  - Maku'u Farmer's Market

#### **New Issues or Clarification of Issues for Final EA**

A number of commenters on the EA noted a need for improved accommodations for transit vehicles.

### **3.3 Socioeconomic Environment**

#### **3.3.1 Population and Housing**

##### **3.3.1.1 Regional Population and Housing Trends from 1970 to 2000**

#### **Summary of Discussion in Draft EA**

- The Puna District, specifically lower Puna, has been rapidly growing in population. In the 30-year period from 1970 to 2000, the Puna District population experienced over a six-fold increase in population, from approximately 5,100 to 31,335 persons. **Table 3-11: Population in Hawai'i County and Puna District, 1970 to 2000** provides the population statistics for Hawaii County and the Puna District. It is estimated that the Puna District population in March 2007 was 43,071 persons, which represents an annual average population rate of six percent from 2000. (PlanPacific, Inc, 2008)

**Table 3-11: Population in Hawai'i County and Puna District, 1970 to 2000**

	<b>1970</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>
Hawai'i County	63,468	92,053	120,317	148,677
<b>Puna District</b>	<b>5,154</b>	<b>11,753</b>	<b>20,781</b>	<b>31,335</b>
Northeast (Census Tract 210.01)	3,802	7,055	6,844	11,776
Northwest (Census Tract 210.02)			7,235	10,962
South (Census Tract 211.00)	1,352	4,698	6,702	8,597

Sources: 1970 population for Hawaii County is from The State of Hawaii Data Book 2000, Table 1.01, "Population of Counties: 1831 to 2000." 1970 population for Census Tracts 210.0 and 211.00 is from 1970 Census of Population and Housing Census Tracts, Honolulu, Hawaii SMSA, PHC (1)-88. 1980 population for Census Tracts 210 and 211.00 is from Census of Population and Housing, 1980 Summary Tape File 1-A, Hawai'i. 1990 and 2000 population for Hawaii County and Puna District Census Tracts is from U.S. Census Bureau, American Fact Finder, available online at <http://factfinder.census.gov>

- In 1970, Puna's population accounted for eight percent of Hawaii County's total population. By 2000, Puna accounted for 21 percent of the island population. Puna's population grew 508% from 1970 to 2000.
- Housing information is provided in **Table 3-12: Housing Units in Hawai'i County and Puna District, 1970 to 2000** and reflects the same patterns of growth as the region's population. Housing in Puna increased 615% from 1970 to 2000. The Puna region's share of housing units in the island-wide supply grew from ten percent in 1970 to 21 percent in 2000.

**Table 3-12: Housing Units in Hawai'i County and Puna District, 1970 to 2000**

	1970	1980	1990	2000
Hawai'i County	18,972	34,215	48,253	62,674
<b>Puna District</b>	<b>1,829</b>	<b>4,575</b>	<b>8,597</b>	<b>13,068</b>
Northeast (210.01)	1,301	2,863	2,646	4,459
Northwest (210.02)			3,229	4,895
South (211.00)	528	1,712	2,722	3,714

Sources: 1970 housing information for Hawaii County and Census Tracts 210 and 211.00 is from 1970 Census of Population and Housing Census Tracts, Honolulu, Hawaii SMSA, PHC (1)-88. 1980 housing information for Hawaii County and Census Tracts 210 and 222.00 from Census of Population and Housing, 1980 Summary Tape File 1-A, Hawaii. 1990 and 2000 housing information for Hawaii County and Puna District Census Tracts is from U.S. Census Bureau, American Fact Finder.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA. A number of commenters on the Draft EA commented on the region's rapid growth.

### **3.3.1.2 Puna District Characteristics from 2000 Census**

#### **Summary of Discussion in Draft EA**

- An overview of demographics and housing is provided in **Table 3-13: Selected Characteristics of Puna District, 2000**. Northeast Puna, which constitutes the northern portion of the study area contains somewhat larger and younger families than Hawai'i County or the other parts of Puna.
- As shown in **Table 3-14: Income Distribution and Poverty Levels, Puna Households and Families, 2000 Census**, the Puna region had consistently lower median incomes, and higher rates of poverty than Hawaii County as a whole.

**Table 3-13: Selected Characteristics of Puna District, 2000**

	Hawai'i County	Total Puna District	Northeast Puna CT 210.01	Northwest Puna CT 210.02	South Puna CT 211.00
<b>Population and Age</b>					
Population	148,677	31,335	11,776	10,962	8,597
Median age	38.6	N/A	33.8	38.2	38.0
<b>Households</b>					
Population in households	145,873	31,109	11,771	10,743	8,595
Number of households	52,985	11,134	3,987	4,032	3,115
Average household size	2.75	2.79	2.95	2.66	2.76
<b>Families</b>					
Population in family households	124,566	26,547	10,343	8,971	7,233
Percent of family members of total population	84%	85%	88%	82%	84%
Number of families	36,903	7,612	2,908	2,631	2,073
Average family size	3.24	3.49	3.56	3.41	3.49
<b>Housing Units</b>					
Housing Units	62,674	13,068	4,459	4,895	3,714
Occupied housing units	52,985	11,134	3,987	4,032	3,115
Percent of total housing units	85%	85%	89%	82%	84%
Percent vacant units	15%	15%	11%	18%	16%
Owner occupied units	34,175	7,924	2,781	3,019	2,124
Percent of total owner occupied units	64%	71%	70%	75%	68%
Percent rental units	36%	29%	30%	25%	32%

Source: 2000 demographic and housing information for Hawaii County and Puna District Census Tracts is from U.S. Census Bureau, American Fact Finder, available at [http://factfinder.census.gov/home/saff/main.html?\\_lang=en](http://factfinder.census.gov/home/saff/main.html?_lang=en)

**Table 3-14: Income Distribution and Poverty Levels, Puna Households and Families, 2000 Census**

	Hawai'i County	Northeast Puna CT 210.01	Northwest Puna CT 210.02	South Puna CT 211.00
<b>Household and Family Median Income</b>				
Household median income	\$ 39,805	\$ 33,042	\$ 31,500	\$ 27,920
Family median income	\$ 46,480	\$ 37,777	\$ 39,338	\$ 31,757
Married couples	\$ 53,344	\$ 45,889	\$ 47,250	\$ 37,333
Female householder*	\$ 26,523	\$ 15,160	\$ 20,938	\$ 17,039
Nonfamily householder	\$ 22,359	\$ 16,289	\$ 18,459	\$ 15,104
Percent of family members of total population	84%	88%	82%	84%
<b>Families Below Poverty Level**</b>				
Total	11.0%	19.4%	16.1%	22.3%
Married couples	6.1%	9.4%	9.5%	13.1%
Female householder*	28.1%	48.1%	34.2%	46.9%
Nonfamily householder	23.5%	28.5%	32.2%	33.3%

\*No husband present

\*\* Percentages of families below the poverty level were calculated by the U.S. Census Bureau in the 2000 Census based upon 61 different 1999 national poverty thresholds that vary according to size of family, number of children, and, for one- and two-person families, age over or under 65. Thresholds are not locally adjusted. Some representative 1999 poverty thresholds used to calculate the percentages in this table: One person (average): \$8,501, two people (average): \$10,869, three people (average): \$13,290, four people (average): 17,029. Higher thresholds are also available for larger families (up to nine people). For more information, refer to: [http://factfinder.census.gov/servlet/MetadataBrowserServlet?type=subject&id=POVERTYSF3&dsspName=DEC\\_2000\\_SF3&back=update&lang=en](http://factfinder.census.gov/servlet/MetadataBrowserServlet?type=subject&id=POVERTYSF3&dsspName=DEC_2000_SF3&back=update&lang=en).

Source: U.S. Census Bureau, Income Distribution in 1999 of Households and Families: 2000, as contained in Summary File 3 - Sample Data and available online at <http://factfinder.census.gov/home/saff/main.html?lang=en>.

- **Table 3-15: Race of Hawai'i County and Puna Residents, 2000** provides racial breakdowns for Hawai'i County and the Puna region. Puna as a whole had similar proportions of racial groups to that of Hawai'i County. Of note within the Puna District is the relatively higher proportion of Whites (38 percent) and Native Hawaiians and other Pacific Islanders (12.7 percent) in South Puna (Pāhoa area).

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

**Table 3-15: Race of Hawai'i County and Puna Residents, 2000**

	Hawai'i County	Total Puna District	Northeast Puna CT 210.01	Northwest Puna CT 210.02	South Puna CT 211.00
<b>Single Race</b>					
White	31.1%	34.0%	30.8%	34.3%	38.0%
Black or African American	0.5%	0.3%	0.3%	0.3%	0.4%
Amerian Indian and Alaskan Native	0.4%	0.5%	0.7%	0.3%	0.4%
Asian	26.7%	21.8%	22.9%	22.4%	19.4%
Native Hawaiian and Other Pacific Islander	10.9%	11.2%	11.0%	10.2%	12.7%
Other race	1.0%	1.2%	1.4%	1.2%	0.9%
<b>Two or More Races</b>					
Two or more races	29.3%	31.0%	32.9%	31.2%	28.2%

Source: U.S. Census Bureau, Race, 2000, as contained in Summary File 3 - Sample Data and available online at [http://factfinder.census.gov/home/saff/main.html?\\_lang=en](http://factfinder.census.gov/home/saff/main.html?_lang=en).

### 3.3.1.3 Future Population Projections

#### Summary of Discussion in Draft EA

- The 2005 Hawai'i County General Plan offered three sets of twenty-year population projections under three scenarios, from lowest to highest growth, based on assumptions of economic activity, employment and population. **Table 3-16: Hawaii County General Plan Projections, 2020** presents the projected population ranges for the County and Puna District under the three scenarios.

**Table 3-16: Hawaii County General Plan Projections, 2020**

	2000 population	Projected 2020 Population			Average Annual Growth Rate, 2000 to 2020		
		Series A	Series B	Series C	Series A	Series B	Series C
Hawai'i County	148,677	213,452	217,718	237,323	1.8%	1.9%	2.4%
Puna District	31,335	57,105	58,246	63,941	3.0%	3.1%	3.6%

Source: County of Hawaii General Plan, Table 1-9. District Resident Population Distribution, Year 2020, page 1-17.

- The General Plan forecasts indicate that the Puna District is anticipated to grow at rates higher than the island-wide projections, regardless of the forecast series.
- The Puna CDP forecasted a Puna population of 62,776 persons in 2020, which reflects rapid growth. The Puna Regional Circulation Plan (PRCP) projected population in 2030 of 80,162 persons, which is over two times the 2000 population, and represents an average annual growth rate of 3.2 percent over the 30-year period.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## **3.3.2 Environmental Justice Communities in Immediate Study Area**

### **Overview**

- Title VI of the Civil Rights Act of 1964 directs the Federal Highway Administration and other federal agencies to ensure that policies do not discriminate against individuals based on race, color, national origin, sex, age or disability. Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires that federal actions do not disproportionately create adverse effects on minority or low-income ("Environmental Justice") populations. Act 294 at the state level requires the Chapter 343 process to make similar considerations.

### **3.3.2.1 Low Income Persons in the Immediate Study Area**

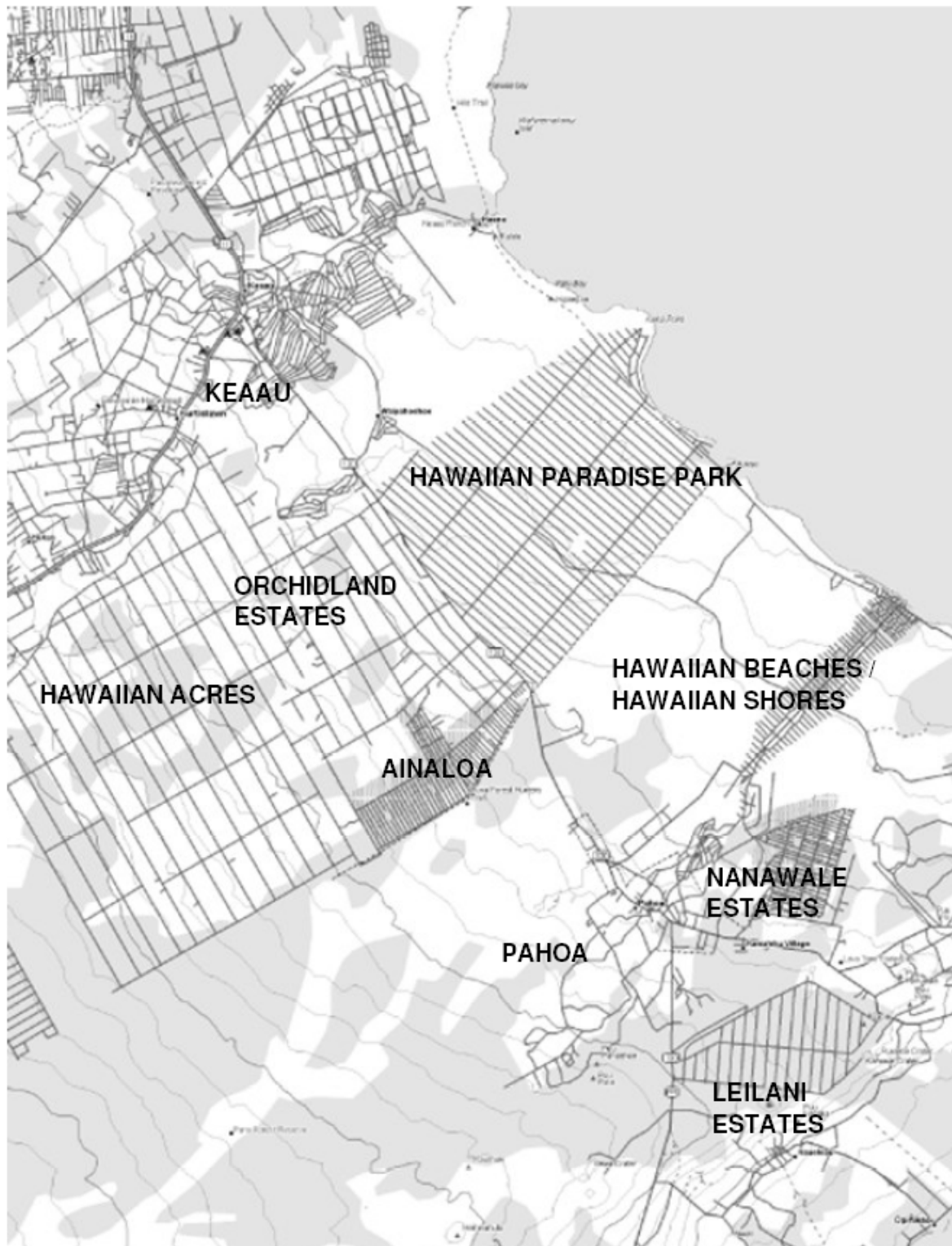
#### **Summary of Discussion in Draft EA**

- The communities in immediate proximity to Kea'au-Pāhoa Road are shown in **Figure 3-8: Immediate Study Area Communities**. Income and poverty information on those communities is shown in **Table 3-17: Income Distribution and Poverty Levels of Households and Families in the Immediate Study Area, 2000 Census**.
- Poverty is high in communities adjacent to the project corridor. Over one-fifth of families in Orchidland, Ainaloa, Hawaiian Acres, Hawaiian Beaches / Hawaiian Shores and Nanawale have incomes below poverty level. Further, female-led families have consistently high proportions of incomes below poverty levels, with the highest level found in Ainaloa where over 77 percent are in this category. Poverty levels were especially high throughout the Immediate Study Area, with the exception of Kea'au. Notably high levels were found in families headed by single females in Ainaloa (77.3 percent), Nanawale (57.4 percent), Orchidland (50.0 percent), Hawaiian Beaches (49.5 percent) and Pāhoa (47.2 percent).

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

**Figure 3-8: Immediate Study Area Communities**



**Table 3-17: Income Distribution and Poverty Levels of Households and Families in the Immediate Study Area, 2000 Census**

	North of Corridor	West of Project Corridor			East of Project Corridor		South End of Project Corridor		
	Kea'au	Orchidland Estates	Ainaloa	Hawaiian Acres	Hawaiian Paradise Park	Hawaiian Beaches / Shores	Pāhoa	Nanawale Estates	Leilani Estates
<b>Household and Family Median Income</b>									
Household	\$ 39,722	\$ 27,083	\$ 25,698	\$ 30,039	\$ 36,300	\$ 28,467	\$ 33,333	\$ 35,703	\$ 31,541
Family	\$ 43,347	\$ 31,290	\$ 37,647	\$ 35,726	\$ 38,312	\$ 30,104	\$ 43,571	\$ 36,875	\$ 32,692
Married couples	\$ 45,417	\$ 41,250	\$ 44,844	\$ 48,207	\$ 47,135	\$ 35,037	\$ 49,500	\$ 47,188	\$ 40,909
Female householder *	\$ 24,375	\$ 15,000	\$ 6,463	\$ 24,271	\$ 17,798	\$ 18,636	\$ 18,750	\$ 13,594	\$ 30,268
Nonfamily	\$ 18,542	\$ 9,844	\$ 10,283	\$ 9,583	\$ 23,125	\$ 17,344	\$ 20,625	\$ 13,750	\$ 17,011
<b>Families Below Poverty Level**</b>									
Total	9.6 %	24.1 %	27.2 %	22.5 %	17.0 %	23.8 %	15.7 %	28.9 %	13.7 %
Married couples	4.7 %	17.2 %	14.4 %	14.8 %	7.5 %	15.0 %	5.0 %	25.5 %	7.8 %
Female householder *	26.0 %	50.0 %	77.3 %	34.9 %	40.0 %	49.5 %	47.2 %	57.4 %	24.0 %
Nonfamily	26.8 %	35.3 %	47.8 %	48.1 %	17.8 %	26.6 %	15.2 %	0.0 %	51.0 %

\* - no husband present

\*\* Percentages of families below the poverty level were calculated by the U.S. Census Bureau in the 2000 Census based upon 61 different 1999 national poverty thresholds that vary according to size of family, number of children, and, for one- and two-person families, age over or under 65. Thresholds are not locally adjusted. Some representative 1999 poverty thresholds used to calculate the percentages in this table: One person (average): \$8,501, two people (average): \$10,869, three people (average): \$13,290, four people (average): 17,029. Higher thresholds are also available for larger families (up to nine people). For more information, refer to:

[http://factfinder.census.gov/servlet/MetadataBrowserServlet?type=subject&id=POVERTYSF3&dsspnName=DEC\\_2000\\_SF3&back=update&lang=en](http://factfinder.census.gov/servlet/MetadataBrowserServlet?type=subject&id=POVERTYSF3&dsspnName=DEC_2000_SF3&back=update&lang=en).

Source: 2000 demographic and housing information for these Census Designated Places is from U.S. Census Bureau, American Fact Finder, available at <http://factfinder.census.gov/home/saff/main.html?lang=en>

### 3.3.2.2 Racial Minorities in Immediate Study Area

#### Summary of Discussion in Draft EA

- HDOT's Title VI Plan (page 10, updated January 18, 2009) defines "minorities" to include:
  - American Indian or Alaskan native;
  - Black
  - Hispanic
  - White
  - Asian Indian (having origins in any of the original peoples of the Indian subcontinent)
  - Chinese;
  - Filipino;
  - Guamanian
  - Hawaiian (having origins in any of the original peoples of Hawaii including peoples who are Part-Hawaiian and identify most closely with the Hawaiian category);
  - Japanese;
  - Korean;
  - Samoan;
  - Vietnamese, and
  - Other (those not identifying with any of the above).
- **Table 3-18: Race of Immediate Study Area Residents, 2000 Census** provides a racial breakdown of the Immediate Study Area and indicates distinctive profiles within the various communities. Asians are the predominant group in the south end of the study area. All other groups were proportionately lower than the Hawai'i County and Puna District profiles, with the exception of Native Hawaiian and other Pacific Islanders in Pāhoa, Nanawale, Hawaiian Beaches, Orchidland (12.9 percent) and Ainaloa (12.2 percent).

#### New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

**Table 3-18: Race of Immediate Study Area Residents, 2000 Census**

	North of Corridor	West of Project Corridor			East of Project Corridor		South End of Project Corridor		
	Kea'au	Orchidland Estates	Ainaloa	Hawaiian Acres	Hawaiian Paradise Park	Hawaiian Beaches / Shores	Pāhoa	Nanawale Estates	Leilani Estates
<b>Single Race</b>									
Caucasian	11.9%	33.4%	35.6%	54.0%	33.0%	29.8%	8.4%	22.8%	60.2%
Black or African American	0.0%	0.4%	0.4%	0.0%	0.3%	0.2%	0.0%	0.0%	0.0%
American Indian and Alaskan Native	0.0%	2.3%	1.1%	0.5%	0.3%	0.3%	0.9%	0.0%	1.8%
Asian	55.7%	22.5%	16.2%	10.9%	19.6%	18.2%	52.8%	24.3%	4.7%
Native Hawaiian and Other Pacific Islander	5.0%	12.9%	12.2%	6.9%	10.6%	13.5%	12.3%	21.2%	11.4%
Other race	1.2%	3.0%	1.7%	0.2%	0.8%	1.1%	0.8%	0.0%	2.2%
<b>Two or More Races</b>									
Two or more races	26.2%	25.5%	32.9%	27.4%	35.3%	36.9%	24.7%	31.6%	19.7%

Source: U.S. Census Bureau, Race: 2000, as contained in Summary File 3 - Sample Data and available online at [http://factfinder.census.gov/home/saff/main.html?\\_lang=en](http://factfinder.census.gov/home/saff/main.html?_lang=en).

### **3.3.2.3 Incorporation of Title VI and Environmental Justice Requirements into the Proposed Project**

#### **Summary of Discussion in Draft EA**

- In 2000, a Sustainability Committee, comprised of citizens of Puna and Ka'u, filed a discrimination complaint against HDOT and Hawai'i County for not recognizing actual land uses, economic needs, and multi-modal needs of low income communities in the Hawaii Long Range Transportation Plan. The Federal Highway Administration (FHWA) found the complaint to have merit. The Kea'au-Pāhoa Road project was considered one effort to address Title VI requirements.
- This project has been conducted for consistency with HDOT's Title VI Plan (updated January 18, 2009). Every effort has been made to include Title VI/Environmental Justice target populations in the planning for this project and social impacts analysis. A Social Impact Assessment (SIA) employed several activities to reach and include Title VI target groups, described in greater detail in the Draft EA.
- In the formation of the KPAG, similar efforts were employed to reach out to Title VI target groups, and the project team worked closely with the HDOT Title VI Specialist.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

### **3.3.3 Economic Environment**

#### **Summary of Discussion in Draft EA**

- The PCDP notes that Puna is primarily an agricultural district, formerly in sugar, now with more diversified agriculture. Much of Puna depends on commercial activity in the Hilo area for jobs and shopping. The PCDP tries to increase the Puna District's self-reliance and economic strength by re-shaping the land use patterns in the district through a group of Village and Town Centers.
- The 2005 Hawai'i County General Plan recognizes Puna's agricultural base, calls for further development of the agricultural industry and notes that any resort growth should enhance and be in keeping with the area's rural character.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

### 3.3.4 Community Character and Facilities

#### Summary of Discussion in Draft EA

- The Kea'au-Pāhoa corridor is notable for large subdivisions that were approved by the county in the 1950s. While the current character can best be described as "agricultural" there is substantial potential for future residential growth on undeveloped lots. Puna's residential density is relatively low, and mostly consists of subdivisions containing large lots.
- Much of Puna's Makai's growth in recent decades comes from affordable and developable land, even where services are lacking. The accessibility of the area to Hilo for employment, schools, and shopping also has encouraged growth.

#### New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

#### 3.3.4.1 Medical Facilities

##### Summary of Discussion in Draft EA

- The nearest comprehensive hospital is Hilo Medical Center, 10 miles from Kea'au and 21 miles from Pāhoa-Kapoho Road. Other regional medical services are near the hospital.
- Kea'au-Pāhoa Road is on the primary route from the study area to the hospital.
- Other medical facilities in the study area include:
  - Puna Community Medical Center in the Pāhoa Marketplace shopping center
  - Bay Clinic's Kea'au Family Health Center and the Pāhoa Family Health Center in the two respective village centers.
  - Bay Clinic's Women's Health Clinic in Pāhoa Village.
  - Hui Mālama Ola Nā 'Ōiwi - A private non-profit organization in the Pāhoa Family Health Center serving Native Hawaiians.

#### New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

#### 3.3.4.2 Educational Facilities

##### Summary of Discussion in Draft EA

- The larger schools in the Puna District are administered by the State Department of Education. **Table 3-19: Current and Projected Enrollments for Kea'au and Pāhoa Complex Public Schools** provides enrollment projections in both school complexes, and shows that the larger increases will occur in the intermediate and high schools.
- Kamehameha Schools' Hawaii campus campus in Kea'au has 1,118 students in elementary, middle and high school.

**Table 3-19: Current and Projected Enrollments for Kea'au and Pāhoa Complex Public Schools**

	Official Enrollment Count			6 Year Enrollment Projection (completed 5/27/09)						Percent Change School Yr. 2009-10 to School Yr. 2014-15
School	School Yr. 2008-09	School Yr. 2009-10	Percent Change	School Yr. 2009-10	School Yr. 2010-11	School Yr. 2011-12	School Yr. 2012-13	School Yr. 2013-14	School Yr. 2014-15	
Keaʻau Complex										
Keaʻau Elementary	760	803	5.7%	762	760	773	802	818	818	1.9%
Keaʻau Intermediate	593	621	4.7%	586	588	612	628	659	692	11.4%
Keaʻau High	971	946	-2.6%	965	967	969	985	1001	1061	12.2%
Pāhoa Complex										
Keonepoko Elementary	650	614	-5.5%	661	654	657	670	668	667	8.6%
Pāhoa Elementary	394	410	4.1%	408	408	409	412	413	413	0.7%
Pāhoa High and Intermediate	762	717	-5.9%	750	742	742	734	767	780	8.8%

Source: Personal communication with Edwin Ramones of Information Management Architecture of the State Department of Education, on September 16, 2009. Projections were completed in May 2009.

- Two charter schools operate in close proximity of the project corridor. Since 2001, the Hawai'i Academy of Arts and Sciences New Century Public Charter School has been serving approximately 462 students in lower Puna from Kindergarten to 12<sup>th</sup> Grade. The school is located on Post Office Road makai of the Pāhoa Bypass. In addition, the Ke Kula 'o Nawahiokalani'opu'u Iki Laboratory New Century Public Charter School is located on Opukahaia Street, just mauka of the end of the Kea'au Bypass. With an enrollment of approximately 161 students from Kindergarten to 8<sup>th</sup> Grade, this school focuses on Hawaiian language immersion.
- The County's General Plan notes that joint community-school branch library facilities are found in Kea'au, Mountain View, and Pāhoa. The Kea'au facility has 21,332 volumes. The Pāhoa and Mountain View facilities house 34,365 volumes and 18,345 volumes, respectively. Library facilities are inadequate in size to meet the student and community needs.

#### **New Issues or Clarification of Issues for Final EA**

A commenter on the Draft EA requested that text be added to the Final EA on the subject of charter schools, as this was overlooked in the Draft EA. Text has been added above to reflect this concern.

### **3.3.4.3 Police Services**

#### **Summary of Discussion in Draft EA**

- The police station headquarters Puna is housed in the Kea'au public office complex covering the entire district. A district substation is located in Pāhoa. There are three shifts, with an average of seven officers per shift.
- A new 8,200 square foot Police Station and Vehicle Registration & Licensing Division complex is under construction along Kea'au-Pāhoa Road in Pāhoa to replace the facility in Pāhoa town, and is slated for completion in 2011. The facility will be utilized by six to seven officers per shift who are responsible for patrolling the area from Shower Drive down to Kalapana. It will permit faster response times to some of the subdivisions outside Pāhoa (notably Hawaiian Paradise Park, Ainaloa, Orchidland and Hawaiian Beaches).
- Currently, emergency vehicles are slowed by traffic congestion conditions, particularly during traffic peak hours.

#### **New Issues or Clarification of Issues for Final EA**

Text has been edited above to reflect the new police station's opening in 2011.

#### **3.3.4.4 Fire/EMS Services**

##### **Summary of Discussion in Draft EA**

- Fire protection and Emergency Medical Services (EMS) services are provided by Hawai'i County. Pāhoa operations serve the Pāhoa-Hawaiian Paradise Park and Kalapana-Kapoho areas. Kea'au has a 24-hour fire/EMS facility. A dual use county/volunteer fire station is in Hawaiian Paradise Park, and a 24-hour volunteer-only fire station is in Hawaiian Beaches. Subdivisions in the study area were shown in **Figure 3-1: Puna Subdivisions By Year of Establishment**.
- Opened officially in December, 2009, a new 8,000 square foot fire station on Kea'au-Pāhoa Road in Pāhoa serves the area. The station includes three bays accomodating six vehicles and eight fire fighters per shift.
- Currently, emergency vehicles are slowed by traffic congestion conditions, particularly during traffic peak hours.

##### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

### **3.4 Climate and Air Quality**

##### **Summary of Discussion in Draft EA**

- A detailed study of air quality has been performed and is found in the Draft EA in Appendix F: Air Study.
- The climate of the Puna District varies considerably from comparatively sunny rocky shoreline to rainforests in upper elevations. Temperatures are uniform throughout the year and rainfall is uniformly high, ranging from approximately 120 inches to 160 inches per year.
- Emissions of sulfur dioxide (SO<sub>2</sub>) and particulates from Kīlauea volcano, called "vog" affect persons with asthma and respiratory conditions. Air quality within the study area is excellent with regards to human-generated pollution as there is little industry and Hawai'i is geographically isolated and benefits from constant trade winds.
- Both the US Environmental Protection Agency (EPA) and the State of Hawai'i have instituted Ambient Air Quality Standards, which are described in greater detail in the Draft EA. The State of Hawai'i is in conformity with EPA's national standards. While concentrations of sulfur dioxide are relatively high from vog, they do not exceed state or federal standards.
- At the regional level, the Kea'au-Pāhoa Road corridor in 2006 contributed an estimated 780 tons per year of carbon monoxide (CO), 93 tons per year of nitrogen oxides (NO<sub>x</sub>), and 63 tons per year of volatile organic compounds (VOC). These are a very small proportion of the overall emissions island-wide.

- Modeling performed for the Draft EA determined that existing emissions at intersections in the corridor are within the stringent Hawai'i AAQS as well as the less-stringent federal standards.
- The EPA also regulates air toxics, of which 188 are created by motor vehicles. There are no tools available at the present time to qualitatively model air toxics, but emissions of air toxics from motor vehicles on a per-mile basis are expected to decline over time.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

### **3.5 Noise**

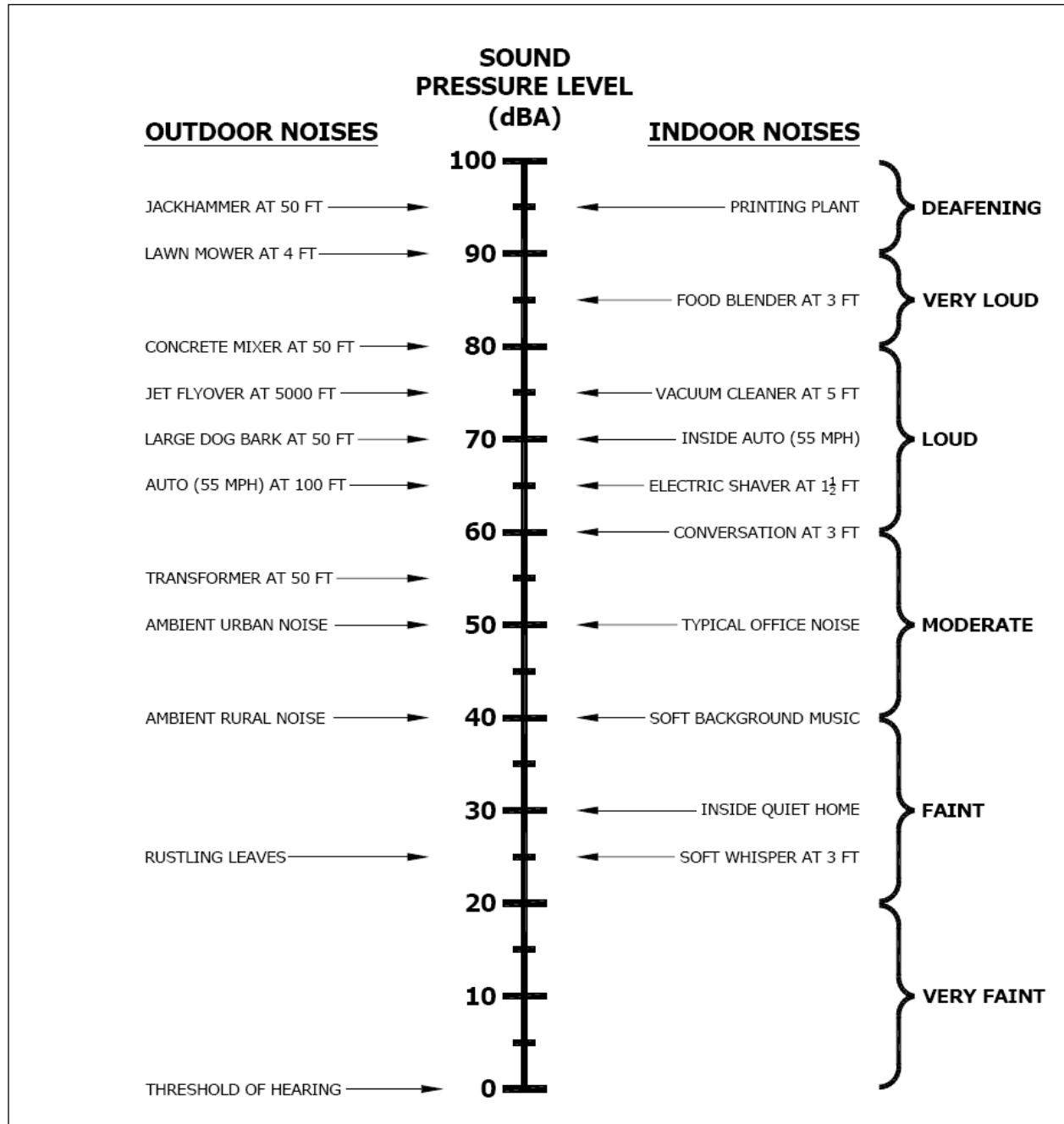
A detailed noise study has been performed for this project and it has been updated since the Draft EA to reflect the effects of the project. Refer to **Appendix E: Noise Study** for the updates and for more information than below, which is greatly summarized from the Draft EA.

#### **3.5.1 Introduction to the Concepts of Noise**

##### **Summary of Discussion in Draft EA**

- Noise is defined as excessive or unwanted sound; sound is measured in decibels (dB). When sound is described in terms of the frequencies humans are capable of hearing, called, "A-weighting," the term 'dBA' is used. **Figure 3-9: Common Outdoor and Indoor Sound Levels in dBA** shows a representation of different noise sources under the A-weighted scale.
- In an environment such as Kea'au-Pāhoa Road, noise includes ambient or background noise (wind, birds, etc.) and traffic noise, which is intermittent and louder than the background noise. Traffic noise is the primary source, along with other human-generated noises.
- Below are some general rules of thumb to explain the concepts of traffic noise, which follows a logarithmic mathematical scale. The Draft EA explains these in greater detail:
  - A 1 or 2 dBA change in the level is difficult for most people to detect. An average person could not distinguish if a 55 dBA noise was louder or softer than a 53 dBA level.
  - A 3 dBA change is commonly taken as the smallest perceptible change and a 6 dBA change corresponds to a noticeable change in loudness.
  - A 10 dB increase or decrease in sound level is perceived as a doubling or halving of loudness, respectively. A 60 dBA noise level sounds "twice as loud" as 50 dBA.
  - Two equivalent sources of noise added together result in a 3 dBA increase because noise is logarithmic. Therefore, a 50 dBA source of noise placed next to another 50 dBA source of noise creates a combined noise level of 53 dBA, not 100 dBA.

**Figure 3-9: Common Outdoor and Indoor Sound Levels in dBA**



Source: DL Adams Associates

- Traffic noise is influenced by volumes, speeds, tire engines, exhaust, acceleration/deceleration, and if vehicles are going up or down steep grades. Heavy trucks make a disproportionate contribution to traffic noise compared to cars.
- Since noise varies continuously over time, a “metric” called  $L_{eq}$  is used to mathematically equate the variable noise over a period of time (like an hour) to a single average noise level. Another metric,  $L_{dn}$  is used to consider day-night noise over a 24-hour period, and contains a “penalty” for nighttime noise, when people are more sensitive to it.

### New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

## 3.5.2 Noise Guidelines, Standards and Regulations

### Summary of Discussion in Draft EA

- The State of Hawaii Community Noise Control Rule does not address traffic noise but does regulate noise related to construction activities, discussed in greater detail in **Section 4.5.3: Construction Noise Impacts and Mitigation**.
- The Federal Highway Administration (FHWA) and HDOT define maximum hourly equivalent sound levels in “noise abatement criteria” (NAC) as listed in **Table 3-20: FHWA and HDOT Noise Abatement Criteria**. On Kea'au-Pāhoa Road, most land can be considered to fall into land use category B or C.

**Table 3-20: FHWA and HDOT Noise Abatement Criteria**

Activity Category	Maximum $L_{eq}$ (1 Hr period)	Description of Activity Category / Land Uses
<b>A</b>	57 dBA (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the lands are to continue to serve their intended purpose.
<b>B</b>	67 dBA (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals.
<b>C</b>	72 dBA (Exterior)	Developed lands, properties or activities not included in Categories A or B above.
<b>D</b>	---	Undeveloped lands.
<b>E</b>	52 dBA (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

Source: Code of Federal Regulations, Title 23 Part 772, Revised April 2005

- According HDOT policy, a traffic noise impact occurs when the predicted traffic noise levels “approach” or exceed the NAC or when the predicted traffic noise levels “substantially

exceed the existing noise levels." "Approach" means comes within at least 1 dB of the NAC and "substantially exceed the existing noise levels" means an increase of at least 15 dBA.

#### **New Issues or Clarification of Issues for Final EA**

HDOT intends to update its noise policy later in 2011, but the policies described above are still current as of this writing.

### **3.5.3 Measured Noise Environment**

#### **3.5.3.1 Measured Noise Along Kea'au-Pāhoa Road**

##### **Summary of Discussion in Draft EA**

- Long term and short term measurements of noise were taken between January 20<sup>th</sup> and 21<sup>st</sup> 2010 for the analysis presented in the Draft EA. The measurement locations are illustrated in **Figure 3-10: Noise Measurement Locations Along Kea'au-Pāhoa Road**.
- At Location L1, the Maku'u Farmers Market, the noise meter was placed at a location approximately 105 feet east of the centerline of Kea'au-Pāhoa Road.
- At Location L2, the noise meter was placed at a private residence on the mauka side of the highway between Shower Drive and Pōhaku Place, at a location approximately 70 feet west of the centerline of the Kea'au-Pāhoa Road.
- Ambient sound levels at both locations are relatively dynamic and are strongly influenced by the vehicular traffic patterns of Kea'au-Pāhoa Road. The dominant noise source for both locations is vehicular traffic noise along Kea'au-Pāhoa Road. Secondary noise sources include birds, wind, rain, and occasional aircraft flyovers. The measurements show that noise levels range from 61 to 69 dBA during peak traffic hours and 55 to 64 dBA at night.
- Short term measurements were also taken at the Maku'u Farmers Market site, with the objective of getting data to validate the modeling.

#### **New Issues or Clarification of Issues for Final EA**

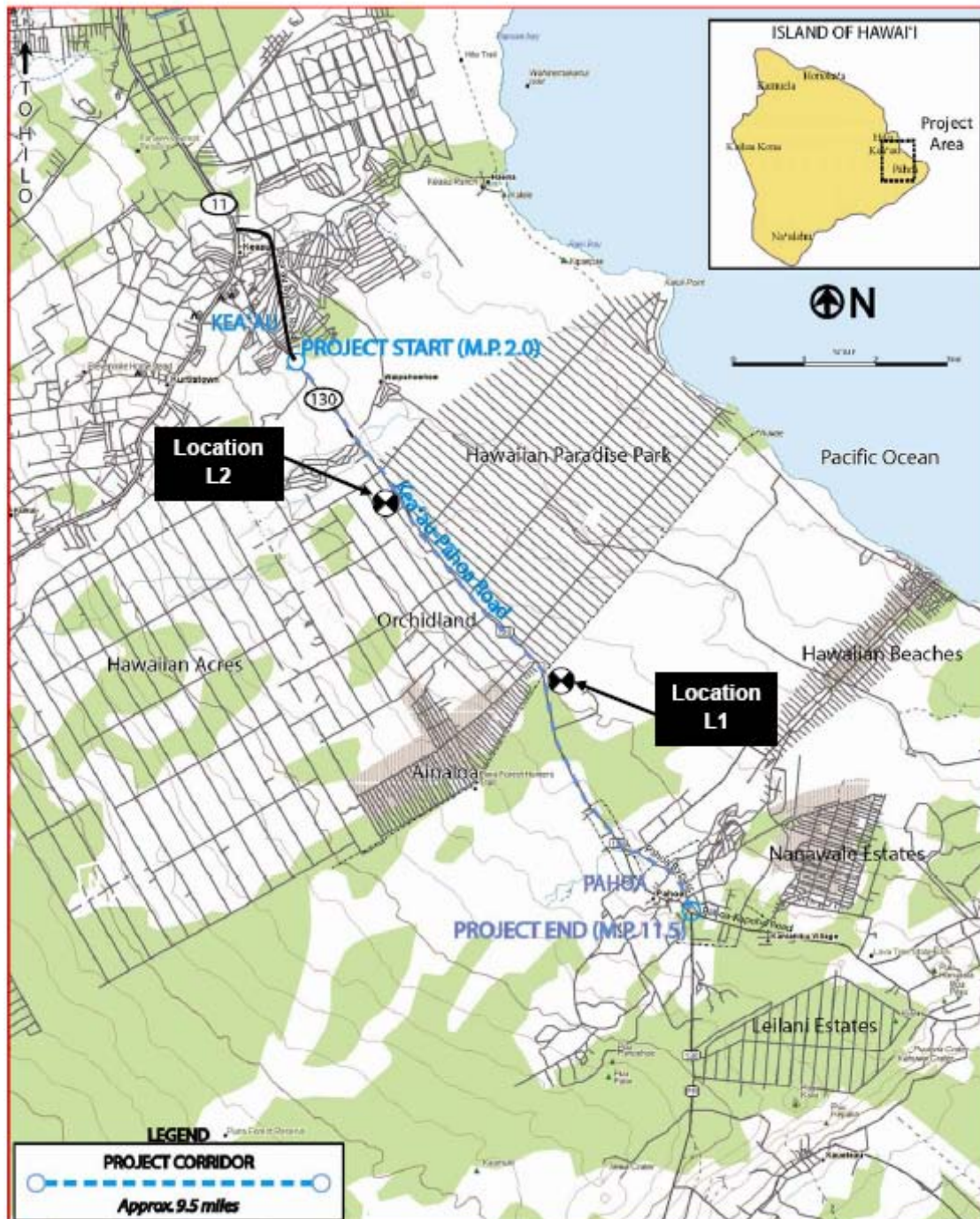
There are no new issues or issues that need to be clarified for the Final EA.

#### **3.5.3.2 Measured Noise Along Access Management Roadways**

##### **New Issues or Clarification of Issues for Final EA**

Access management roadways proposed for the Preferred Alternative, discussed in **Section 2.2.2: Access Control Under the Preferred Alternative**, offer opportunities to improve traffic control through the corridor and improve circulation within and between subdivisions. These improvements, however, will introduce new noise sources within the subdivision areas. New measurements and analysis were performed for the Final EA; see **Appendix E: Noise Study**.

**Figure 3-10: Noise Measurement Locations Along Kea'au-Pāhoa Road**



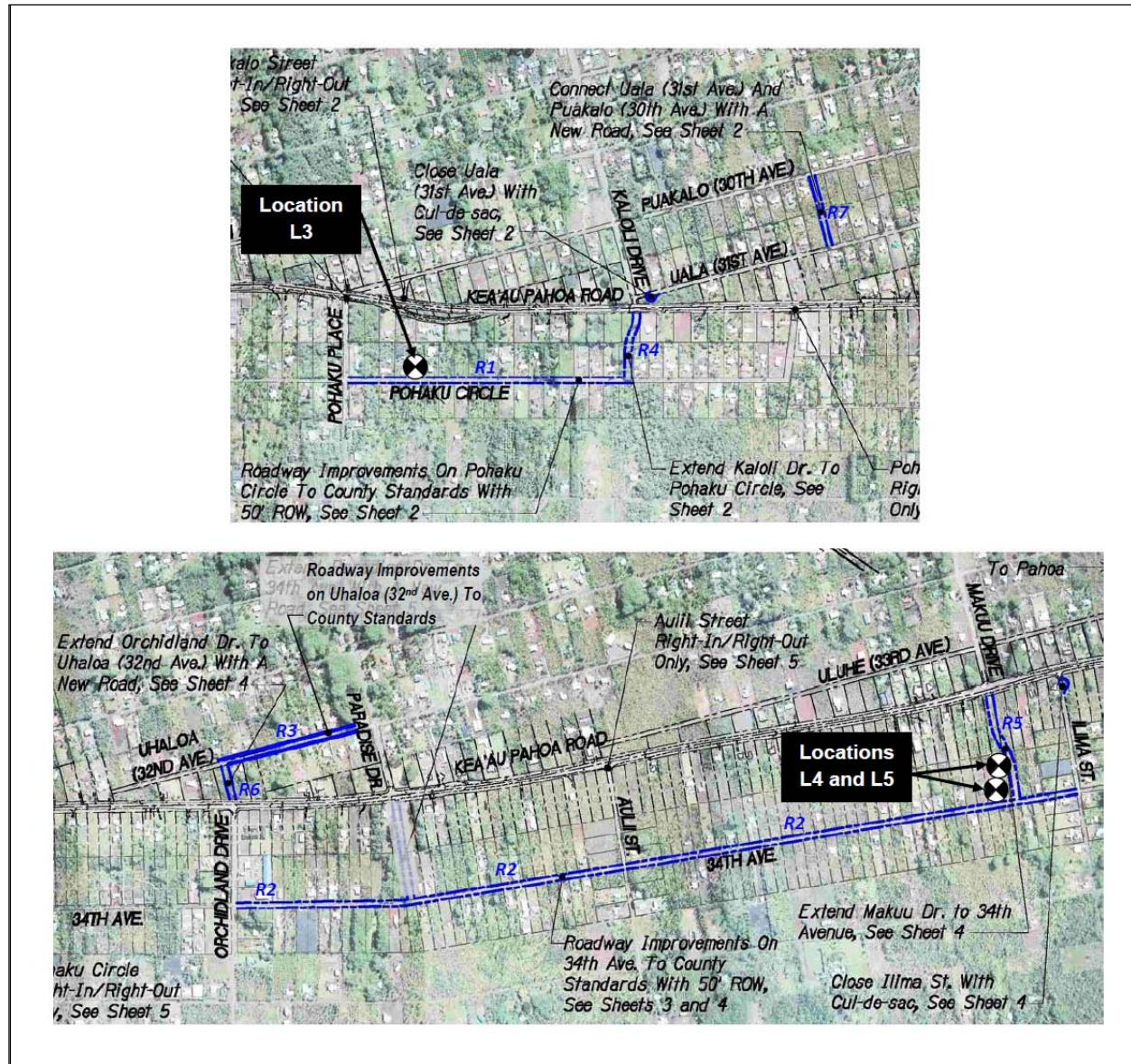
Source: DL Adams Associates

### Long-Term Measurements

Additional long-term noise level measurements were made within the subdivisions near the locations of the Access Management improvements. Noise measurements along the access

management roadways were taken between November 16th and 17th, 2010. The locations of the three sites measured for access management roadways are shown in **Figure 3-11: Noise Monitoring Locations Near Access Management Roadways**.

**Figure 3-11: Noise Monitoring Locations Near Access Management Roadways**



The three noise measurement locations were selected due to their adjacency to representative roadways where the proposed improvements would pave existing gravel roadways, add new roadway segments, or create a substantial traffic volume increase:

- Location L3: Pōhaku Circle. The meter was located on the north-eastern side of Pōhaku Circle, approximately 40 feet east of the centerline of the road.

- Location L4: 34th Avenue. The meter was located on the north-eastern side of 34th Avenue, approximately 45 feet east of the centerline of the road, near the location of the proposed extension of Maku'u Drive.
- Location L5: 34th Avenue. The meter was located on the north-eastern side of 34th Avenue, approximately 250 feet east of the centerline of the road. As this site is located further from 34th Avenue than the preceding location, it would be representative of noise levels expected along new roadways that do not exist today.

The ambient sound levels are generally static throughout the day then drop off at night. Ambient noise measurements (in dBA) at the three sites ranged in the general range of 51 to 53 dBA during daytime hours, which would be representative of AM and PM peak hours of interest in the noise study. Nighttime noise levels generally fell as low as 40 to 45 dBA in the middle of the night. These measurements suggest that the dominant noises are caused by environmental sources that are present only during the day, such as birds and insects. Secondary noise sources include wind, rain, dogs barking, occasional vehicles passing by on the rural roadways, and occasional aircraft flyovers.

### Short Term Noise Measurements

Since several of the access management roadways would be upgraded from gravel to pavement, short term measurements were conducted along several sample roadways to assess the comparative loudness of gravel versus pavement. The sound quality of the vehicle pass-by on the gravel roadway may be subjectively louder to a listener as the tires make contact with the gravel and potholes. However, based on the measurement results, it was determined that the equivalent sound level of a single vehicle pass-by on a gravel road is not significantly higher than a single vehicle pass-by on a paved road (at a similar speed). Therefore, there is no quantitative difference between vehicular noise on low speed gravel or paved roadways.

## 3.5.4 Modeled Existing Noise Levels

### 3.5.4.1 Modeled Existing Noise Levels Along Kea'au-Pāhoa Road

#### Summary of Discussion in Draft EA

- The Draft EA provided a detailed discussion of the existing noise levels along Kea'au-Pāhoa Road, and this is also available in **Appendix E: Noise Study**.
- Existing noise levels (using year 2006 traffic volumes) were predicted along the corridor at 182 noise receiver locations (most of which are single family homes) using FHWA's Traffic Noise Model (TNM) Version 2.5. The TNM model is a computer-based application that calculates noise at receivers based on traffic volumes, speeds, terrain, and physical location of the roadway relative to the receivers.
- Out of 182 noise receivers (mostly residential in nature) bounding Kea'au-Pāhoa Road, there are 117 existing properties shown in the table that are calculated to already approach or exceed the FHWA/HDOT Noise Abatement Criteria (NAC) discussed above in **Section**

**3.5.2: Noise Guidelines, Standards and Regulations.** Therefore, high noise levels already affect properties along Kea'au-Pāhoa Road, particularly those that are close to the existing highway. Houses and other buildings that are over 100 feet away from the corridor generally showed lower noise levels than those structures that were closer to the highway.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

### **3.5.4.2 Modeled Existing Noise Levels Along Access Management Roadways**

#### **New Issues or Clarification of Issues for Final EA**

For this Final EA, a new assessment was made of existing noise levels for the year 2006 for AM and PM peak traffic conditions along the access management roadways. Since the roadways are two lane rural streets with low traffic volumes, the FHWA Traffic Noise Model Look-up Tables Software Version 2.5 was used instead of the TNM model described above in the preceding section. Representative speeds and volumes were used, and noise levels were calculated at a distance of 35 feet from the centerline of the access management roadway segments. (A distance of 35 feet is the minimum distance that can be accommodated by the FHWA's Look-up Tables software.)

The results of this modeling are shown in **Table 3-21: Calculated 2006 Peak Hour Noise Levels on Access Management Roadways**. Noise attributable only to traffic was calculated to be substantially less than the ambient noise levels that were measured on-site from wind, birds, and other non-traffic sources, and which ranged from 51 to 53 dBA. Therefore, the contribution of traffic noise to the existing overall noise environment is insignificant and mathematically does not increase the existing noise levels above the measured levels of 51 to 53 dBA. In other words, vehicular traffic noise is currently not the dominant noise source for the residents along these roadways (as described in **Section 3.5.3.2: Measured Noise Along Access Management Roadways**). This is because current traffic volumes along the access management roadways are very low.

**Table 3-21: Calculated 2006 Peak Hour Noise Levels on Access Management Roadways**

Roadway	Access Management Roadway	Measured Ambient Noise Levels (dBA) <sup>1</sup>	Calculated Noise at 35 feet from Centerline, from Traffic Only, 2006 Volumes (dBA)		Total Estimated Existing Noise at 35 feet from Centerline (dBA) <sup>2</sup>	
		AM/PM Peaks	AM	PM	AM	PM
R-1	Pōhaku Circle between Pōhaku Pl. and Kaloli Drive Extended	51 - 53	48.3	49.7	51 - 53	51 - 53
R-2	34th Avenue between Auli'i Street and Maku'u Drive Extended	51 - 53	43.7	42.9	51 - 53	51 - 53
R-3	Uhaloa Avenue (32nd Ave.) between Orchidland Drive Extended and Paradise Drive	51 - 53	42.9	43.2	51 - 53	51 - 53
R-4	Kaloli Drive Extension	51 - 53	n/a*	n/a*	51 - 53	51 - 53
R-5	Maku'u Drive Extension	51 - 53	n/a*	n/a*	51 - 53	51 - 53
R-6	Orchidland Drive Extension	51 - 53	n/a*	n/a*	51 - 53	51 - 53
R-7	Connector between Uala and Puakalo	51 - 53	n/a*	n/a*	51 - 53	51 - 53

Source: DL Adams and Associates

\* Roadway does not exist today and therefore, there is no traffic noise contribution at this location

<sup>1</sup>The identical range in this column reflects that only three representative sites were measured to estimate ambient noise on all roads

<sup>2</sup>Since monitored ambient noise levels were substantially louder than noise calculated for traffic alone, and because monitored noise levels include traffic noise, the total estimated noise level is assumed to be the monitored levels.

## 3.6 Biological Resources

### 3.6.1 Flora

#### Summary of Discussion in Draft EA

- A botanical field review of the Kea'au-Pāhoa Road corridor was made in May and June, 2009, visiting areas at least 60 feet beyond the existing right-of-way limits (except where this encroached into active residential, commercial or agricultural uses.) Appendix I: Botanical Study in the Draft EA provides the full description of the areas visited.
- The area's vegetation is classified as Lowland Wet 'Ōhi'a/Uluhe Fern Forest (Gagne and Cuddihy 1990). Human disturbance, fires and historic cattle grazing have probably reduced native plant diversity and increased the prevalence of weeds in much of lowland Puna. Much of the area near the highway was altered for agriculture, residential, and commercial development.
- Vegetation adjacent to the highway has been generally disturbed by invasive weeds, herbicides, litter, utility work, driveways, and motorists driving on the vegetation. Areas disturbed in the past often have been re-colonized by alien species. Some 'ohi'a-uluhe forest patches are almost pristine. The least disturbance is often on the largest parcels, owned by W.H. Shipman Ltd. and the Department of Hawaiian Homes lands.
- During the field visits, 211 plant species were documented. Twenty-four of the plant species present in the corridor are natives, most of them very common throughout Puna and much of the Hawaiian Islands. Five endemic natives (found in Hawai'i and nowhere else) were found and 19 indigenous natives (found in Hawai'i as well as elsewhere) were observed. For some of the native species, most or all of the specimens observed were planted by humans. Descriptions of the species are found in the Draft EA and its appendix.
- No listed or proposed threatened or endangered plant species were found. Given the context and limited vegetated area, it is somewhat unlikely that one would be found unless it were planted intentionally as part of landscaping.

#### New Issues or Clarification of Issues for Final EA

Access management roadways proposed for the Preferred Alternative, discussed in **Section 2.2.2: Access Control Under the Preferred Alternative**, offer opportunities to improve traffic control through the corridor and improve circulation within and between subdivisions. However, with the addition of these roadways to the study area, it was necessary to re-evaluate vegetation in these locations to ensure that there would be no additional impacts not considered in the Draft EA.

A new field visit was performed on January 26, 2011 to consider impacts in these areas, and an addendum to the botanical survey performed for the Draft EA is provided in **Appendix I-1:**

**Addendum to Draft EA Botanical Study.** The discussion that follows is a summarization of the findings of the addendum.

The access management areas varied between fairly undisturbed native *‘ohi’a-uluhe* forest and completely disturbed and graded former agricultural land.

No threatened or endangered plant species were detected in the January, 2011 visit, and given the context, it is extremely unlikely that any would be present. Only three species not found in the original survey were found in the subsequent visit: *Cassytha filiformis* is an indigenous vine (Kaunaoa pehu), *Miconia calvenscens* is the invasive tree miconia, and *Euphorbia pulcherrima* is the decorative landscaping shrub commonly known as Poinsettia. None are a conservation concern.

## 3.6.2 Fauna

### Summary of Discussion in Draft EA

- The Draft EA provides a detailed overview of fauna in the Kea'au-Pāhoa corridor.
- Avian and mammalian surveys were conducted by walking the entire length of both sides of Kea'au-Pāhoa Road between July 9, and July 13, 2009. The objective was to determine if there were any species currently listed as endangered, threatened, or proposed for listing under either the federal or the State of Hawai'i's endangered species legislation.

### New Issues or Clarification of Issues for Final EA

While the new Access Management Roadways will affect some subdivision roadways that were not visited during the Draft EA process, the Draft EA identified every possible species that is endangered, threatened, or proposed for listing in the region of the project and suggested comprehensive mitigative measures for all these species. Therefore, no additional fieldwork was deemed necessary, as the mitigation proposed in the Draft EA would also apply to the access management roads as well.

### 3.6.2.1 Avian Survey and Resources

#### Summary of Discussion in Draft EA

- During the field survey, a total of 461 individual birds of 15 different species representing eight families were recorded. One species, Hawai'i Amakihi (*Hemignathus virens*) is endemic to (found only on) the Island of Hawai'i. All others are alien to the Hawaiian Islands. No species currently listed as threatened, endangered or proposed for Federal/State listing was detected during the course of this survey.
- Avian diversity and densities were relatively low, due to the disturbance from heavy traffic.
- The endangered Hawaiian Hawk or *‘io* (*Buteo solitarius*), is endemic to the Island of Hawai'i but not detected during this survey. The Hawaiian Hawk uses resources within the general project area on a seasonal basis. Hawaiian Hawks are found in nearly all habitats with large

trees on the island. Current population estimates are 1,450 Hawaiian Hawks living in the wild, equal to/higher than the population in pre-contact times (Klavitter 2000). There are no appropriate nesting trees identified on Kea'au-Pāhoa Road for this species. The USFWS has proposed to de-list the Hawaiian Hawk; the proposal is still open.

- Two migratory indigenous shorebird species, Pacific-Golden Plover (*Kolea*, or *Pluvialis fulva*), and Ruddy Turnstone ('akekeke, or *Arenaria interpres*) use resources within the general project area seasonally. Both are widespread worldwide and not listed for protection.
- While not observed in the surveys, small numbers of the endangered endemic Hawaiian Petrel (*Pterodroma sandwichensis*), or *ua'u*, and the threatened Newell's Shearwater (*Puffinus auricularis newelli*), or 'a'o, probably over-fly the project area between May and November based on earlier studies in Pāhoa, Hawaiian Beaches, and Paradise Park. Predation by alien mammals and disorientation by artificial light threaten both species.

#### **New Issues or Clarification of Issues for Final EA**

As noted above, any endangered, threatened, or proposed-for-listing birds in this section could also be affected along the new Access Management roads. The mitigation proposed in Section **4.6.2: Fauna** would apply on the Access Management roads as well.

### **3.6.2.2 Mammalian Survey and Resources**

#### **Summary of Discussion in Draft EA**

- With the exception of the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), or 'ōpe'ape'a, all terrestrial mammals on the Island of Hawai'i are alien species, and most are ubiquitous. Domestic dogs, cattle, cats, rats, mice, mongooses, horses and pigs were either observed directly or signs of scat indicated their presence either in or near the study area.
- No Hawaiian hoary bats were detected during the the fireld survey, but they are regularly seen in the general project area on a seasonal basis (Jacobs 1994, David 2009). Recent research on this species has shown that the bats are seasonally present on the Island of Hawai'i in almost all areas with dense vegetation and tree cover. The bat is also attracted to tree farms, agriculture, and outdoor lights that draw insects on which this species forages (Bonaccorso et al. 2004, 2007).

#### **New Issues or Clarification of Issues for Final EA**

The Hawaiian hoary bat could be affected by the new Access Management roads. Mitigation proposed in Section **4.6.2: Fauna** would apply on the Access Management roads as well.

### 3.6.3 Aquatic Biota

#### Summary of Discussion in Draft EA

- In May 2009, water quality and aquatic resource surveys along Kea'au-Pāhoa Road assessed aquatic resources and water quality within a 200 foot (60 m) wide area. Dominant vegetation, aquatic biota, water quality, and stream bed morphology were noted.
- A few, isolated pools present in stream channels are ephemeral features that likely disappear during dry periods. The pools may support aquatic insect biota, perhaps including native species, though none were observed in the field surveys.
- An intermittent unnamed stream (referred to as Waipāhoehoe Stream by some sources) is found about 1.8 miles south of the Kea'au Bypass merge. The surface flow of the unnamed stream, even when considerable from heavy rainfall, does not reach the ocean, precluding recruitment of diadromous fish (which use both marine and freshwater habitats).
- No threatened or endangered species (DLNR, 1998; USFWS, 2009a) associated with aquatic environments were encountered in the survey area and none is expected since no suitable habitats are present.

#### New Issues or Clarification of Issues for Final EA

With the addition of access management roadways to the Preferred Alternative's study area, it was necessary to re-evaluate water quality and aquatics in these locations to ensure that there would be no additional impacts not considered in the Draft EA.

A new field visit was performed on January 19, 2011 to consider impacts in these areas, and an addendum to the aquatics survey performed for the Draft EA is provided in **Appendix D-1: Addendum to Draft EA Aquatics Study**. The fieldwork involved traversing new areas on foot to find any hydrological or biological factors that would indicate the presence of wetlands or watersheds. The geology of the area is an extensive Pahala ash deposit that is highly porous, resulting in few streams.

The areas surveyed were a combination of roadway areas, lawns, scrub growth, and forest and no streams or wetlands were identified. No threatened or endangered aquatic species were detected, and none is anticipated to utilize the project area.

#### 3.6.3.1 Invertebrates

#### Summary of Discussion in Draft EA

- The only invertebrate observed in the May, 2009 survey was the giant African snail (*Achatina fulica*), a terrestrial species observed in a tributary north of the intermittent unnamed stream (also called Waipāhoehoe Stream) and in culverts between the Kea'au Bypass and Opukahaia Street. A second snail, mimic lymnaea (*Pseudosuccinea columella*) was observed in the unnamed stream in a 2004 survey for a different project (AECOS, Inc., 2004). Neither species is protected as a listed endangered or threatened species.

- No dragonflies were observed during the May, 2009 field surveys. A dragonfly nymph, the globe skimmer (*Pantala flavescens*) was identified in 2004. This species is neither an endangered nor threatened species.
- Prior to the release of the Draft EA, a citizen raised concerns about native damselflies in the project area, and particularly native damselflies that are listed as threatened or endangered. The Draft EA provided great detail on damselfly species in Hawai'i. To summarize, the only damselflies currently proposed for listing are the Flying Earwig Hawaiian Damselfly (*Megalagrion nesiotes*) and Pacific Hawaiian Damselfly (*M. pacificum*; Federal Register, 2009). Neither species is expected to be present in the area of Hawai'i Island near Kea'au - Pāhoa Road because of a lack of habitat.
- *M. xanthomela*, the Orangeblack Hawaiian damselfly, was once considered Hawai'i's most abundant species of damselfly, yet is now believed to be extirpated from Kaua'i, and is very rare on O'ahu, Moloka'i and Lāna'i. This species is perhaps the only species that potentially could be found in the project vicinity, although there is a complete absence of suitable habitat for any of these rare damselflies, and none were observed in the field. Therefore, the Kea'au-Pāhoa Road improvements project will not impact habitat for this species.

#### New Issues or Clarification of Issues for Final EA

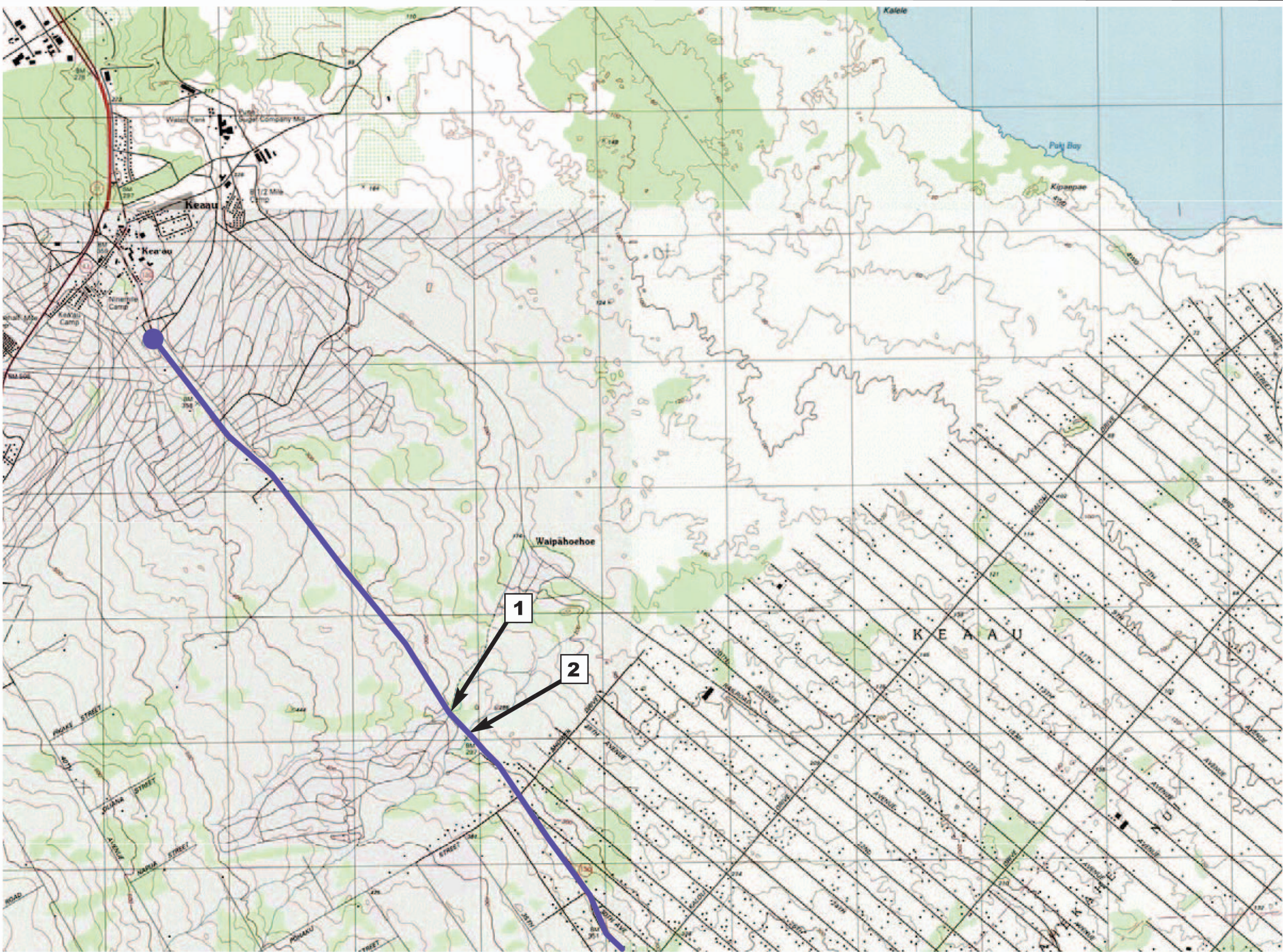
The 2011 field survey identified no aquatic resources, habitat or rare species associated with the area surrounding the access management roads and therefore no invertebrates of concern are expected to be present.

## 3.7 Water Resources

### 3.7.1 Surface and Groundwater

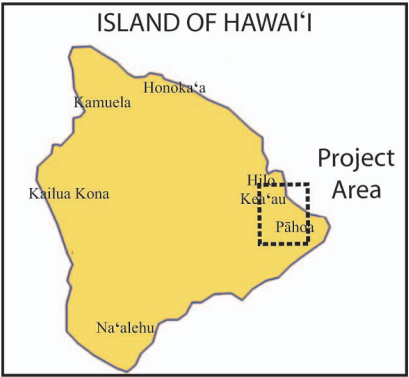
#### Summary of Discussion in Draft EA

- The youthful geology of the study area and the porous nature of soils and bedrock result in poorly defined drainage and few streams. In May, 2009 field surveys, the project team identified 34 culverts, one bridge, and drainage ditches along Keaau-Pāhoa Road. There are 38 watersheds drained by the drainages that pass runoff across the highway from mauka to makai. There are a number of low areas along the road where runoff crosses over the pavement during moderate to large storms. Drainage ditches capture runoff and direct it parallel to the roadway to a culvert feature.
- US Geological Survey (USGS) mapping shows three intermittent streams in the corridor with well-defined stream bed characteristics. Two of them are an unnamed intermittent stream (called Waipāhoehoe Stream by some sources) and an associated tributary, about 1.7 to 1.8 miles south of the end of the Kea'au Bypass. **Figure 3-12: Unnamed Stream and Tributary Location** illustrates the location of these features. The one bridge within the study corridor crosses this intermittent stream. When it is flowing, water in this stream disappears into





**RECEIVING WATERS**

- [1] - N 19 35.324' W 155 0.828'  
UNNAMED TRIBUTARY  
ELEVATION 309 FT. MSL
- [2] - N 19 35.230' W 155 0.737'  
UNNAMED STREAM  
ELEVATION 305 FT. MSL



**LEGEND**

-  Keaau-Pahoa Road Improvements Study Corridor
-  Location of Receiving Water



Unnamed Stream and Tributary Location

Figure 3-12

***THIS PAGE INTENTIONALLY LEFT BLANK***

highly permeable lava about 3.7 miles from the ocean and therefore does not directly reach the ocean via a channel.

- A third unnamed intermittent drainage with defined stream bed characteristics is located near the Pāhoa Marketplace shopping center and Old Pāhoa Road.
- Samples for water quality analyses were not taken in May, 2009 because only small pools of standing water were observed in a few locations and they were too small for sampling.
- There are no known impaired waters in the study area.
- A coordination meeting with the US Army Corps of Engineers took place in September, 2009 to discuss the surface waters in the area and if any Waters of the United States (WOUS) under the Corps' jurisdiction are present as regulated under Section 404 of the Clean Water Act. Consultation with the Corps is ongoing and if a Department of the Army Permit is necessary, it will be obtained by HDOT prior to construction.
- Abundant groundwater is known to be quite pristine, having been filtered through miles of lava rock. The project area is located mauka of the Hawai'i Department of Health Underground Injection Control Area line, meaning that the underlying aquifer is considered a drinking water source, and needs to be protected from injection well activity.
- The Pāhoa aquifer system underlies the entire study area, and is an important source of water for the County's Department of Water Supply (DWS), with the highest sustainable yield (435 million gallons per day) of an aquifer system on the island. Most domestic use of water in the area is provided by rain catchment, with the exception of some users immediately along Kea'au-Pāhoa Road.

#### **New Issues or Clarification of Issues for Final EA**

The new Access Management Roadways associated with the preferred alternative will affect some subdivision roadways that were not visited during the Draft EA process. A field survey performed on January 19, 2011 found that the new areas visited contain neither flowing water nor channels of any significance; no wetlands were identified. Refer to **Appendix D-1: Addendum to Draft EA Aquatics Study** for more information.

### **3.7.2 Wetlands**

#### **Summary of Discussion in Draft EA**

- In the vicinity of the unnamed intermittent stream (referred to by some as Waipāhoehoe Stream) described in **Section 3.7.1: Surface and Groundwater** above, there is a depression area close to the mauka side of Kea'au-Pāhoa Road with characteristics that suggest a wetland. This depressed area, adjacent to a farm, is covered with para or California grass (*Urochloa mutica*), a facultative wetland indicator species (FACW).
- This area exhibits some wetland characteristics, specifically positive vegetation and hydrology indicators. Soils are inconclusive. As noted in **Section 3.7.1: Surface and**

**Groundwater** above, the unnamed intermittent stream system with which this potential wetland is associated is not known to be a Water of the US. Therefore this depression not classified as a jurisdictional wetland under the regulatory oversight of the US Army Corps of Engineers, even if it otherwise meets the federal definition (USACE, 1987) of a wetland.

- A review of National Wetlands Inventory maps (USFWS, 2009b) shows no wetlands in the project area. While non-jurisdiction removes federal permitting requirements, Executive Order 11990 (Protection of Wetlands) requires that federal projects minimize harm to wetlands over and above any permit issues.
- The Natural Resources Conservation Service (NRCS) requested consideration of hydric soils within the corridor as they are a potential indicator of wetlands. See **Section 3.8.1: Geology** for more about this request. No vegetation or hydrology indicative of wetlands was identified by the survey team where the hydric soils are mapped.

#### **New Issues or Clarification of Issues for Final EA**

A field survey performed on January 19, 2011 for the new access management roadways found no wetlands or other aquatic resources. Refer to **Appendix D-1: Addendum to Draft EA Aquatics Study** for more information.

### **3.7.3 Floodplains and Hydrology**

#### **Summary of Discussion in Draft EA**

- There is minimal development with impervious area upstream of the study area. Only major roadways within residential subdivisions are paved. There are no formal storm drain systems within subdivisions. Areas downstream of the project are similar. Drainage away from the highway is provided primarily by overland flow and/or open streams and ditches.
- Flood damage has mainly been caused by surface sheet flows when heavy storms strike. Flooding has occurred in some subdivisions in the area, including Orchidland and Hawaiian Paradise Park; flooding also occurs in certain areas of Pāhoa.
- Flood hazard areas for the study area and larger Puna district are difficult to delineate due to the lack of defined drainage ways. The Federal Emergency Management Agency (FEMA), which maps floodplains for the National Flood Insurance Program (NFIP), designated the part of lower Puna including Kea'au-Pāhoa Road as Zone X. Zone X has no base flood elevations or depths mapped. Actions in Zone X are not regulated by the NFIP.
- There are 35 drainage crossings of Kea'au-Pāhoa Road within the project limits. Of these, one is a bridge and one is a box culvert, and the other 33 are pipe culverts. Culverts are generally between 24 and 48 inches in diameter. There are also existing drywells located within the project limits. Each of these culverts was analyzed for hydraulic capacity in the Draft EA's Appendix L: Culvert Drainage Study. Where necessary due to increased flow, the post-project capacity of the crossings would be increased through the installation of additional culverts or larger culverts.

- Approximately 16 low points were identified along Kea'au-Pāhoa Road, based on a review of the topographic mapping or input from citizens and HDOT staff. Several locations have ponding of water during heavy rainfall events.

#### **New Issues or Clarification of Issues for Final EA**

A field survey was performed on January 19, 2011 to evaluate biological and water quality issues along the new access management roadways that have been added to the Preferred Alternative. Most of these areas are in the Hawaiian Paradise Park and Orchidland subdivisions, where there have been minimal, if any drainage improvements. Refer to **Appendix D-1: Addendum to Draft EA Aquatics Study** for more information.

## **3.8 Geographic Setting and Natural Hazards**

### **Overview**

- Most of the Puna District receives over 100 inches of rainfall yearly. Kea'au-Pāhoa Road ranges from 320 feet to 675 feet above mean sea level and runs between 3.5 and 5.2 miles inland from the coast. The landscape appears generally level, though it does increase 300 feet in elevation over 9.5 miles between Kea'au and Pāhoa. Rises and dips come from lava flows.
- The study area is outside of the tsunami inundation zone. The primary hazards to the study area come from volcanic eruptions (lava flows) and earthquakes. Floods and floodplains are discussed above in **Section 3.7.3: Floodplains and Hydrology**.

### **3.8.1 Geology**

#### **Summary of Discussion in Draft EA**

- The geology of the greater region has been heavily influenced by lava flows from two active volcanoes, Kīlauea and Mauna Loa. Refer to **Figure 3-13: Lava Flows Surrounding Project Corridor** for locations of flows. Flow types are described in greater detail in the Draft EA.
- Lava tubes and lava tube caves are a notable geological feature underlying the study area. In many cases, the presence of a lava tube is not known unless a cave roof collapses from construction activity or vegetation clearing otherwise results in the discovery of a skylight. The depth of lava tube caves often cannot be determined without detailed surveying. Recent studies (Allred and Allred 1997; Rechtman 2004) have emphasized the possibility of extensive lava tube systems underlying the study corridor.

[illegible]

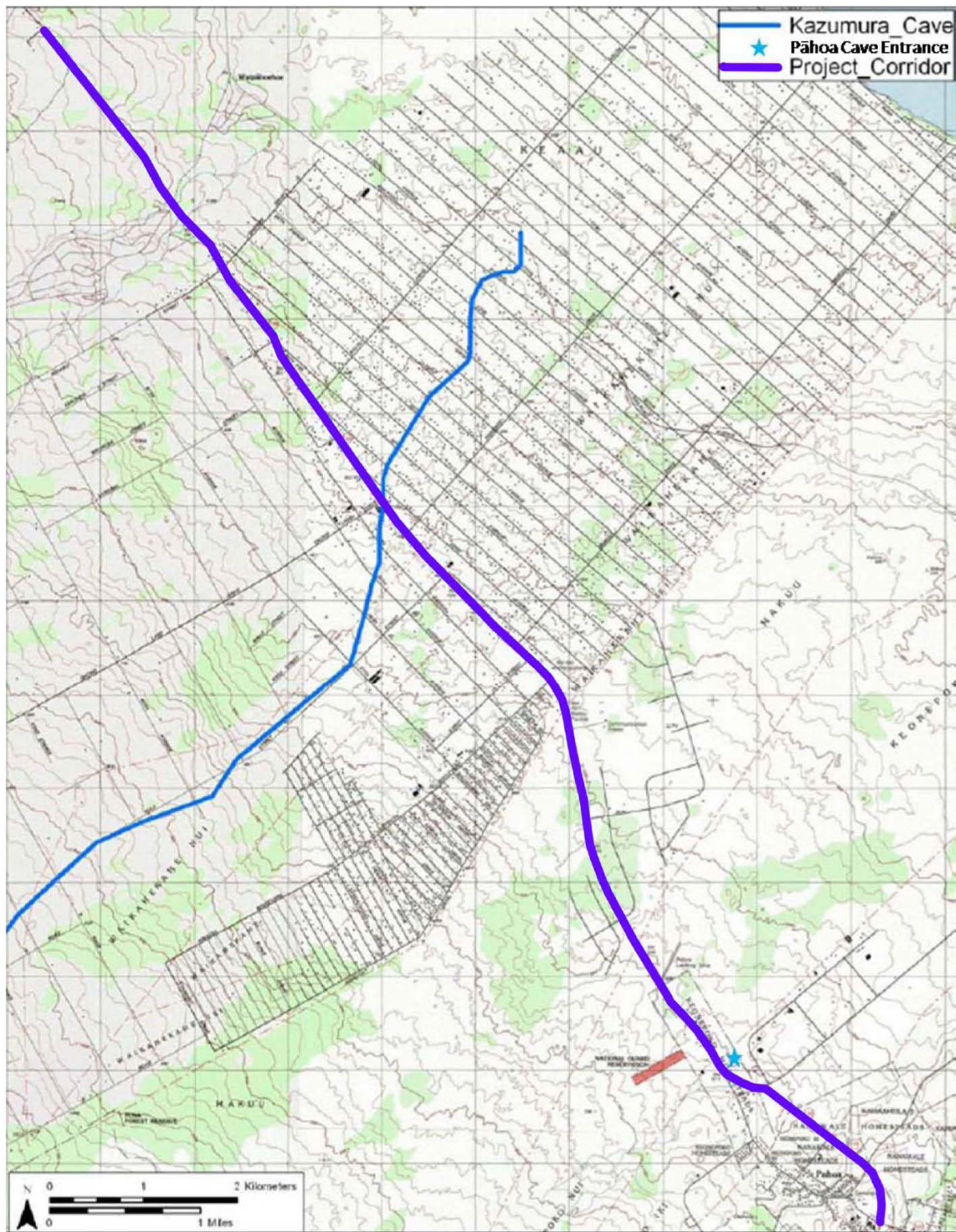
Final Environmental Assessment

- The Kazumura Cave is a lava tube cave near the corridor discussed in the Draft EA. At more than 60 km long and 1,101 m deep the Kazumura Cave (lava tube) has been called the longest and deepest lava tube in the world and the deepest cave in the USA ([www.showcaves.com/english/usa/caves/Kazumura.html](http://www.showcaves.com/english/usa/caves/Kazumura.html), accessed October, 2009). Kazumura Cave crosses under Kea'au-Pāhoa Road in close proximity to Orchidland Drive, however, no openings to the Kazumura Cave were found in the research on the cave or during field surveys for the Draft EA. **Figure 3-14: Location of Kazumura and Pāhoa Lava Tube Caves Relative to Project Corridor** shows the general location. Refer to **New Issues or Clarification** below for updated information on Kazumura Cave.
- Pāhoa Cave is another lava tube cave that crosses under the study area between Kahakai Boulevard and the recently-constructed Pāhoa fire station complex. There are two entrances several hundred feet makai of Kea'au-Pāhoa Road. **Figure 3-14: Location of Kazumura and Pāhoa Lava Tube Caves Relative to Project Corridor** shows the general location of this cave.
- There are several land and soil types in the corridor, which reflect the volcanic origins of the area. The predominant land type is pāhoehoe lava flows. Small pockets of other soil types are found in the study area, and these tend to be thin soils overlaying pāhoehoe or 'a'ā lava rock. Refer to the Draft EA for more information.
- During pre-assessment consultation, the Natural Resources Conservation Service (NRCS) requested consideration of hydric soils in the corridor as they are a potential indicator of wetlands. Hydric soils are formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions (low oxygen). NRCS mapping indicates that some hydric soils are found in the vicinity of the Pāhoa Bypass towards the southern end of the corridor. (This correspondence and mapping is found in Appendix B of the Draft EA). No vegetation or hydrology indicative of wetlands was identified by the survey team in this area.

#### **New Issues or Clarification of Issues for Final EA**

The research team performing the Archaeological Inventory Survey (AIS) for the Draft EA was aware of and reported on the presence of the Kazumura Cave crossing under the Kea'au-Pāhoa Road in close proximity to Orchidland Drive. However, no openings to the cave in the corridor were identified during field surveys or in background research, possibly because of dense vegetation or because they simply are not present in this specific location. During analyses performed for the Draft EA, the actual depth of the Kazumura Cave in this area was unknown. Profile views shown in the Allred and Allred (1997) study suggested that the upper portion of the lava tube typically lies within ten to twenty meters of the surface. This information was provided to the State Historic Preservation Division (SHPD) with the submission of the AIS.

**Figure 3-14: Location of Kazumura and Pāhoa Lava Tube Caves Relative to Project Corridor**



Sources: Cultural Surveys Hawai'i, 2010, Rechtman 2004b

With the inclusion of new Access Management Roadways into the preferred alternative, a supplementary archaeological survey was performed in January, 2011 to survey subdivision roadways that would receive improvements and were not visited during the Draft EA process. The field visits discovered cultural resources near 34<sup>th</sup> Avenue in the Orchidland Subdivision. As a result, a portion of 34<sup>th</sup> Avenue is no longer under consideration for improvement as part of the study area.

## 3.8.2 Lava Flows

### Summary of Discussion in Draft EA

- The study area is within the path of flows from Kīlauea and Mauna Loa. The Island of Hawaii has been divided into Lava Flow Hazard Zones by the US Geological Survey (USGS) according to the degree of hazard from lava flows. Zones range from 1 (most threatened) through 9 (least threatened). **Figure 3-15: USGS Lava Flow Hazard Zones** illustrates the rankings of lava zones in the study area.
- The area from roughly the Pāhoa Bypass to Pāhoa-Kapoho Road is located within Lava Zone 2, which has had between 15 and 25 percent of its area covered by lava since 1800 and between 25 and 75 percent covered by lava in the last 750 years.
- Between the Kea'au Bypass and just north of the Pāhoa Bypass, the area is located within Lava Zone 3, which has had between one and five percent of its area covered by lava since 1800 and between 15 and 75 percent covered by lava in the last 750 years. Zone 3 is gradationally less hazardous than Zone 2 because of greater distance from recently active vents and/or because the topography makes it less likely that flows will cover these areas.

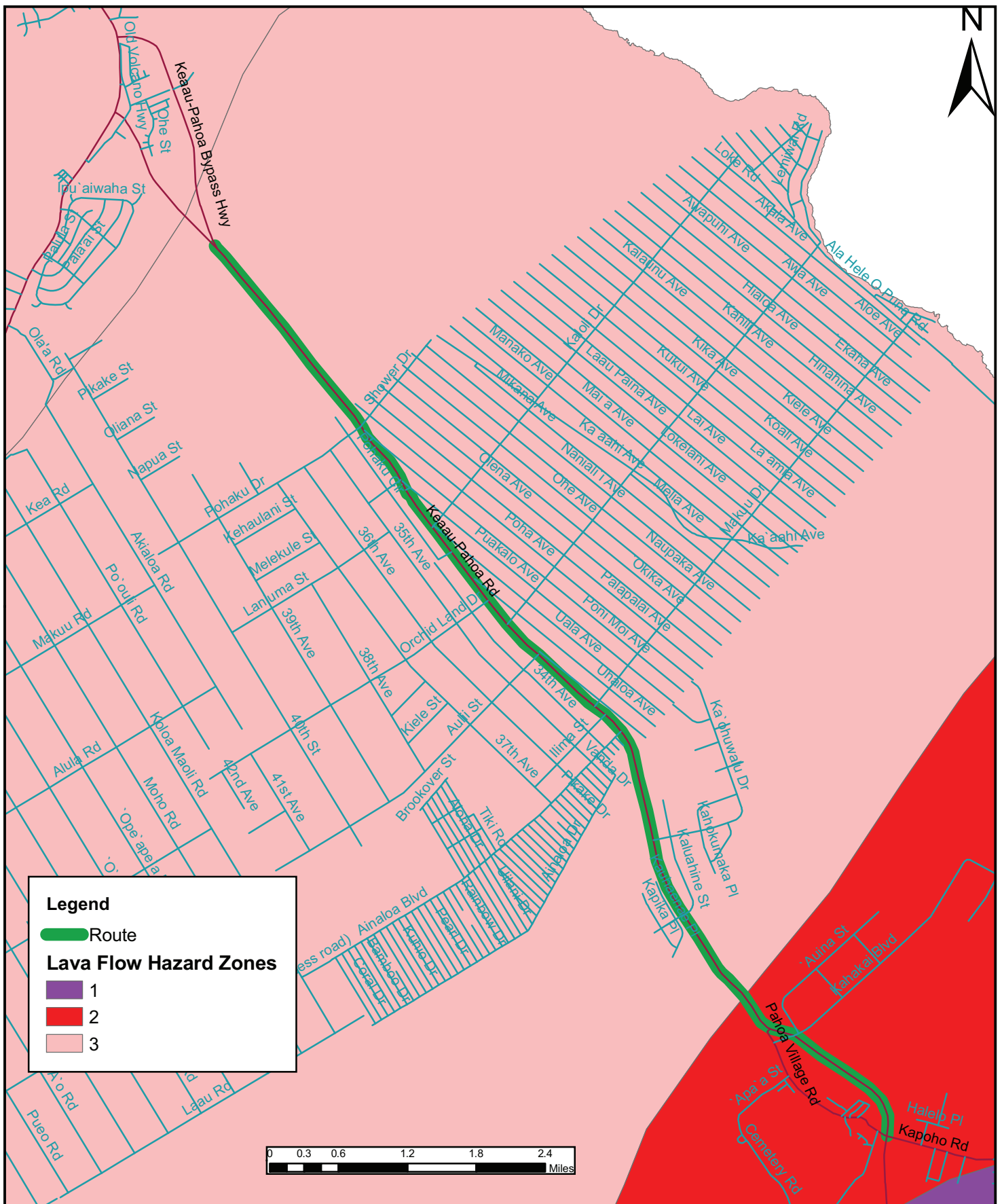
### New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

## 3.8.3 Earthquakes

### Summary of Discussion in Draft EA

- The study area, as with the rest of Hawai'i, is seismically active, primarily related to volcanic activity caused by magma movement, or else from structural weakness deep within the earth beneath the island. Volcanic-related earthquakes are concentrated primarily beneath the south flanks of Kīlauea and Mauna Loa but may cause damage over much of the island.
- The October 15, 2006 Kīholo Bay Earthquake included two primary quakes (magnitude 6.7 and 6.0) and over 50 aftershocks. Centered roughly 13 miles north of Kailua-Kona, it caused extensive damage closest to the epicenter; damage was much more limited in Puna.



## USGS Lava Flow Hazard Zones

Kea'au-Pāhoa Road Improvements, Kea'au to Pāhoa, Project No. STP-0130(27)  
State of Hawai'i, Department of Transportation

Figure 3-15

Source:  
USGS



### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## **3.9 Cultural Resources**

### **Summary of Discussion in Draft EA**

- The Kea'au-Pāhoa Road Improvements project is subject to both Section 106 of the National Historic Preservation Act (NHPA) and Hawai'i State environmental and historic preservation review legislation [Hawai'i Revised Statutes (HRS) Chapter 343 and HRS 6E-8 / Hawai'i Administrative Rules (HAR) Chapter 13-275, respectively]. An assessment of potential archaeological, historic, and cultural resources was prepared for the Draft EA.
- Archaeological Inventory Surveys (AISs) document resources, determine significance, and recommend mitigation for historic properties. The project's effect and potential mitigation measures are evaluated based on potential impact to "significant" historic properties (that are eligible for the Hawai'i or National Registers of Historic Places). Refer to the Draft EA for the criteria for eligibility.
- Both background research and fieldwork were performed. Background research for the Draft EA focused on the project area's pre-contact and post-contact land use, cultural significance, and types and locations of potential historic properties.
- Fieldwork for the Draft EA's AIS took place from July 21, 2009 and July 29, 2009 and required approximately 15 person-days to complete. A ground survey was made of the entire project area. Limited subsurface testing, possibly with a backhoe, would have been performed if subsurface deposits were located, and samples would be tested if appropriate. Supplementary research was also performed as needed. For more information, refer to the AIS, found in Appendix J: Archaeological Inventory Survey of the Draft EA.

### **New Issues or Clarification of Issues for Final EA**

The AIS performed for the Draft EA has been reviewed by SHPD. In their comments on the AIS and the Draft EA, SHPD noted that the Access Management Roadways proposed above in **Section 2.2.2: Access Control Under the Preferred Alternative** were proposed in the Draft EA as part of Alternative 2 (TSM Alternative) but had not been formally assessed for cultural resource impacts. Therefore, with the incorporation of these Access Management Roadways into the Preferred Alternative, a supplementary Archaeological Inventory Survey was performed. This effort identified cultural resources near 34<sup>th</sup> Avenue in the Orchidland subdivision. This segment of 34<sup>th</sup> Avenue has been removed from consideration of improvements to protect these resources.

FHWA will initiate Section 106 consultation with SHPD (the State Historic Preservation Division) based on their concurrence with all studies. Full coordination will take place with the SHPD, and County of Hawai'i relating to archaeological matters. This coordination takes place after consent of the owner or representatives has been given.

### 3.9.1 Natural and Historic Context of Area

#### Summary of Discussion in Draft EA

- Section **3.8.1: Geology** discusses lava flows that created the current natural environment. Young lava flows have destroyed pre-contact archaeological features, and have altered the landscape, particularly in the southern portion of the project area.
- Native Hawaiian traditions suggest Puna's significance and association with the people of ancient times. The AIS, found in the Draft EA in Appendix J: Archaeological Inventory Survey, provides great detail on legendary and historical figures, notes an ancient and continuous occupation of the area, and identifies wahi pana (places sacred to Hawaiian culture and spirituality) in Puna.
- The Draft EA and the AIS should be consulted for the history of the area, covering:
  - The influence of foreigners (Captain Cook's crew, missionaries, western landowners)
  - The rise of the sugar industry, its effects on the population (immigration) and destruction of cultural uses and archaeological resources
  - Roads, trails, and railroads that were developed in Puna
  - The settlement patterns (first on the coast, then further inland)
  - Evolution of Kea'au-Pāhoa Road from a trail, then a carriage and cart road, and then an increasingly wider and wider highway.

#### New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

### 3.9.2 Archaeological Resources

#### Summary of Discussion in Draft EA

- The Archaeological Inventory Survey performed for the Draft EA looked at both developed and undeveloped lands and involved a pedestrian inspection of the entire project area. All cultural resources encountered were located with a Geographic Positioning System (GPS) device and documented with a written field description, scale drawings, and photographs.
- The pedestrian survey for the Draft EA identified two historic properties within the current project area, discussed in greater detail in **Section 3.9.3: Historic Resources** below.
- Sugarcane cultivation and young lava flows have destroyed pre-contact features. Lava tubes, remnants of historic structures related to cattle ranching, the sugarcane industry, and/or railroad infrastructure, were anticipated as potential finds.
- No signs of archaeological resources were identified in the course of fieldwork for the Draft EA, likely due to the original construction of Kea'au-Pāhoa Road and on-going development. The majority of land within visited for the analysis in the Draft EA has been significantly altered.

- Ground visibility within developed portions of the current project area was generally high. Ground visibility within undeveloped portions of the current project area was generally low due to thick, nearly impassable vegetation.
- The Draft EA discusses formations along the highway created in the past by construction bulldozers (which can be confused for human-made rock structures) and agricultural terraces found during a previous archaeological inventory survey (Komori 1987) near the current project area. Since the terraces are more than 50 feet west of the survey area no attempt was made to find them.
- No signs of lava tubes were found during the fieldwork for the Draft EA, though their presence may have been obscured by dense vegetation, particularly in the southern portion of the project area in the vicinity of Pāhoa. (Refer to the **New Issues** section below for an update since the Draft EA).
- Kazumura Cave crosses (underlies) the project area in close proximity to the intersection with Orchidland Drive. The Kazumura Cave is a lava tube cave near the corridor discussed in the Draft EA. At more than 60 km long and 1,101 m deep the Kazumura Cave (lava tube) has been called the longest and deepest lava tube in the world and the deepest cave in the USA ([www.showcaves.com/english/usa/caves/Kazumura.html](http://www.showcaves.com/english/usa/caves/Kazumura.html), accessed October, 2009). Kazumura Cave crosses under Kea'au-Pāhoa Road in close proximity to Orchidland Drive, however, no openings to the Kazumura Cave were found in the research on the cave or during field surveys for the Draft EA. **Figure 3-14: Location of Kazumura and Pāhoa Lava Tube Caves Relative to Project Corridor** shows the general location.
- Pāhoa Cave is another lava tube cave that crosses under the study area between Kahakai Boulevard and the recently-constructed Pāhoa fire station complex. There are two entrances several hundred feet makai of Kea'au-Pāhoa Road. **Figure 3-14: Location of Kazumura and Pāhoa Lava Tube Caves Relative to Project Corridor** shows the general location of this cave.
- There are several land and soil types in the corridor, which reflect the volcanic origins of the area. The predominant land type is pāhoehoe lava flows. Small pockets of other soil types are found in the study area, and these tend to be thin soils overlaying pāhoehoe or 'a'ā lava rock. Refer to the Draft EA for more information.
- During pre-assessment consultation, the Natural Resources Conservation Service (NRCS) requested consideration of hydric soils in the corridor as they are a potential indicator of wetlands. Hydric soils are formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions (low oxygen). NRCS mapping indicates that some hydric soils are found in the vicinity of the Pāhoa Bypass towards the southern end of the corridor. (This correspondence and mapping is found in Appendix B of the Draft EA). No vegetation or hydrology indicative of wetlands was identified by the survey team in this area.
- The research team performing the Archaeological Inventory Survey (AIS) for the Draft EA was aware of and reported on the presence of the Kazumura Cave crossing under the

Kea'au-Pāhoa Road in close proximity to Orchidland Drive. However, no openings to the cave in the corridor were identified during field surveys or in background research, possibly because of dense vegetation or because they simply are not present in this specific location. During analyses performed for the Draft EA, the actual depth of the Kazumura Cave in this area was unknown. Profile views shown in the Allred and Allred (1997) study suggested that the upper portion of the lava tube typically lies within ten to twenty meters of the surface. This information was provided to the State Historic Preservation Division (SHPD) with the submission of the AIS.

- **Figure 3-14: Location of Kazumura and Pāhoa Lava Tube Caves Relative to Project Corridor** showed the general locations of both caves. At the time the AIS was performed for the Draft EA, there was no known entrance to the Kazumura Cave anywhere near the present study area and it was theorized that the lava tube lies at a substantial depth below the ground surface where it crosses beneath Kea'au-Pāhoa Road. It is asserted that: "Prehistoric use of the cave by humans was heavy in the downstream nine kilometers nearest the ocean" (Allred and Allred 1997:67) - which would appear to include the vicinity of the portion of the lava tube underlying the present project area.
- Based on Hawaiian Government Reports, workers constructing the original Kea'au-Pāhoa Road could hear machinery echoes coming from the cave beneath the roadway, supposedly from the Kazumura lava tube system.

#### **New Issues or Clarification of Issues for Final EA**

In their comments on the AIS and the Draft EA, SHPD noted that the Access Management Roadways proposed above in **Section 2.2.2: Access Control Under the Preferred Alternative** had not been formally assessed for cultural resource impacts. Therefore, with the incorporation of these Access Management Roadways into the Preferred Alternative, a supplementary Archaeological Inventory Survey was performed.

### **3.9.3 Historic Resources**

#### **Summary of Discussion in Draft EA**

A complete pedestrian survey for the Draft EA identified one historic property within the Area of Potential Effect (APE) of the project. A second historic property lies just outside the APE, but is discussed below. The definition of the APE is presently being reviewed by the State Historic Preservation Division (SHPD) as part of their review of the Archaeological Inventory Survey. Further discussion of the APE and SHPD concurrence with the APE boundaries will follow with formal initiation of Section 106 consultation by FHWA.

#### **New Issues or Clarification of Issues for Final EA**

Additional fieldwork was performed along access management roadways to supplement the AIS from the Draft EA.

### 3.9.3.1 1930s-Era Concrete Bridge

#### Summary of Discussion in Draft EA

- An abandoned concrete bridge (SIHP # 50-10-44-26874), likely constructed in the 1930s, is adjacent and parallel to the southwestern edge of the existing Kea'au-Pāhoa Road approximately 630 meters (2,067 feet) northwest of the intersection of Pōhaku/Shower Drives and Kea'au-Pāhoa Road. The bridge crosses an intermittent unnamed stream (also called Waipāhoehoe Stream, see **Section 3.7.1: Surface and Groundwater**). **Figure 3-16** through **Figure 3-19** show representative views of the bridge and roadway.
- This bridge will be demolished as part of the separate Shoulder Lane Conversion project described in **Section 1.2.2.1: The Kea'au-Pāhoa Road Shoulder Lane Conversion Project**, and therefore will no longer be present at the time that the project covered in this EA is constructed. The EA for the Shoulder Lane Conversion Project indicated the bridge was significant under Criterion D (have yielded or is likely to yield information important for research on prehistory or history). Their recommendation is that their documentation adequately documents the site and no further work or preservation is recommended.
- The bridge measures 28.2 meters (92.5 feet) long by 5.8 meters (19.0 feet) wide with an approximate height of 2.8 m (9.1 feet) from the surface of the dry streambed. It likely functioned as an older alignment of the highway.
- The bridge is not listed in the Historic Bridge Inventory and Evaluation (Alvarez 1987) for the island of Hawai'i, nor is it in the State of Hawaii Historic Bridge Inventory and Evaluation (Spencer Mason Architects 1996), but the bridge is constructed in a style that is similar to 1930s concrete slab bridges.
- SIHP # 50-10-44-26874 is recommended as significant under Criterion D (in accordance with the significance evaluation of Haun and Henry 2008:18) under the HRHP and the NRHP.

#### New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

**Figure 3-16: Abandoned 1930s-Era Concrete Bridge, View to Northeast**



**Figure 3-17: Abandoned 1930s-Era Concrete Bridge, Close-up View to North**



**Figure 3-18: View of Existing Kea'au-Pāhoa Road to Southeast from Abandoned Bridge**



**Figure 3-19: Asphalt-Paved Roadway at Southeastern End Abandoned Bridge, View to South**



### **3.9.3.2 Sacred Heart Catholic Church Cemetery**

#### **Summary of Discussion in Draft EA**

- Adjacent to, but outside of the Area of Potential Effect for this project, is a cemetery associated with the Sacred Heart Catholic Church in Pāhoa. **Figure 3-20** to **Figure 3-23** show representative views.
- The cemetery abuts the current right-of-way, at the intersection of the Pāhoa Bypass and Pāhoa-Kapoho Road (Old Pāhoa Road). The church and cemetery are components of the Pāhoa Historic and Commercial District, SIHP # 50-10-55-7388.
- A “path of meditation” is 16 meters (52.5 feet) from the edge of Kea'au-Pāhoa Road and includes landscaped areas containing basalt stone alignments, basalt pebble pavement, cement and basalt constructions, wooden crosses, a miniature replica of the church, and at least one wooden placard inscribed with family names. No burials are believed to be associated with this path. The church property improvements and amenities do not extend into the existing or future anticipated highway right-of-way. The path of meditation's landscaping extends to the edge of the existing highway right-of-way.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

### **3.9.3.3 Roadside Memorials**

#### **Summary of Discussion in Draft EA**

- Six roadside memorials were found within the project area that do not appear to be historic properties but are associated with bereavement.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

**Figure 3-20: Path of Meditation, Sacred Heart Catholic Church, View to Northwest**



**Figure 3-21: Placard on Path of Meditation Showing Family Who Helped Construct Path**



**Figure 3-22: Sacred Heart Catholic Church Path of Meditation, View to South**



**Figure 3-23: Sacred Heart Path of Meditation and Kea'au-Pāhoa Road, View to North**



### 3.9.4 Cultural Practices

#### Summary of Discussion in Draft EA

- Hawai'i's Act 50 (2000) requires the project proposers under Chapter 343 to consider cultural practices in a cultural impact assessment (CIA). To ensure compliance with Act 50, a Cultural Impact Assessment (CIA) study was performed for the Draft EA, and has been revised for the Final EA. The full report is found in **Appendix K: Cultural Impact Assessment**. The discussion that follows is greatly summarized.
- Background research for the CIA is described above in **Section 3.9.1: Natural and Historic Context of Area**.
- Currently developed areas are dominated by subdivisions. An area of Hawaiian Home Land, called "Parcel A" on TMK [3] 1-5, is located along the corridor within Maku'u and Hālonā Ahupua'a, below the southern boundary of Hawaiian Paradise Park. A large outdoor farmers' market is located south of Maku'u Drive.
- As described above in **Section 3.9.3: Historic Resources**, SIHP # 50-10-44-26874 is an abandoned circa 1935 concrete bridge. The Sacred Heart Catholic Church cemetery, part of the Pāhoa Historic and Commercial District, SIHP # 50-10-55-7388 (DOT 1979:F1), lies just outside the Area of Potential Effect for the project. Six roadside memorials that were found do not appear to be historic properties but are associated with bereavement.
- For this CIA, the team attempted to contact 91 community members (government agency or community organization representatives, or individuals such as cultural and lineal descendants, and cultural practitioners). Thirty-three people responded, nine people provided telephone comments and 11 kūpuna (elders) and/or kama'āina (native born) were interviewed.
- Interviewees noted concerns regarding potential adverse impacts on social and customary practices within the community that the new expanded road will bring to Puna. Safety and urban changes to Puna's country landscape were cited.
- Most interviewees were not concerned about project impacts on cultural and natural resources and associated beliefs and practices, with the exception of ongoing cultural activities at the Maku'u Farmers Market. Much of the corridor is not used for cultural purposes, but there is a concern that the removal of trees and shrubs along the roadway will expose cultural sites just outside of the project area to adverse effects in the future. Except for those who refused to comment, none of the respondents indicated opposition to roadway expansion.
- As part of the Draft EA process, is the CIA indicated the project would create no anticipated impact to traditional cultural practices along the corridor, with the exception of the activities that are ongoing at the Maku'u Farmers Market Association site where ongoing cultural activities still survive into the 21<sup>st</sup> century.

### **New Issues or Clarification of Issues for Final EA**

The Cultural Impact Assessment was updated to reflect the Access Management Roadways described above in **Section 2.2.2: Access Control Under the Preferred Alternative**.

## **3.10 Parks and Recreational Resources**

### **Summary of Discussion in Draft EA**

- FHWA regulates impacts on publicly-owned park and recreational facilities in its Section 4(f) regulations. Refer to **Chapter 5: Section 4(f) Evaluation** for more information. There are no existing publicly-owned recreational facilities in immediate vicinity of the study area corridor. There are no properties regulated under Section 6(f) of the Land and Water Conservation Fund Act.
- For passive recreation, there are a number of resources in Puna, all located miles from the study corridor. Hawai'i Volcanoes National Park is the most prominent resource in the region and 60,000 acres of the 229,176-acre park is in Puna. A number of county facilities are located between Kapoho and Kalapana. The County also developed a park in Hawaiian Beaches near the shoreline, and offers the Pāhoa Neighborhood Center in the middle of Pāhoa Town. Tennis courts and ballfields are located in Kea'au town at the Shipman Gym.
- Several of the study area subdivisions were developed with private facilities intended for the use of their residents. The PCDP has recommended additional community parks and improvements to the existing park system. The PCDP's Village Centers concepts would include new parks.
- The Hawai'i Department of Education offers gymnasiums and outdoor ballfields at school facilities, though school activities take precedence over public use.
- The County of Hawai'i requested in 2006 a Capital Improvement Project grant for a conceptual Pāhoa recreational complex adjacent to the recently-opened Pāhoa fire station and future Pāhoa police station north of Pāhoa town. The project has not been programmed by the county as part of any long-term plans, and no conceptual design plans have been produced to date. (Personal Communication, Robert Fitzgerald, County of Hawai'i Director of Parks and Recreation, 11/12/09).

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

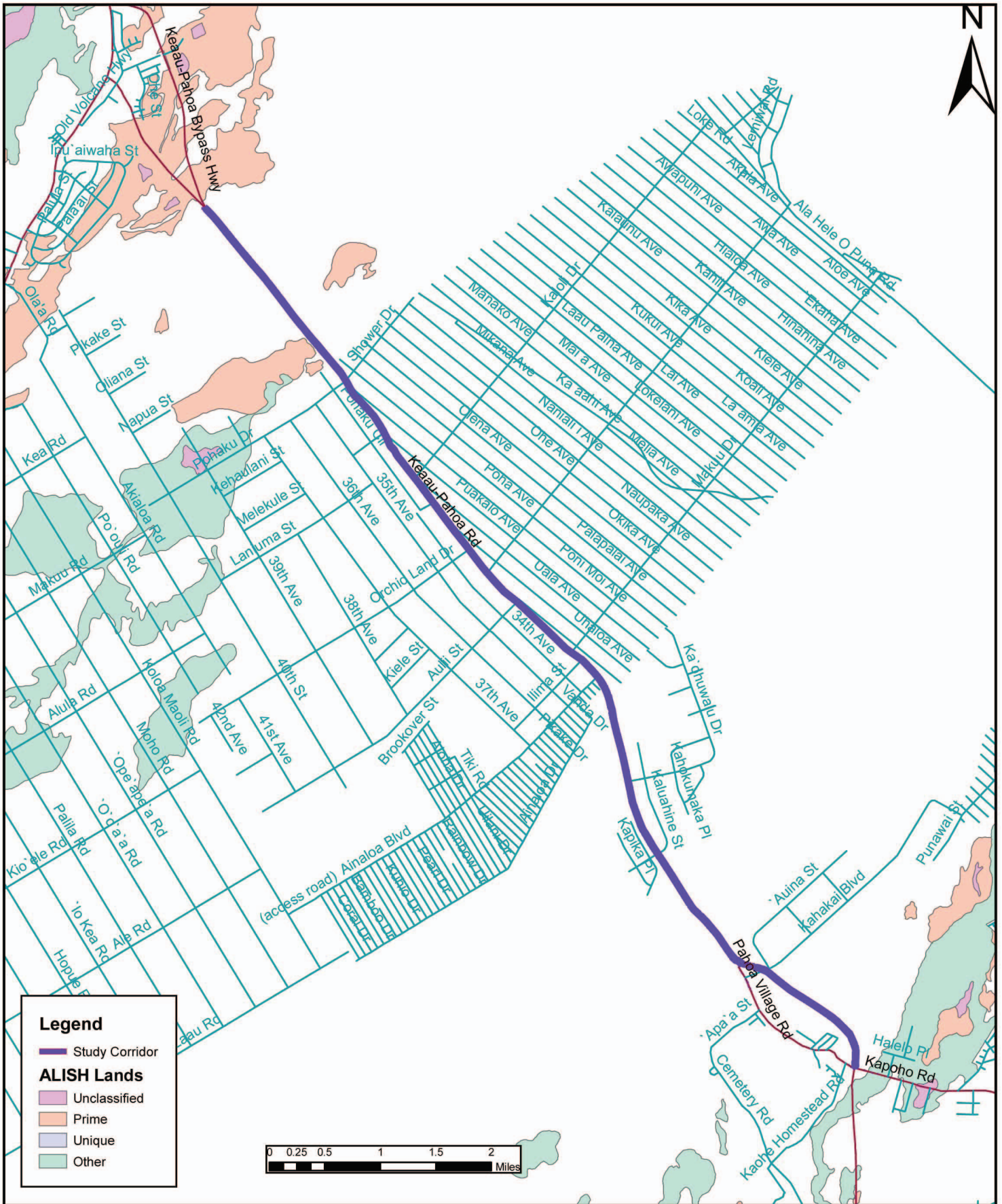
## **3.11 Agricultural Lands**

### **Summary of Discussion in Draft EA**

- The Puna district has a long history of agriculture, particularly sugar. A diversified agricultural industry has replaced sugar cultivation in Puna. Approximately 97 percent of

Hawaii's papaya production occurs in Puna. Puna produces at least 40 different agricultural products, including cut flowers, fruits, vegetables and livestock (PCDP, p. 1-3). 62 percent of Puna's land is zoned Agriculture (2005 Hawai'i County General Plan, Table 14-3).

- The Hawai'i State Department of Agriculture and the Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service) have established a classification system, Agricultural Lands of Importance to the State of Hawai'i (ALISH). The ALISH classes are:
  - Prime Agricultural Land is land best suited for the production of food, feed, forage and fiber crops.
  - Unique Agricultural Land is land other than prime agricultural land and is used for the production of specific high-value food crops.
  - Other important agricultural land is land other than prime or unique agricultural land that is of state-wide or local importance for the production of food, feed, fiber and forage crops.
- **Figure 3-24: Agricultural Lands of Significance to the State of Hawai'i (ALISH)** shows the ALISH classifications in the study area. As the figure demonstrates, little of the study area borders directly onto important agricultural land.
- There are a number of scattered small agricultural parcels in immediate proximity to Kea'au-Pāhoa Road, primarily in the Pāhoa area, as well as one large agricultural landowner, W.H. Shipman Limited near Kea'au. Most agricultural activity is set back a distance from the highway.
- W.H. Shipman Limited has 17,000 acres in Puna devoted to agriculture and commercial/industrial development and leasing, and is headquartered in Kea'au. Shipman leases over 4,850 acres to independent farmers.
- Agricultural properties that border on Kea'au-Pāhoa Road are listed in **Table 3-22: Parcels With Agricultural Activity Directly Bordering Study Corridor**, and are found both mauka and makai of the highway between the Kea'au Bypass and Shower Drive. For properties not owned by W.H. Shipman, the table only includes those properties that have agricultural operations in close proximity to Kea'au-Pāhoa Road that could potentially be affected by the project.
- There are two gated driveways to the Shipman properties on the mauka side of the highway between Shower Drive and the Kea'au Bypass, and one gated driveway on the makai side. Access to these parcels is important to ensure their continued use.



## Agricultural Lands of Importance to the State of Hawai'i (ALISH)

Kea'au-Pāhoā Road Improvements, Kea'au to Pāhoā, Project No. STP-0130(27)  
State of Hawai'i, Department of Transportation

Figure 3-24

Source:

Hawai'i Dept. of Agriculture



**Table 3-22: Parcels With Agricultural Activity Directly Bordering Study Corridor**

Tax Map Key (TMK)	Total Acres	Acres ALISH	Current Use Next to Kea'au-Pāhoa Road	Approximate Location
<b>W.H. Shipman Ltd. Agricultural Properties Between Kea'au and Shower Drive**</b>				
16001015	989.5	-	Wooded open space	Makai side north of Shower Drive
16003002	38.6	-	Wooded open space	Makai side south of Transfer Station
16004011	1154.1	-	Wooded open space	Mauka side south of Opukahaia Street
16004048	366.3	266.2 Prime*	Wooded open space	Mauka side north of Shower Drive
16004049	0.7	-	Woods, Agricultural access	Mauka side north of Shower Drive
16004050	25.2	-	Woods, Agricultural access	Mauka side south of Transfer Station access
16004055	21.3	-	Wooded open space	Mauka side opposite Transfer Station
16004056	2.1	-	Wooded open space	Mauka side opposite Transfer Station
<b>Other Agricultural Properties near Pāhoa</b>				
15007075	5.6	-	Large shade house immediately next to road	Makai side, approximately 1,400 feet north of new Pāhoa fire station
15116019	15.3	-	Several large shade houses next to road	Mauka side, immediately south of Kahakai Boulevard
15006005	15.4	-	Several large shade houses next to road	Makai side, north of Nanawale Homestead Road (Post Office Rd.)
15006026	6.6	-	Agricultural field next to road	Makai side, south of Nanawale Homestead Road (Post Office Rd.)
15005001	10.7	-	Abandoned shade houses	Makai side north of Pāhoa-Kapoho Road
15006017	14.5	-	Church property with gardens	Mauka side north of Pāhoa-Kapoho Road

\*Parcel contains two separate pieces of Prime Agricultural Farmland, 9.1 acres and 257.1 acres respectively.

\*\*Does not include non-agricultural properties leased to institutions by W. H. Shipman that border Kea'au-Pāhoa Road, including Kea'au Transfer Station.

Source: County of Hawai'i, Real Property Tax Office, Hawai'i Department of Agriculture

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## **3.12 Visual Environment**

### **Overview**

- The corridor from about 320 feet above sea level at the Kea'au Bypass to roughly 675 feet above sea level at Pāhoa-Kapoho Road. The ocean generally cannot be seen in the distance

from Kea'au-Pāhoa Road (except just beyond the project limits along the Kea'au Bypass) and the corridor itself ranges in distance from roughly three to five miles inland.

- Distant views of both Mauna Loa and Mauna Kea are afforded to Kea'au-bound traffic when conditions are clear. The Hawai'i County General Plan designates the various locations where these two mountains can be viewed along Kea'au-Pāhoa Road as "Natural Beauty" sites. (2005 Hawai'i County General Plan, page 7-4).
- Despite the overall change in elevation along the Kea'au-Pāhoa Road, the corridor is generally level, with gentle grades affording some distant views. Rainfall of approximately 120 to 160 inches per year results in green vegetative growth. Isolated remnants of the region's sugar plantation history can be observed.
- The project corridor can be viewed from two perspectives, the view from the road, and the view of the road from nearby properties.

### **3.12.1 View From the Corridor**

#### **Summary of Discussion in Draft EA**

- The roadway right-of-way itself is generally disturbed from its original state, with mowed, weedy areas and utility poles flanking the graded sides of the highway. Many residential properties that abut the corridor are fenced/gated, which provide a visual separation from the roadway environment.
- From the Kea'au Bypass (near Opukahaia Street) and Shower Drive, the property along the highway is generally a degraded native forest punctuated by agricultural open space with some thicker levels of trees and vegetation flanking the sides of the roadway.
- From Shower Drive to Ainaloa Boulevard, the corridor is lined with open parcels and lower-density residential properties in the Hawaiian Paradise Park, Orchidland and Ainaloa subdivisions. Residences are mostly landscaped with ornamental plants. Homes are varying distances from the highway. A commercial area is found at Orchidland Drive. This segment offers a mix of views of homes, yards and open land in a somewhat rural, but developing area. Views vary depending upon the viewer and the individual property viewed. The corridor is fairly straight and affords the viewer some distant views of the road.
- From Ainaloa Boulevard to Old Pāhoa Road, the corridor is more undeveloped and contains native forest and agricultural properties, punctuated with occasional residences. The forest is generally low-stature 'ōhi'a trees and uluhe ferns, a representative vegetation community. Prominent features in this segment include the Maku'u Farmer's Market, Department of Hawaiian Homelands properties, a water tank, a potable water filling facility, and the new Pāhoa Fire Station and future Police Station. There are some gentle curves in this segment; distant views along the road itself are somewhat limited, though the overall gentle topography allows views to the sides of the road.

- Near Old Pāhoa Road, the northern gateway into Pāhoa town is a commercial area landscaped with planted palms and grassy mowed roadside areas. The Pāhoa Village Marketplace shopping center is a commercial focus of the area, and contains bright-colored storefront buildings surrounding an asphalt parking lot.
- Between Kahakai Boulevard and Pāhoa-Kapoho Road, the highway bypasses Pāhoa town, a 100-year old community with older storefronts and homes. Instead, the road curves around Pāhoa, passing larger agricultural parcels. Near Pāhoa-Kapoho Road, the viewshed contains some notable tall albizia trees, an elaborately-landscaped cemetery behind the Sacred Heart Catholic Church, Pāhoa High School, and the southern gateway into Pāhoa town.

#### **New Issues or Clarification of Issues for Final EA**

The Woodland Center Shopping Center at Old Pāhoa Road has been constructed since the release of the Draft EA. It is now a prominent fixture on the landscape in this area.

Subdivision roads will be upgraded and several new roadways will be constructed as part of the access management improvements outlined in **Section 2.2.2: Access Control Under the Preferred Alternative**. These private roads are mostly low-volume two-lane roads, many unpaved, and are mostly composed of a mixture of single-family rural residential properties and vacant parcels, some cleared, and some vegetated.

### **3.12.2 View of the Corridor**

#### **Summary of Discussion in Draft EA**

- Along Kea'au-Pāhoa Road, adjoining properties view a typical rural two-lane highway right-of-way, generally between 80 and 100 feet wide in total. Paved shoulders and graded and mowed areas beyond the shoulders vary depending upon the available space and road design. Since the corridor contains generally gentle grades, there are few areas where adjoining properties are far above or below the elevation of the highway.
- During peak hour congested conditions, adjoining properties are subjected to views of heavy traffic. Other visual elements include signs, striping, lighting, etc. Utility poles are also part of the visual landscape through virtually the entire corridor.

#### **New Issues or Clarification of Issues for Final EA**

The current views of subdivision roads that may be improved in the future as part of the Access Management are typical views of low-volume, mostly unpaved roads with scattered rural residential properties.

### **3.13 Utilities**

A number of utilities serve the project area. Coordination with utilities will be ongoing during final alignment and construction.

### 3.13.1 Electrical Service

#### Summary of Discussion in Draft EA

- Electrical service is provided by the Hawai'i Electric Light Company (HELCO). On Kea'au-Pāhoa Road, HELCO has one major 69 kV overhead transmission line with 12 kV distribution and communication lines (Hawaiian Telcom and Oceanic Time Warner Cable) along the mauka side of the highway, and a second major 69 kV overhead transmission line with 34.5 kV subtransmission lines along a portion of the makai side of the highway.
- The wood poles and guy wires abut the existing highway right-of-way lines. There are also street lights attached to the wood poles as well as standard metal street light poles at the various intersections.

#### New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

### 3.13.2 Telecommunications

#### Summary of Discussion in Draft EA

- Hawaiian Telcom provides telephone service using the mauka-side poles described in **Section 3.13.1: Electrical Service**.
- Sandwich Isles Communications (SIC) is currently in its final design phase for construction of a 9.38-mile fiber-optic line that will extend between Highway 11 in Kea'au and the Department of Hawaiian Home Lands (DHHL) property down at the Maku'u Farmers Market. (See **Section 3.1.4: State of Hawai'i Department of Hawaiian Homelands** for more information on the planned development) The line would follow the mauka side of Kea'au-Pāhoa Road in an underground conduit within HDOT right-of-way in a utility easement. The line would be located anywhere between three and ten feet below the existing grade. SIC will relocate the line if HDOT needs the easement area.

#### New Issues or Clarification of Issues for Final EA

The timeline for the construction of the SIC line has been updated to third quarter of 2011 .

### 3.13.3 Water Service

#### Summary of Discussion in Draft EA

- Most of the properties within the study area are not served by public water supplies but rather rely on rainwater catchment. The only subdivision fully served by a private water utility is the Hawaiian Beaches area. The County Department of Water Supply (DWS) public services in the study area is limited to customers in immediate proximity of water mains (along Kea'au-Pāhoa Road) and in town centers (Pāhoa and Kea'au).

- The Draft EA provides greater detail on DWS infrastructure throughout Puna.
- DWS provides potable water for residents on catchment at filling spigots along Kea'au-Pāhoa Road. One water-filling station, which serves both the public and commercial water haulers, is located between Pāhoa town and Kaluahine Street on the makai side of the highway. A potable water spigot is also located on the mauka side of the highway (on an old highway remnant) just north of Shower Drive, and an additional one located just outside the gate of the Kea'au Transfer Station. DWS has proposed providing improved facilities at the Kea'au transfer station to provide enhanced service.
- DWS has a 12-inch water line located on the makai side of Kea'au-Pāhoa Road within the shoulder, between Shower Drive and Ka Ohuwalu Drive (4.4 miles). A 12-inch water line on the makai side extends from Kaluahine Street to Old Pāhoa Road (1.2 miles).
- DWS also has a 12-inch water line on the mauka side, extending from Kaluahine Street to the existing water tank (0.4 miles). The mauka-side water line then reduces to a 6-inch pipe between the existing water tank and Old Pāhoa Road (0.8 miles).
- DWS also owns and operates approximately 40 fire hydrants located along the project corridor on both sides of the highway.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

### **3.13.4 Wastewater Services**

#### **Summary of Discussion in Draft EA**

- Most residents of Puna are served by individual sewerage systems and this will continue until such time as increased population distribution and densities make it economically feasible to install municipal sewerage systems.
- There are no County of Hawai'i public wastewater facilities within the project limits.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

### **3.14 Hazardous Materials**

#### **Summary of Discussion in Draft EA**

- The presence of unknown contamination at an adjacent property could pose safety concerns to construction workers. There could also be liability concerns associated with the purchase of contaminated property for right-of-way needs. Several databases containing documentation of hazardous materials were consulted.

- The Kea'au-Pāhoa Road corridor generally contains very few adjacent properties that have a land use history with a high potential for subsurface contamination.
- The Hawai'i State Department of Health, Office of Hazard Evaluation and Emergency Response (HEER) database contained a record of an incident at the Kea'au transfer station of used oil being dumped in 1990; this has since been remediated. The air traffic control beacon near the Maku'u Farmer's Market had a release of gear oil in 1992. Two 55-gallon drums of an unknown liquid were found under a wooden classroom structure at Pāhoa High School in 2000.
- There are no CERCLIS (Superfund) database sites in immediate proximity to the study corridor. Some Superfund sites further afield from the project area with historic contamination are in Kea'au's former sugar plantation operations (8.5. and 9.5 mile camps, and the Puna Sugar Mill on Milo Road) and at Puna Geothermal Venture on Pāhoa-Kapoho Road. None of these sites are on the National Priorities List (highest concern).
- The Maku'u Farm Lots agricultural subdivision (Department of Hawaiian Home Lands) is being remediated by the US Army Corps of Engineers for unexploded ordnance from World War II, when the area was the Popoki Target Area. The areas of highest risk being remediated are a 93-acre bombing target area, and a 15-acre troop maneuver area. Neither area abuts directly onto Kea'au-Pāhoa Road.

#### **New Issues or Clarification of Issues for Final EA**

There are no known current or past land uses in proximity to the Access Management Roadways proposed for the Preferred Alternative that would raise concerns for hazardous materials.

## **CHAPTER 4: ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

### **4.1 Land Use**

#### **4.1.1 Consistency with Government Plans, Policies and Controls**

A number of separate plans and policies influence the current and future land use and transportation goals for the area.

##### **4.1.1.1 County of Hawai'i General Plan**

###### **Summary of Discussion in Draft EA**

- The current County of Hawai'i General Plan (2005) considers the local economy, housing, education, protective services, recreation, transportation and land use. In general, the proposed improvements to Kea'au-Pāhoa Road are neutral towards or consistent with the goals of the plan in all these areas. Refer to Section 3.1.3.1: County of Hawai'i General Plan in the Draft EA for a discussion of the primary issues of relevance.

###### **Preferred Alternative**

The General Plan (page 13-8) specifically calls for the state "to widen Highway 130 to four lanes with a median and channelized intersections or modern roundabouts." It does not specify the endpoints within which this widening should take place. The Preferred Alternative is fully consistent with that prescription. In more general terms, the plan calls for secondary arterials to have a minimum right-of-way of 80 feet, which will be the case under the Preferred Alternative.

The Preferred Alternative is consistent with other facets of the Hawai'i County General Plan in the following ways:

- It will be generally supportive of agriculture, the primary economic sector in Puna
- It will not exacerbate flooding (and will possibly improve drainage) across the highway
- It will not block distant vistas of Mauna Loa or Mauna Kea, which are recognized as "Natural Beauty" sites.
- It will be supportive of infrastructure improvements in nonconforming subdivisions.
- It will be generally supportive of public facilities and services (education, protective services, health, etc.) through improved mobility. Emergency services' response times will be improved in the corridor.
- It will mitigate any effects on public utilities to ensure no reduction in service.

- It will improve access to recreational facilities in the corridor and will not cause impacts on recreational facilities.
- It will improve transportation service and address present and future demands.
- It will support shared use by multi-modal uses, including mass transit, bicycle, and pedestrians and provide a bike facility in the shoulder area.
- It will not preclude but rather be complementary of an alternative parallel roadway (PMAR). A number of commenters on the Draft EA stated their opinions on the urgent need for PMAR.

### **Other Alternatives**

Alternatives 3 and 5 are generally consistent with the prescription of widening the highway to four lanes, though Alternative 5 would be six lanes (wider than four lanes) between Kea'au and Paradise Drive, and both Alternatives 3 and 5 contain portions of the corridor that would remain two lanes wide. Both Alternatives 3 and 5 are also consistent with the bulleted list above.

The No-Build and TSM alternatives are not consistent with the General Plan because they would not widen the highway.

### **New Issues or Clarification of Issues for Final EA**

The study area for the Preferred Alternative has been revised to include local streets within the Hawaiian Paradise Park and Orchidland subdivisions, as noted in **Section 2.2.2: Access Control Under the Preferred Alternative**. Improvements to these local streets will be neutral towards most prescriptions called for in the general plan.

#### **4.1.1.2 County of Hawai'i Zoning**

##### **Summary of Discussion in Draft EA**

- Most of the study area is zoned Agricultural of varying acreages. Many of the properties in subdivisions that were platted from the 1950s through 1970s are non-conforming with county zoning that was put in place after the subdivisions.

##### **Preferred Alternative**

Under the Preferred Alternative the project's primary effects on property will arise from any right-of-way that needs to be acquired from abutting properties. In general, land acquisition is not likely to create nonconforming properties from currently-conforming ones except in rare cases where existing setbacks are small or properties are at the minimum size for their zoning classification. A similar verdict is expected for local streets improved with the access management roadways added to the Preferred Alternative since the Draft EA.

## **Other Alternatives**

Like the Preferred Alternative, under the TSM Alternative and Alternatives 3 and 5, the project's primary effects on property would arise from any right-of-way acquisition. TSM would require less right-of-way because most construction would be localized near intersections; no road widening would occur.

The No-Build Alternative will not require acquisition of any property and therefore will not change any properties or their conformity with zoning.

## **New Issues or Clarification of Issues for Final EA**

The study area for the Preferred Alternative has been revised to include local streets within the Hawaiian Paradise Park and Orchidland subdivisions, as noted in **Section 2.2.2: Access Control Under the Preferred Alternative**.

### **4.1.1.3 Puna Community Development Plan (PCDP)**

#### **Summary of Discussion in Draft EA**

- The PCDP recognizes that current land use in the Puna District has been strongly influenced by past actions, and that the current trends of spread-out rapid growth and dependency on the Hilo area for services and employment are unsustainable over the long-term. Section 3.1.3.3: Puna Community Development Plan (PCDP) in the Draft EA outlines in detail the PCDP's plans for Village and Town Centers, which are envisioned to serve a live-work-play capacity.
- The PCDP also looks at transportation, noting the dependency of Lower Puna on Highway 130. The lack of alternative routes, congestion, intersections with substandard private streets, poor suitability for transit, and dangers for pedestrians and bicyclists are all noted. The PCDP calls for:
  - Travel Demand Management (TDM) to reduce single-occupancy vehicles, encourage telecommuting, reduce commuting outside Puna, and reduce reliance on fossil fuels.
  - Mass Transportation improvements
  - Improved roadway network: emergency/evacuation routes, connectivity between subdivisions, and an alternative redundant Puna Makai Alternative Route (PMAR)
  - Improvements for multi-modal use, safety, traffic calming, and aesthetics as a priority over efficient travel speed, and reduced speed limit to 45 mph from the Kea'au Bypass to Ainaloa Boulevard
  - Increased capacity between the Kea'au Bypass and Ainaloa Boulevard
  - A right turn lane from Pāhoa-Kapoho Road (Highway 132) to Highway 130

## **Preferred Alternative**

The Preferred Alternative will be supportive of the PCDP's vision for Village and Town Centers, especially because access improvements that extend cross streets into adjoining subdivisions

(via a four-way intersection) such as those outlined in **Section 2.2.2: Access Control Under the Preferred Alternative** are pursued.

While the PCDP envisions development that reduces dependency on highways like Kea'au-Pāhoa Road, greater mobility in lower Puna District afforded by the Preferred Alternative will increase the viability of these Village and Town Centers' to serve the larger community for motorists and users of alternative modes like transit and bicycling.

The Pāhoa Regional Town Center and Orchidland Neighborhood Village Center border on the study corridor. The Preferred Alternative will need to be sensitive to and complementary with these areas' planned roles as Town and Village centers, particularly with encouraging a pedestrian-oriented character and design feel that encourages persons to visit. The Preferred Alternative will not directly affect other Village/Town center areas further from Kea'au-Pāhoa Road, though these centers clearly influence (and will be influenced by) traffic access from the Preferred Alternative.

While the Preferred Alternative could offer TDM opportunities for ride-sharing, van-pools, car-pooling, transit, and other alternative modes, it will also reduce congestion and travel times and therefore make single-occupancy vehicle use a more viable choice for travelers than today. It will, however, improve accessibility to services and employment in Village and Town Centers and potentially encourage development that supports employment and services in Puna.

Under the Preferred Alternative, bus pullouts and improved amenities for transit users will greatly improve the safety, comfort, schedule reliability, and viability of transit service. Improvements will also enable the County's Mass Transit Agency to increase routes and service frequencies, and offer viable transit hubs. Other forms of transit, such as paratransit and school buses will benefit as well.

The Preferred Alternative will improve lower Puna's ability to evacuate persons during natural disaster. The four-lane cross-section will also permit use of a contra-flow configuration when large numbers of vehicles need to be evacuated quickly. The Preferred Alternative will not preclude the County's ability to construct an alternative PMAR roadway.

Connectivity between subdivisions will be greatly improved as the Preferred Alternative will extend cross streets (via a four-way intersection) as outlined in **Section 2.2.2: Access Control Under the Preferred Alternative**.

The PCDP calls for reduction in speed limit to 45 mph between the Kea'au Bypass and Ainaloa Boulevard. The Preferred Alternative will have a posted speed limit based on engineering needs. Refer to Appendix C: Traffic Study in the Draft EA for information on the justification for speeds of alternatives in the corridor.

The PCDP calls for a study to create greater highway safety for all travel modes, including cost-benefit of improvements, consideration of a wide range of traffic calming features, use of frontage roads, and intersection controls. The Preferred Alternative has focused on safety and the anticipated reduction of accidents has been analyzed as part of this EA.

The Preferred Alternative will clearly support the PCDP's call for increased capacity on Kea'au-Pāhoa Road between the Kea'au Bypass and Ainaloa Boulevard.

The Preferred Alternative will support a right-hand turn lane from Pāhoa-Kapoho Road (Highway 132) onto Highway 130 as called for in the PCDP.

The PCDP calls for improvements to non-motorized travel and for scenic byways, given the limited bicycle and pedestrian facilities in place today. It specifically notes the lack of safe pedestrian crossings on Kea'au-Pāhoa Road. The Preferred Alternative is greatly supportive of these goals and will greatly improve safety for pedestrians and bicyclists. The Preferred Alternative will include crosswalks at critical intersections, and signals or roundabouts at high-volume intersections to greatly improve safety for both pedestrians and bicyclists crossing both Kea'au-Pāhoa Road and cross-streets. Accommodations for pedestrians and bicyclists along Kea'au-Pāhoa Road will include separated pedestrian areas and an eight-foot shoulder/bikeway area. Landscape improvements will also improve the experience for all users.

### **Other Alternatives**

Alternatives 3 and 5 would be consistent with the PCDP for reasons similar to those outlined above for the Preferred Alternative, and they would have similar outcomes in improving safety, managing access, improving multi-modal use of the corridor, and increasing capacity. They would not preclude PMAR.

The TSM Alternative (Alternative 2) would provide some of the benefits outlined above, but have a lesser effect on increasing capacity in the corridor. While traffic operations at intersections would be improved, congestion elsewhere would persist with the highway remaining two lanes wide. Alternative 2 would be 45 mph as called for in the PCDP.

The No-Build Alternative would make no improvements and therefore is not consistent with the measures called for in the PCDP.

### **New Issues or Clarification of Issues for Final EA**

The study area for the Preferred Alternative has been revised to include local streets within the Hawaiian Paradise Park and Orchidland subdivisions, as noted in **Section 2.2.2: Access Control Under the Preferred Alternative**. As noted above, these access management improvements are supportive of the PCDP.

As of this writing, amendments to the Puna CDP are under consideration by the County Council and Mayor.

#### **4.1.1.4 Puna Regional Circulation Plan (PRCP)**

##### **Summary of Discussion in Draft EA**

- The Puna Regional Circulation Plan (PRCP), issued in November 2005 (though never formally adopted), reflected many of the values expressed later in the 2008 PCDP, including the Village Centers concept. The PRCP intended to address five key problems that affect

transportation and the quality of life: lack of emergency bypass routes, Puna's relatively high motor vehicle fatality rate, the region's rapid growth, a lack of provisions for equal access to transportation, and auto-dependency created by existing land use patterns.

### **Preferred Alternative**

The PRCP calls for bus transit expansion, addressing schedules, headways, and fleet providing more equity in transportation service for elderly, children, low income. The Preferred Alternative is consistent with this goal and will facilitate improvements by the County's Mass Transit Agency. Bus pull-outs will enable buses to more safely transition into and out of traffic. Safer designs near bus stops, including crosswalks and signalization at busy intersections, will make conditions safer for passengers. Bus service will be much more reliable when congestion is reduced and schedules are more consistent day to day.

The PRCP proposes improved bike and pedestrian facilities, and specifically improvements called for in Bike Plan Hawai'i (see **Section 4.1.1.8: Bike Plan Hawai'i** below.) The Preferred Alternative is consistent with this improvement.

The PRCP calls for improved connectivity between subdivisions. The Preferred Alternative's access management concepts proposed in **Section 2.2.2: Access Control Under the Preferred Alternative** will improve direct travel between subdivisions by creating new accesses into and out of the subdivisions that line up on both sides of Kea'au-Pāhoa Road.

An alternate route (PMAR) parallel to Highway 130 is called for in the PRCP. The Preferred Alternative is neutral towards this goal as it will not preclude the County's ability to construct an alternative PMAR roadway. Once a PMAR route is determined, connections to Highway 130 can be made.

The PRCP advocates widening of Highway 130 from two to four lanes from Kea'au to Pāhoa and also calls for study of various intersections along Kea'au-Pāhoa Road. The Preferred Alternative is fully consistent with this goal.

### **Other Alternatives**

Alternatives 3 and 5 would generally be consistent with the PRCP for reasons similar to those outlined above for the Preferred Alternative. The one prominent difference is that both Alternatives 3 and 5 contain segments of highway that would remain two lanes wide. In addition, Alternative 5 would contain a six-lane segment, which exceeds the PRCP's recommendation of four lanes.

Neither the TSM Alternative nor the No-Build Alternative would widen the highway to four lanes and therefore neither are consistent with the measures called for in the PRCP.

### **New Issues or Clarification of Issues for Final EA**

In its comments on the Draft EA, the Hawai'i County Department of Planning asked for text clarifying that the PRCP was never formally adopted. This clarification has been made in the Final EA.

The study area for the Preferred Alternative has been revised to include local streets within the Hawaiian Paradise Park and Orchidland subdivisions, as noted in **Section 2.2.2: Access Control Under the Preferred Alternative**. The access management improvements will be supportive of the PRCP's goals.

#### **4.1.1.5 State of Hawai'i Statewide Transportation Plan**

##### **Summary of Discussion in Draft EA**

- The Hawai'i Statewide Transportation Plan (HSTP) was last updated in September, 2002 and is currently being revised. The 2002 plan had a horizon to 2025.
- The overall mission was to provide for the safe, economic, efficient and convenient movement of people and goods through an integrated multi-modal transportation system that provides mobility and accessibility for people and goods. Capacity is to be increased to address current needs and anticipated growth. Multi-modal transportation choices (transit, bicycling, walking) are encouraged.

##### **Preferred Alternative**

The Preferred Alternative is consistent with all listed elements of the HSTP, as capacity will be increased, while transit, bicycling, and pedestrian activity will be enhanced.

##### **Other Alternatives**

Alternatives 3 and 5 are consistent with all listed elements. The TSM Alternative would be somewhat less consistent as capacity would not be increased to the same levels as the other alternatives, especially between intersections. The No-Build Alternative would not provide improvements and therefore is not consistent with the HSTP.

##### **New Issues or Clarification of Issues for Final EA**

The study area for the Preferred Alternative has been revised to include local streets within the Hawaiian Paradise Park and Orchidland subdivisions, as noted in **Section 2.2.2: Access Control Under the Preferred Alternative**. The access management improvements will be supportive of the HSTP.

#### **4.1.1.6 Hawai'i Long-Range Land Transportation Plan (HLRLTP)**

##### **Summary of Discussion in Draft EA**

The Hawai'i Long-Range Land Transportation Plan (HLRLTP), from 1998 identified the transportation improvements needed to support growth of the Big Island until 2020. It noted the potential for very extensive development from Puna's approximately 56,000 residential lots. The HLRLTP recommended the need to increase the capacity of Kea'au-Pāhoa Road by widening from two to four lanes between the Kea'au Bypass and the Pāhoa Bypass.

### **Preferred Alternative**

The Preferred Alternative is totally consistent with the call for widening this segment to four lanes.

### **Other Alternatives**

Alternatives 3 and 5 would widen this segment to at least four lanes wide (though Alternative 5 would exceed that with its 6-lane segment between Kea'au Bypass and Paradise Drive.) Neither the TSM Alternative nor the No-Build Alternative would make the widening called for in the HLRLTP.

### **New Issues or Clarification of Issues for Final EA**

The study area for the Preferred Alternative has been revised to include local streets within the Hawaiian Paradise Park and Orchidland subdivisions, as noted in **Section 2.2.2: Access Control Under the Preferred Alternative**. The access management improvements will be supportive of the HLRLTP's goals.

## **4.1.1.7 State of Hawai'i Statewide Transportation Improvement Program (STIP)**

### **Summary of Discussion in Draft EA**

The Hawai'i Statewide Transportation Improvement Program (STIP) provides a multi-year listing of HDOT and County projects and identifies those projects slated for federal funding. It recognizes the projects that HDOT and FHWA have in the pipeline for priority funding. This Kea'au-Pāhoa Road improvements project is listed in the STIP for design in Fiscal Year 2011 and construction is tentatively scheduled for Fiscal Year 2013.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## **4.1.1.8 Bike Plan Hawai'i**

### **Summary of Discussion in Draft EA**

- Last updated in 2003, Bike Plan Hawai'i calls for an improved bicycle network for safe travel. Improvements include shared signed bike routes (bikes use shoulder areas on existing roads), bike lanes (dedicated striped bike lanes specifically for bicycles), and multi-use paths, which are separate from roadways. In the study area, the Plan calls for:
  - A shared signed bike route along Kea'au-Pāhoa Road between Shower Drive and the Kea'au Bypass. (Route 32 in the plan).
  - A shared signed bike route running from Shower Drive, across Kea'au-Pāhoa Road, then along Pōhaku Drive, 'Ōla'a, and 40<sup>th</sup> Avenue to connect with Volcano Highway. (Route 33 in the plan). Route 33 would connect Hawaiian Paradise Park, Orchidland Estates, Hawaiian Acres, and Kurtistown.

### **Preferred Alternative**

The Preferred Alternative is supportive of Route 32 and will provide bicyclists and pedestrians with an eight-foot shoulder and greatly improve conditions along the entire length of the corridor between the Kea'au Bypass and Pāhoa-Kapoho Road.

Signalization and geometric improvement of the Shower Drive/Pōhaku Drive intersection will take place in the Shoulder Improvements project (see **Section 1.2.2.1: The Kea'au-Pāhoa Road Shoulder Lane Conversion Project**) and greatly improve safety for bicyclists wishing to cross Kea'au-Pāhoa Road. Therefore, the Preferred Alternative is supportive of Route 33.

### **Other Alternatives**

Alternatives 3 and 5 would improve conditions for bicycles consistent with those of the Preferred Alternative. While the TSM Alternative would benefit Route 33 (improved crossing of Kea'au-Pāhoa Road at the signal on Shower Drive), it would not benefit Route 32, as no improvements would be made to the highway in this area. The No-Build Alternative would provide no benefits to bicycles.

### **New Issues or Clarification of Issues for Final EA**

The study area for the Preferred Alternative has been revised to include local streets within the Hawaiian Paradise Park and Orchidland subdivisions, as noted in **Section 2.2.2: Access Control Under the Preferred Alternative**. The access management improvements will improve bike travel within and between the subdivisions.

#### **4.1.1.9 Hawaiian Paradise Park Master Plan**

##### **Summary of Discussion in Draft EA**

- The Hawaiian Paradise Park (HPP) subdivision released a draft Master Plan in September, 2005. The primary element of relevance to the Kea'au-Pāhoa Road Improvements Project states: "If Route 130 or any other highway or roadway that abuts HPP is constructed or improved, the governmental entity under whose jurisdiction the roadway falls shall provide adequate protection against noise pollution, water runoff, and other unforeseen environmental hazards."

### **Preferred Alternative**

This Environmental Assessment is evaluating impacts of the Preferred Alternative on adjoining properties and will recommend mitigation as necessary, consistent with the HPP Master Plan.

### **Other Alternatives**

The impacts of the other alternatives (No-Build, TSM, Alternative 3 and Alternative 5) on adjoining properties has been analyzed in this project as well.

### **New Issues or Clarification of Issues for Final EA**

The study area for the Preferred Alternative has been revised to include local streets within the Hawaiian Paradise Park and Orchidland subdivisions, as noted in **Section 2.2.2: Access Control Under the Preferred Alternative**. These improvements should be very beneficial overall for the subdivisions, and impacts of these improvements on the subdivisions have been considered as part of additional analyses in this Final EA.

#### **4.1.1.10 State of Hawai'i Department of Hawaiian Homelands**

##### **Summary of Discussion in Draft EA**

- As noted in the Draft EA in Section 3.1.4: State of Hawai'i Department of Hawaiian Homelands, the Department of Hawaiian Homelands (DHHL) prepared a Hawai'i Island Plan in 2002 and a regional Plan for its Maku'u Region properties in 2008. Both note the importance of Kea'au-Pāhoa Road in serving its Maku'u properties, and the 2008 plan prioritized improvements to Kea'au-Pāhoa Road in the vicinity of DHHL properties. The intersection of the Maku'u Farmers' Market with Kea'au-Pāhoa Road was improved with a Pāhoa-bound left turn lane and approach from the market to the highway in 2008-2009.

##### **Preferred Alternative**

DHHL fully supports improvements to Kea'au-Pāhoa Road and the Preferred Alternative is fully consistent with DHHL's plans for the area.

##### **Other Alternatives**

DHHL would support similar capacity improvements to Kea'au-Pāhoa Road under Alternative 3 and Alternative 5 as well. Neither the TSM nor No-Build Alternatives would improve capacity to a level needed for DHHL's long-term vision of the area.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

#### **4.1.1.11 Hawai'i 2050 Sustainability Plan**

##### **Summary of Discussion in Draft EA**

- The "Hawai'i 2050 Sustainability Plan: Charting a Course for Hawai'i's Sustainable Future" was produced in January, 2008 and notes that functioning infrastructure is critical to the state's economic health.

##### **Preferred Alternative**

The Preferred Alternative is generally consistent with this plan, which generally called for improved energy efficiency and options for transportation, especially public transportation.

The Preferred Alternative will reduce congestion, improve mobility for motorists, pedestrians and bicyclists, and encourage transit use, all consistent with these goals.

### **Other Alternatives**

Alternatives 3 and 5 would be similarly consistent with this plan. The TSM Alternative would provide some congestion and mobility improvements, though to a lesser degree than the other Alternatives. The No-Build Alternative would offer no improvements and is not consistent with the plan.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## **4.1.2 Induced Development**

### **Summary of Discussion in Draft EA**

- Improvements at intersections could stimulate interest in developing commercial uses. The access management concepts included in **Section 2.2.2: Access Control Under the Preferred Alternative** would align intersections so that they lead to village centers and could also encourage development.

### **Preferred Alternative**

The project corridor currently has one intersection that is already signalized, and the Shower Drive/Pōhaku Drive intersection is slated for signalization as part of an interim project that is independent of the Proposed Action. The Preferred Alternative includes signalization or roundabouts at seven new intersections. Therefore, the 9.5-mile stretch of road will have nine controlled intersections between Shower Drive and Pāhoa-Kapoho Road.

The stimulation of interest in commercial development is a direct project impact. The Preferred Alternative's direct impact on actual commercial development is remote, however. Control of adjacent land uses is outside the scope of this project and not under the jurisdiction of HDOT. Such control is under the purview of land use controls exercised by the County and State. Current land use controls do not permit such developments, and the PCDP clearly disapproves of new commercial development along the project corridor.

### **Other Alternatives**

Similar issues would be expected under the TSM Alternative, Alternative 3 and Alternative 5, all of which would improve intersections similarly to the Preferred Alternative. The No-Build Alternative would offer no improvements to intersections.

### **New Issues or Clarification of Issues for Final EA**

Improvements to subdivision roads are included in the Preferred Alternative as noted in **Section 2.2.2: Access Control Under the Preferred Alternative**. These improvements, particularly road

paving and widening may increase the attractiveness of some lots within the subdivisions for future development as access may be improved.

## 4.2 Traffic and Transportation

### Overview

The following section discusses the impacts of the Preferred Alternative on motorized traffic and other transportation modes. An extensive traffic analysis was performed in Appendix C: Traffic Study in the Draft EA. That analysis considered the comparative effects of all the project alternatives, including the No-Build Alternative on the transportation system. Since the Preferred Alternative is the focus of the discussion that follows, the reader should refer back to the materials in the Draft EA and that Appendix for specifics on other alternatives.

For the purposes of the traffic analyses, “westbound” means towards Kea'au and Hilo, and “eastbound” is towards Pāhoa and Kalapana. For cross-streets, “northbound” is heading towards the ocean (makai) and “southbound” is heading inland (mauka). Traffic analyses assume the Puna Makai Alternate Route (PMAR) has not been constructed. The design year is 2038; refer to **Section 3.2: Traffic and Transportation** for an explanation of why 2038 was used. The AM Peak Hour is defined as the hour between 7:00 AM and 8:00 AM, and the PM Peak Hour is defined as the hour between 4:15 PM and 5:15 PM.

The design speed is 60 mph (posted speed limit of 55 mph) for the Preferred Alternative, which is four lanes wide. For the No-Build and TSM Alternatives, where the ultimate roadway cross-section has only one through lane in each direction, the design speed is 50 mph (posted speed limit of 45 mph). The appropriate design speed and posted speed limits for analysis were determined through a detailed process that considered a number of separate factors:

- Safety considerations,
- Standard engineering references such as the American Association of State Highway Transportation Officials' (AASHTO) “Green Book” and the National Cooperative Highway Research Project (NCHRP) Report 504
- Roadway geometrics and the functional classification of the road,
- The likely speeds that the road's capacity could accommodate,
- Existing speeds measured on Kea'au-Pāhoa Road from travel time measurements,
- The number of traffic-controlled access points (signals, stop signs, roundabouts)
- The number of driveways and other access points along Kea'au-Pāhoa Road
- The severity of vertical grades and horizontal curves along the facility

### Definition of the Preferred Alternative

The Preferred Alternative analyzed in this section is described in greater detail in **Section 2.2: Proposed Action – Four Lane Highway With Associated Access Management Improvements**. To summarize, it contains or assumes the following:

- A four-lane divided cross-section between the Kea'au Bypass and Pāhoa-Kapoho Road

- Access control measures that consolidate access points for safety and improved traffic operations as discussed in detail in **Section 2.2.2: Access Control Under the Preferred Alternative**. Some accesses will be extended across the highway to serve subdivisions on both sides with a four-way intersection. In other locations, accesses will be closed with a cul-de-sac, or converted to right-in-right-out access only.
- Signals at: Shower/Pōhaku Drives (signal already committed in Shoulder Improvements project), Kaloli Drive, Orchidland Drive, Maku'u Drive, and Pāhoa-Kapoho Road (signal already in place). Roundabouts at Ainaloa Boulevard, Old Pāhoa Road, and Kahakai Boulevard. Lower-level cross streets will continue to have stop signs.
- Turn lane additions or lengthening where needed, both on Kea'au-Pāhoa Road and cross-streets. Right turn taper areas will be improved as appropriate.
- Transit improvements, with eight new bus pull-outs as identified in **Section 2.2.5: Transit Improvements**.
- Implementation of the Puna CDP Village and Neighborhood Centers concept

## 4.2.1 Roadway LOS Between Intersections

### Summary of Discussion in Draft EA

The traffic analysis that follows has calculated delay and level of service (LOS) along Kea'au-Pāhoa Road under the No-Build and Preferred Alternative scenarios during AM and PM peak hour periods. These are areas, away from intersections, that would be “free-flowing” under ideal conditions. Performance of traffic within the intersections themselves is discussed separately in **Section 4.2.2: Intersection LOS**. A brief summarization is provided of how the other alternatives not selected as the Preferred Alternative (TSM, Alternative 3 and Alternative 5) function; the reader should consult the Draft EA for detailed specifics on those Alternatives performed.

#### 4.2.1.1 New Issues or Clarification of Issues for Final EA

The analysis of the Preferred Alternative that is performed below in **Section 4.2.1.3: Preferred Alternative LOS Between Intersections** is a refinement of the analysis that was performed in the Draft EA. There are several major changes that have been incorporated into the Preferred Alternative that were not modeled in Alternative 4 as studied in the Draft EA. In particular, the Access Management improvements outlined in **Section 2.2.2: Access Control Under the Preferred Alternative** have been incorporated into this traffic analysis, and as a result, volumes are slightly different. Furthermore, the Preferred Alternative now assumes implementation of Roundabouts at Ainaloa Boulevard, Old Pāhoa Road and Kahakai Boulevard.

#### 4.2.1.2 No-Build Alternative Roadway LOS Between Intersections

By the design year 2038, the LOS along the corridor is expected to become markedly worse than it is today without improvements. As shown in **Table 4-1: Volumes, Level of Service and Capacity, 2038 No-Build Conditions, Between Intersections**, in the AM peak hour in 2038, heading towards Kea'au, the corridor will be above its capacity (LOS F) for the entire length between Old Pāhoa Road and Shower Drive in the No-Build Alternative. Furthermore, even in what is considered the "off peak" direction for the AM hour (towards Pāhoa), much of the corridor between Pōhaku Place and Old Pāhoa Road will be near or above capacity (LOS E or LOS F) and operate poorly. Therefore, mobility in the corridor will be greatly limited for a much longer portion of the day, even in what is not today considered "peak conditions" or the "peak direction."

A microscopic modeling effort was performed using the SimTraffic model to look at speeds approaching the intersections. **Table 4-2: 2038 No-Build, Operational Speeds on Approaches to Intersections** indicates that the speeds and delays for both the AM and PM peak hours will vary widely, but will generally be lower than the 45 or 55 mph posted speeds, and in some segments will be extremely low.

For the PM peak hour, the table demonstrates a similar, if even more extreme level of congestion that is anticipated in the PM Peak Hour in 2038, for the No-Build Alternative as the entire corridor heading towards Pāhoa will operate at a LOS F (above capacity) from Old Pāhoa Road back to Kea'au. This congestion will extend towards the Kea'au Bypass and even Highway 11. The off-peak direction (heading towards Kea'au) will experience some segments operating at LOS E, approaching capacity.

The overall conclusion that can be drawn from these analyses is that existing congestion along the roadway corridor will become markedly worse in the future year 2038 under the No-Build Alternative, and speeds and flow will deteriorate. Intersections under the No-Build Alternative, covered below in **Section 4.2.2.2: No-Build Alternative Intersection Operations**, show similar problems.

**Table 4-1: Volumes, Level of Service and Capacity, 2038 No-Build Conditions, Between Intersections**

From	To	AM Peak Hour						PM Peak Hour					
		Volume Ebd	Volume Wbd	Ebd V/C	Wbd V/C	Ebd LOS	Wbd LOS	Volume Ebd	Volume Wbd	Ebd V/C	Wbd V/C	Ebd LOS	Wbd LOS
Opukahaia	Transfer Sta	837	2646	0.25	0.78	B	D	2792	1249	0.82	0.37	<b>E</b>	C
Transfer Sta	Shower	857	2614	0.61	0.77	D	D	3137	1235	0.93	0.36	<b>E</b>	C
Shower	Pōhaku Pl	900	2001	0.64	1.42	D	<b>F</b>	2409	1082	1.71	0.77	<b>F</b>	D
Pōhaku Pl	Kaloli Dr.	1144	2156	0.81	1.53	<b>E</b>	<b>F</b>	2391	1074	1.70	0.76	<b>F</b>	D
Kaloli Dr.	Pōhaku Cr.	1211	1841	1.07	1.63	<b>F</b>	<b>F</b>	1990	980	1.41	0.87	<b>F</b>	<b>E</b>
Pōhaku Cr.	Orchidland	1295	2093	0.92	1.48	<b>E</b>	<b>F</b>	2158	971	1.53	0.69	<b>F</b>	D
Orchidland	Paradise	1488	2183	1.06	1.55	<b>F</b>	<b>F</b>	2114	1120	1.50	0.79	<b>F</b>	<b>E</b>
Paradise	Auli'i	1167	1705	1.03	1.51	<b>F</b>	<b>F</b>	1944	952	1.72	0.84	<b>F</b>	<b>E</b>
Auli'i	Maku'u	1287	1705	0.91	1.21	<b>E</b>	<b>F</b>	1885	1047	1.34	0.74	<b>F</b>	D
Maku'u	Ilima	1109	1554	0.79	1.10	D	<b>F</b>	1792	891	1.27	0.63	<b>F</b>	D
Ilima	Ainaloa	1233	1734	0.87	1.23	<b>E</b>	<b>F</b>	1792	1052	1.27	0.75	<b>F</b>	D
Ainaloa	Ka Ohuwalu	1393	1666	0.99	1.18	<b>E</b>	<b>F</b>	1678	1118	1.19	0.79	<b>F</b>	<b>E</b>
Ka Ohuwalu	Kaluahine	1303	1697	1.16	1.50	<b>F</b>	<b>F</b>	1568	1038	1.39	0.92	<b>F</b>	<b>E</b>
Kaluahine	Old Pāhoa	1274	1697	0.90	1.20	<b>E</b>	<b>F</b>	1757	1038	1.25	0.74	<b>F</b>	D
Old Pāhoa	Kahakai	687	1190	0.49	0.84	C	<b>E</b>	944	774	0.67	0.55	D	C
Kahakai	Nanawale (Post Ofc.)	543	641	0.48	0.57	C	D	486	508	0.43	0.45	C	C
Nanawale (Post Ofc.)	Unnamed	444	601	0.39	0.53	C	C	453	400	0.40	0.35	C	C
Unnamed	Kapoho	459	582	0.41	0.52	C	C	466	366	0.41	0.32	C	C

Note: LOS worse than LOS D is displayed in **bold** text.

Source: SSFM International and Roger Roger Dyar, P.E., from HDOT Data

**Table 4-2: 2038 No-Build, Operational Speeds on Approaches to Intersections**

Approaching Cross Street	AM Peak Hour		PM Peak Hour	
	Eastbound Approach Avg. Speed (mph)	Westbound Approach Avg. Speed (mph)	Eastbound Approach Avg. Speed (mph)	Westbound Approach Avg. Speed (mph)
Opukahaia St.	50	41	22	47
Kea'au Transfer Station	41	49	18	53
Shower Drive	38	13*	6*	27
Pōhaku Place	44	45	37	52
Kaloli Drive	38	42	44	40
Pōhaku Circle	40	47	46	53
Orchidland Dr.	23	46	45	51
Paradise Drive	30	46	43	48
Auli'i Street	50	49	48	52
Maku'u Drive	46	34	45	40
Ilima Street	35	44	13	50
Ainaloa Blvd.	41	46	27	47
Ka Ohuwalu	50	47	48	51
Kaluahine St.	48	36	47	51
Old Pāhoa Rd.	46	41	44	7
Kahakai Blvd.	45	42	45	10
Nanawale Homestead (Post Office Rd.)	49	50	52	49
Unnamed Road	50	55	52	55
Kapoho Rd.	3*	2*	5*	5*

\*Comparatively low speeds at this intersection are indicative of the effect of traffic signals, which are not present at the other intersections.

Source: SSFM International and Roger Dyar, P.E., from HDOT Data

#### 4.2.1.3 Preferred Alternative LOS Between Intersections

The Preferred Alternative will provide substantial improvement in traffic operations along Kea'au-Pāhoa Road.

**Table 4-3: Volumes, Level of Service and Capacity, 2038, Preferred Alternative, Between Intersections**, shows one analysis of the corridor with Alternative 4 in place looking at approach volumes and roadway capacity. In 2038 under the Preferred Alternative, the predicted LOS for the corridor is D or better for all segments in the AM Peak Hour. For the PM Peak hour, the effort predicted LOS D or better for all segments except for the eastbound segments at the intersections approaching the Transfer Station and Shower Drive. This analysis would indicate the potential for some minor congestion issues in the PM Peak hour eastbound in the segments west of Shower Drive. All other segments have LOS D or better in the peak travel direction and C or better in the off-peak travel direction.

**Table 4-3: Volumes, Level of Service and Capacity, 2038, Preferred Alternative, Between Intersections**

From	To	AM Peak Hour						PM Peak Hour					
		Volume Ebd	Volume Wbd	Ebd V/C	Wbd V/C	Ebd LOS	Wbd LOS	Volume Ebd	Volume Wbd	Ebd V/C	Wbd V/C	Ebd LOS	Wbd LOS
Opukahaia	Transfer Sta	882	2646	0.26	0.78	B	D	2782	1249	<b>0.82</b>	0.37	<b>E</b>	C
Transfer Sta	Shower	837	2614	0.25	0.77	B	D	3137	1235	<b>0.93</b>	0.36	<b>E</b>	C
Shower	Pōhaku PI	909	2251	0.27	0.66	B	D	2409	1082	0.71	0.32	D	C
Pōhaku PI	Puakalo	1146	2538	0.34	0.75	C	D	2375	1068	0.70	0.32	D	C
Puakalo	Kaloli Dr.	1145	2565	0.34	0.76	C	D	2425	1056	0.72	0.31	D	B
Kaloli Dr.	Pōhaku Cr.	1184	2220	0.35	0.65	C	D	1986	996	0.59	0.29	D	B
Pōhaku Cr.	Orchidland	1565	2443	0.46	0.72	C	D	2241	971	0.66	0.29	D	B
Orchidland	Paradise	1189	2483	0.35	0.73	C	D	1667	963	0.49	0.28	C	B
Paradise	Auli'i	1144	1988	0.34	0.59	C	D	1921	941	0.57	0.28	D	B
Auli'i	Maku'u	1284	2113	0.38	0.62	C	D	1901	1026	0.56	0.30	D	C
Maku'u	Ainaloa	1233	1540	0.35	0.45	C	C	1792	1043	0.53	0.31	C	C
Ainaloa	Ka Ohuwalu	1393	1668	0.38	0.50	C	C	1678	1118	0.49	0.33	C	C
Ka Ohuwalu	Kaluahine	1303	1697	0.38	0.50	C	C	1558	1132	0.46	0.33	C	C
Kaluahine	Old Pāhoa	1284	1166	0.23	0.34	B	C	1557	1038	0.46	0.31	C	C
Old Pāhoa	Kahakai	960	1136	0.16	0.19	B	B	1072	737	0.38	0.22	C	B
Kahakai	Nanawale (Post Ofc.)	547	641	0.13	0.18	B	B	506	498	0.15	0.15	B	B
Nanawale (Post Ofc.)	Unnamed	444	582	0.14	0.17	B	B	553	400	0.16	0.12	B	B
Unnamed	Kapoho	459	582	0.26	0.17	B	B	466	364	0.14	0.11	B	B

Note: LOS worse than LOS D is displayed in **bold** text.

Source: SSFM International and Roger Dyar, P.E., from HDOT Data

The SimTraffic model was used to predict speeds in the corridor under the Preferred Alternative in 2038. **Table 4-4: 2038 Preferred Alternative, Operational Speeds on Approaches to Intersections** shows the results. In the AM Peak Hour, speeds are predicted to generally vary from 12 to 56 mph in the westbound direction and 13 to 55 mph in the eastbound direction. The lower predicted speeds are indicated at the intersections with traffic signals or roundabouts and reflect the effect of traffic slowing as they approach a signal or a merge on a roundabout. Except for the approaches to the traffic signals or roundabouts, the speeds shown are generally above 45 mph in the westbound direction and slightly higher in the eastbound direction. These predicted speeds indicate a good level of service for the mainline through volumes.

The table also shows speeds generally ranging from 4 to 56 mph in the eastbound direction in the PM Peak hour with values of 4 to 5 mph being on the approaches to roundabouts at Ainaloa and Kahakai Boulevards. Several other intersections, which are signalized, show approach speeds below 20 mph, reflecting that some traffic has to stop for the signal. All the other speeds are typically above 34 mph. Speeds in the westbound direction are generally higher than those predicted for the eastbound direction for the Peak hour. Again, approaches to signals and roundabouts are slower, but segments that are free-flowing operate at high speeds.

The conclusion that can be drawn from these analyses is that under the Proposed Action the LOS of the roadway between intersections will be greatly improved from the No-Build Alternative, with improved traffic flow and reductions in delay. Speeds will be improved at several problem areas that are projected to operate poorly under the No-Build Alternative. The Proposed Alternative will fulfill the Purpose and Need of the project from the standpoint of traffic movement in the corridor.

**Table 4-4: 2038 Preferred Alternative, Operational Speeds on Approaches to Intersections**

Approaching Cross Street	AM Peak Hour		PM Peak Hour	
	Eastbound Approach Avg. Speed (mph)	Westbound Approach Avg. Speed (mph)	Eastbound Approach Avg. Speed (mph)	Westbound Approach Avg. Speed (mph)
Opukahaia St.	55	37	46	21
Kea'au Transfer Station	36	47	39	49
Shower Drive	47	34	46	27
Pōhaku Place	52	49	46	52
Connector to 30 <sup>th</sup> Ave.	50	48	46	53
Kaloli Drive	13	28	17	28
Pōhaku Circle	51	42	46	49
Orchidland Dr.	17	13	34	15
Paradise Drive	26	28	51	50
Auli'i Street	54	51	50	54
Maku'u Drive	22	12	18	12
Ainaloa Blvd.	26	24	4	25
Ka Ohuwalu	58	56	58	57
Kaluahine St.	56	50	56	57
Old Pāhoa Rd.	46	15	44	17
Kahakai Blvd.	13	24	5	22
Nanawale Homestead (Post Office Rd.)	54	56	55	55
Unnamed Road	55	56	56	57
Pāhoa-Kapoho Rd.	8	2	8	6

Source: SSFM International and Roger Dyar, P.E., from HDOT Data

#### 4.2.1.4 Other Alternatives

The Draft EA considered the traffic operations of Kea'au-Pāhoa Road under the TSM Alternative (in both 2018 and 2038) and under Alternatives 3 and 5 in 2038 and a detailed evaluation is provided in the Draft EA in Appendix C: Traffic Study and Section 4.2: Traffic and Transportation. Provided here is a very brief synopsis of the performance of these other alternatives, specifically the traffic operations between cross-roads.

##### TSM Alternative:

Because the TSM alternative would not add any new lanes of capacity beyond the limit of intersections or roundabouts, by 2018, much of the corridor between Shower Drive and Old Pāhoa Road would be operating at a poor level of Service (LOS E or LOS F) for the peak directions (westbound in the AM Peak, eastbound in the PM peak). Speeds would be improved in the approach to some intersections, but would be poorer at those that contain roundabouts. By 2038, conditions would deteriorate further, with LOS E or LOS F in the peak directions from Opukahaia Street to Kahakai. While TSM would provide some benefit over the No-Build

Alternative in future years, it would not be an improvement over current congested conditions, and this can be attributed to the fact that no additional lane capacity would be provided outside of intersection areas.

#### Alternative 3:

By 2038, under Alternative 3, there would still be some congestion problems in the AM Peak Hour (LOS E or LOS F) from Kahakai Boulevard to Ainaloa Boulevard for travel in both directions on Kea'au-Pāhoa Road. This can be attributed in large part to the fact that this portion of roadway would remain two lanes wide and not receive any additional lane capacity beyond intersection areas. Similarly, for the PM Peak hour, there would be poor operations with the segments from Ainaloa Boulevard to Old Pāhoa Road and also for the eastbound direction from Opukahaia Street to Shower Drive. As under the Preferred Alternative, speeds would be slowest where they approach signals or roundabouts, though they would be improved under No-Build conditions. Alternative 3 would mostly fulfill the Purpose and Need of the project from the standpoint of traffic movement in the corridor, but was not selected as the Preferred Alternative in large part because of the traffic problems that would persist.

#### Alternative 5:

Under Alternative 5, by 2038, the corridor would be operating at a markedly improved LOS compared to the No-Build Alternative. With the exception of two segments that would operate at an acceptable LOS D in the Peak Hour, all other roadway segments would operate at a very good LOS C or better. Speeds would be optimal, with only limited reductions in speed in the immediate vicinity of some signalized intersections or roundabouts. While Alternative 5 would meet Purpose and Need of the project, it was not selected as the Preferred Alternative in large part due to other impacts that would result from a much larger (6-lane) cross-section between the Kea'au Bypass and Paradise Drive. The incremental improvement in traffic operations over the Preferred Alternative was not considered justified given the Preferred Alternative's generally satisfactory operations.

## **4.2.2 Intersection LOS**

### **Summary of Discussion in Draft EA**

The traffic analysis for intersections has calculated intersection delay and level of service (LOS) for future conditions for the No-Build and Preferred Alternatives during AM and PM peak hour periods. The analysis that follows assumes that for the Preferred Alternative, single-lane roundabouts have been installed at Ainaloa Boulevard, Old Pāhoa Road and Kahakai Boulevard. All other locations that would receive traffic control are signalized.

The capacity analysis considers either the Level of Service or the ratio of volume to capacity (V/C) at all the major intersections in the corridor, based on the computer model Synchro, which uses algorithms based on the 2000 Highway Capacity Manual. The tables list LOS for overall intersections or traffic movements where the computer model calculates LOS. For the traffic movements where the computer models do not calculate LOS, the volume to capacity

(V/C) ratios are shown instead. Any traffic operations that are worse than a LOS D or have a higher V/C ratio than 0.85 are shown in **bold** in the tables.

#### 4.2.2.1 New Issues or Clarification of Issues for Final EA

The traffic analysis in the Draft EA for the Build Alternatives considered traffic operations at corridor intersections without specific access management improvements (discussed above in **Section 2.2.2: Access Control Under the Preferred Alternative**). With the decision that the Preferred Alternative would include all access management measures, additional analysis was performed for the Final EA to assess if traffic operations would be acceptable with the access management measures included. Therefore, **Section 4.2.2.3: Preferred Alternative Intersection Operations** shows intersection traffic operations with the additional access management measures included. It also considers the traffic within the subdivisions that will have altered traffic volumes with new patterns of access.

The analysis for the Preferred Alternative below considers single lane roundabouts at Ainaloa Boulevard, Old Pāhoa Road, and Kahakai Boulevard. The Draft EA demonstrated that single-lane roundabouts would not adequately accommodate traffic at these locations by 2038, and current HDOT roundabouts policy does not allow multi-lane roundabouts. However, to address immediate safety concerns and public support of roundabouts, the Preferred Alternative now includes these three single-lane roundabouts in the early phases of construction, as these locations would still be only two-lanes wide at that time. Refer to **Section 4.2.3: Roundabouts Implementation** for more detailed information. The Draft EA established that traffic signals would perform satisfactorily at these locations in 2038.

#### 4.2.2.2 No-Build Alternative Intersection Operations

Two tables that follow, **Table 4-5: No-Build LOS and V/C, AM Peak Hour, Year 2038, Study Corridor Intersections** and **Table 4-6: No-Build LOS and V/C, PM Peak Hour, Year 2038, Study Corridor Intersections**, demonstrate the capacity of the intersections along Kea'au-Pāhoa Road in the No-Build Alternative (which would not include any improvements other than what is programmed to be improved in the near future in the Shoulders Conversion project).

As seen in **Table 4-5: No-Build LOS and V/C, AM Peak Hour, Year 2038, Study Corridor Intersections**, the AM peak hour has LOS E or worse and/or V/C ratios over 0.85 for the westbound direction for the seven mile distance between Kaluahine Drive and Opukahaia Street. The only exception is one approach to Maku'u Drive, which would operate at an acceptable LOS. Most side street approaches between Kaluahine Drive and Opukahaia Street will operate at LOS E or worse for the AM peak hour.

**Table 4-6: No-Build LOS and V/C, PM Peak Hour, Year 2038, Study Corridor Intersections**, shows that the PM peak hour has even greater eastbound congestion problems. From Opukahaia Street to Kaluahine Street, eastbound V/C ratios are all above 0.85, with all but two being over 1.0. Almost every side street movement has LOS E or worse in the PM peak hour. In essence, it will be extremely difficult for cross-street traffic to safely turn onto Kea'au-Pāhoa Road in a reasonable amount of time.

**Table 4-5: No-Build LOS and V/C, AM Peak Hour, Year 2038, Study Corridor Intersections**

Intersection with Kea'au-Pāhoa Road			Individual Traffic Movements											
Cross Street	Traffic Control	Overall LOS	Eastbound			Westbound			Northbound			Southbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Opukahaia St.	Stop			0.60		B	<b>0.88</b>		D		D			
Kea'au Transfer Station	Stop		E	0.58			<b>0.87</b>					F		F
Shower Drive	Signal*	F	A	A	A	A	F		D			F		
Pōhaku Place	Stop			0.61		B	<b>1.44</b>		F		F			
Kaloli Drive	Stop		F	0.62			<b>1.24</b>					F		F
Pōhaku Circle	Stop			0.83		B	<b>1.40</b>		F		F			
Orchidland Dr.	Stop			0.76	0.11	C	<b>1.36</b>		F		F			
Paradise Drive	Stop		F	0.82			<b>1.07</b>	0.08				F		F
Auli'i Street	Stop			0.77	0.02	B	<b>1.19</b>		F		F			
Maku'u Drive	Stop		D	0.73			0.73	0.33				F		F
Ilima Street	Stop			0.75			<b>3.61</b>		F		F			
Ainaloa Blvd.	Stop			0.68	0.18	C	<b>1.03</b>		F		F			
Ka Ohuwalu	Stop		C	<b>0.93</b>			<b>1.15</b>					F		F
Kaluahine St.	Stop		A	<b>0.86</b>	0.02	B	<b>1.11</b>		F		F	F		F
Old Pāhoa Rd.	Stop			0.53	0.34	C	0.66		F		F			
Kahakai Blvd.	Stop		B	0.29			0.35	0.09				F		F
Nanawale Homestead Rd (Post Office Rd.)	Stop		0.69			0.70			F			F		
Unnamed Road	Stop		0.55			0.63			A			A		
Pāhoa-Kapoho Rd.	Signal	F	C	D	C	E	F	D	C	B		B	F	

Notes: LOS worse than LOS D, or V/C ratios greater than 0.85 are displayed in **bold** text.

Where a number is given for an individual movement, HCM does not provide a LOS Value, in which case the value displayed is the v/c ratio.

Traffic movements that do not exist are shaded in grey.

\*Installed as part of the Shoulders Conversion Project.

Source: SSFM International and Roger Dyar, P.E., from HDOT Data.

**Table 4-6: No-Build LOS and V/C, PM Peak Hour , Year 2038, Study Corridor Intersections**

Intersection with Kea'au-Pāhoa Road			Individual Traffic Movements											
Cross Street	Traffic Control	Overall LOS	Eastbound			Westbound			Northbound			Southbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Opukahaia St.	Stop			<b>1.22</b>		E	0.41		F		F			
Kea'au Transfer Station	Stop		B	<b>0.90</b>			0.41					F		F
Shower Drive	Signal*	F	F	F		D	C		E			F		
Pōhaku Place	Stop			<b>1.59</b>		D	0.70		F		F			
Kaloli Drive	Stop		E	<b>1.23</b>			0.65					F		F
Pōhaku Circle	Stop			<b>1.32</b>		C	0.64		F		F			
Orchidland Dr.	Stop			<b>1.28</b>	0.14	F	0.62		F		F			
Paradise Drive	Stop		D	<b>1.12</b>			0.55	0.08				F		F
Auli'i Street	Stop			<b>1.25</b>	0.04	C	0.68		F		F			
Maku'u Drive	Stop		C	<b>1.05</b>			0.55	0.11				F		F
Ilima Street	Stop			<b>1.18</b>		<b>4.11</b>			F		F			
Ainaloa Blvd.	Stop			<b>0.86</b>	0.32	E	0.61		F		F			
Ka Ohuwalu	Stop		B	<b>1.10</b>			0.75					F		F
Kaluahine St.	Stop		B	<b>1.02</b>	0.01	A	0.69		E			F		
Old Pāhoa Rd.	Stop			0.60	0.43	E	0.36		F		F			
Kahakai Blvd.	Stop		B	0.34			0.25	0.09				F		F
Nanawale Homestead Rd (Post Office Rd.)	Stop		0.50			0.44			F			B		
Unnamed Road	Stop		0.44			0.38			A			C		
Pāhoa-Kapoho Rd.	Signal	C	C	C	B	C	C	C	B	B		B	C	

Notes: LOS worse than LOS D, or V/C ratios greater than 0.85 are displayed in **bold** text.

Where a number is given for an individual movement, HCM does not provide a LOS Value, in which case the value displayed is the v/c ratio.

Traffic movements that do not exist are shaded in grey.

\*Installed as part of the Shoulders Conversion Project.

Source: SSFM International and Roger Dyar, P.E., from HDOT Data.

The No-Build Alternative would not fulfill the purpose and need of the project from the standpoint of intersection operations.

#### 4.2.2.3 Preferred Alternative Intersection Operations

The Preferred Alternative will widen Kea'au-Pāhoa Road to a divided four lane cross section between the Kea'au Bypass and Pāhoa-Kapoho Road and include signals at four intersections and roundabouts at three. It will include access management measures, turn lane improvements, and accommodations for transit. The following discussion of intersection LOS considers all these improvements along Kea'au-Pāhoa Road itself, and also looks at how intersections within subdivisions will function with the access management improvements.

As seen in **Table 4-7: Preferred Alternative LOS and V/C, AM Peak Hour, Year 2038, Study Corridor Intersections**, the westbound through movement has LOS C or better or V/C ratios under 0.85 in the AM peak hour except for at Orchidland Drive, Ainaloa Boulevard, and Old Pāhoa Road. In that same hour, the through movements in the eastbound direction towards Pāhoa have LOS B or better or V/C ratios under 0.49, with the exception of Ainaloa Boulevard, Old Pāhoa Road, and Kahakai Boulevard. Some of the side street movements do have LOS worse than D at some of the stop sign controlled intersections, reflecting the difficulty in making left turns across the heavy traffic volumes on Kea'au-Pāhoa Road. However, this is to be expected in areas that are urban or urbanizing, particularly in peak hours. All of the signalized intersections in the corridor show overall intersection LOS C or better in the AM peak hour. This table does show some congestion on Kea'au-Pāhoa Road at the three proposed roundabouts.

The next table, **Table 4-8: Preferred Alternative LOS and V/C , PM Peak Hour , Year 2038, Study Corridor Intersections**, shows the eastbound through movement generally has LOS B or better or acceptable V/C ratios in the PM peak hour. Exceptions include Shower Drive and the three proposed roundabout locations, which do show some congestion using the HCM methods. However, as described above in **Section 4.2.1.3: Preferred Alternative LOS Between Intersections**, the traffic simulation model shows much better traffic flow measures. In that same hour, the through movements in the westbound direction towards Kea'au have LOS C or better or V/C ratios under 0.78, with the exception of Ainaloa Boulevard. Some of the side street movements do have LOS worse than D at some of the non-signalized intersections, reflecting the difficulty in making left turns across the heavy traffic volumes on Kea'au-Pāhoa Road. Again, this is to be expected in areas that are urban or urbanizing, particularly during peak hours. All of the signalized intersections in the corridor show overall intersection LOS C or better in the PM peak hour, with the exception of Shower Drive.

While the single-lane roundabouts at Ainaloa Boulevard, Old Pāhoa Road, and Kahakai Boulevard would have movements that are over capacity by 2038, the implementation of roundabouts as a shorter-term solution (while these locations still have a two-lane-wide highway) is included as part the Preferred Alternative. Later decisions will be made about modification to multi-lane roundabouts (if HDOT policy changes to allow them) or conversion to conventional traffic signals. The Draft EA established that conventional traffic signals at the three locations would have satisfactory traffic operations in the year 2038.

**Table 4-7: Preferred Alternative LOS and V/C, AM Peak Hour, Year 2038, Study Corridor Intersections**

Intersection with Keaʻau-Pāhoa Road			Individual Traffic Movements											
Cross Street	Traffic Control	Overall LOS	Eastbound			Westbound			Northbound			Southbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thr	Right	Left	Thr	Righ
Opukahaia St.	Stop			0.28		B	0.83		C		C			
Keaʻau Transfer Station	Stop		E	0.28			0.84					F		F
Shower Drive	Signal	A	C	A	A	A	B		E			E		A
Pōhaku Place	Stop – RIRO			0.24			0.81				B			
Connector to 30 <sup>th</sup> Ave.	Stop – RIRO			0.37			0.82							E
Kaloli Drive	Signal	C	F	A		A	B		E		E	E		A
Pōhaku Circle	Stop – RIRO			0.37	0.01		0.78				B			
Orchidland Dr.	Signal	D	F	A	A	A	E		E		D	E		E
Paradise Drive	Right In Only			A			B	A						
Auliʻi Street	Stop – RIRO			0.37	0.01		0.71				B			
Makuʻu Drive	Signal	B	B	A		A	B	A	C	C		C		D
Ainaloa Blvd.	Roundabout		1.05			1.81			0.38					
Ka Ohuwalu	Stop		C	0.44			0.55					F		F
Kaluahine St.	Stop		A	0.41	0.02	B	0.49	0.49	F			F		
Old Pāhoa Rd.	Roundabout		0.95			1.28			0.46					
Kahakai Blvd.	Roundabout		0.91			0.66			0.25			0.58		
Nanawale Homestead Rd	Stop		A	0.19		A	0.19		F		B	D		D
Unnamed Road	Stop		A	0.14			0.39					A		
Pāhoa-Kapoho Rd.	Signal	C	C	C	C	C	D	C	B	B		C	C	C

Notes: LOS worse than LOS D, or V/C ratios greater than 0.85 are displayed in **bold** text. RIRO means "Right-In-Right-Out"

Where a number is given for an individual movement, HCM does not provide a LOS Value, in which case the value displayed is the v/c ratio.

Traffic movements that do not exist are shaded in grey.

Source: SSFM International and Roger Dyar, P.E., from HDOT Data.

**Table 4-8: Preferred Alternative LOS and V/C , PM Peak Hour , Year 2038, Study Corridor Intersections**

Intersection with Kea'au-Pāhoa Road			Individual Traffic Movements											
Cross Street	Traffic Control	Overall LOS	Eastbound			Westbound			Northbound			Southbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Opukahaia St.	Stop			0.89		E	0.40		F		F			
Kea'au Transfer Station	Stop		B	0.87			0.39					F		F
Shower Drive	Signal	<b>F</b>	B	<b>F</b>	A	D	B		D			E		A
Pōhaku Place	Stop – RIRO			0.77			0.38				D			
Connector to 30 <sup>th</sup> Ave.	Stop – RIRO			0.76			0.33							B
Kaloli Drive	Signal	B	D	A		B	B		C		C	C		A
Pōhaku Circle	Stop – RIRO			0.63	0.01		0.31				C			
Orchidland Dr.	Signal	B	B	B	A	B	B		C		C	D		C
Paradise Drive	Right In			0.53			0.26	0.07						
Auli'i Street	Stop – RIRO			0.60	0.03		0.33				C			
Maku'u Drive	Signal	B	A	A		C	B	A	C		C	D		C
Ainaloa Blvd.	Roundabout			<b>1.46</b>			<b>1.10</b>			0.19				
Ka Ohuwalu	Stop		B	0.53			0.37					D		D
Kaluahine St.	Stop		B	0.49	0.01	A	0.33	0.33	C			F		
Old Pāhoa Rd.	Roundabout			<b>1.22</b>			0.78			0.41				
Kahakai Blvd.	Roundabout			<b>1.19</b>			0.59			0.48			0.38	
Nanawale Homestead Rd (Post Office Rd.)	Stop		A	0.14		A	0.12		F		B	F		F
Unnamed Road	Stop		A	0.14			0.12					A		
Pāhoa-Kapoho Rd.	Signal	B	C	B	B	B	C	C	B		B	B	C	B

Notes: LOS worse than LOS D, or V/C ratios greater than 0.85 are displayed in **bold** text. RIRO means "Right-In-Right-Out"

Where a number is given for an individual movement, HCM does not provide a LOS Value, in which case the value displayed is the v/c ratio.

Traffic movements that do not exist are shaded in grey.

Source: SSFM International and Roger Dyar, P.E., from HDOT Data.

The overall conclusion that can be drawn is that by 2038, the Preferred Alternative will provide substantial improvement at all of the intersections that will receive traffic signals. Operations for through traffic along Kea'au-Pāhoa Road will be very good, and the signalized crossroads will have mostly good operations for turning onto/off of Kea'au-Pāhoa Road, which will greatly improve safety in the corridor. It is likely that further traffic signal optimization (changing the signal cycle times and phases) may be able to improve operations at the few signalized turning movements that still have poor operations.

A number of smaller cross-streets that are not signalized at their intersections with Kea'au-Pāhoa Road will continue to have some poor LOS with their turning movements. To some degree, these problems have been mitigated with the access management measures, which eliminate problematic turning movements and direct traffic instead to the controlled signals.

In addition to the effects of the project on Kea'au-Pāhoa Road itself, additional analysis was performed on intersections that would be affected by traffic changes within subdivisions, to ensure that the access management changes would not adversely affect the operations on these intersections. **Table 4-9: Levels of Service and V/C Ratios for Side Street Intersections in Study Corridor for the Preferred Alternative for Year 2038 for AM Peak Hour** and **Table 4-10: Levels of Service and V/C Ratios for Side Street Intersections in Study Corridor for the Preferred Alternative for Year 2038 for PM Peak Hour** show that all subdivision intersections (all controlled with stop signs) will have excellent levels of service, even with traffic changes.

**Table 4-9: Levels of Service and V/C Ratios for Side Street Intersections in Study Corridor for the Preferred Alternative for Year 2038 for AM Peak Hour**

Intersection (All Stop Sign Controlled)	Eastbound			Westbound			Northbound			Southbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
34 <sup>th</sup> Ave. at Makuu Dr. Ext.	N/A - 0.00				N/A -0.02					A		C
34 <sup>th</sup> Ave. at Auli'i St.	A - 0.02			B - 0.08			A - 0.01			A - 0.01		
34 <sup>th</sup> Ave. at Orchidland Dr.	A - 0.03			A - 0.01			B - 0.21			C - 0.49		
34 <sup>th</sup> Ave. at Ainaloa Blvd.	C			B			A -0.03			A -0.02		
34 <sup>th</sup> Ave. at Ilima St.	A			B			A - 0.00			A - 0.00		
Pohaku Cir. at Pohaku Pl.	A - 0.02			A - 0.06			A - 0.00			A - 0.01		
Pohaku Cir. at Kaloli Dr.		A			NA - 0.02					A		A
Kaloli Dr. at 30 <sup>th</sup> Ave.	B			C			A			A		
30 <sup>th</sup> Ave. at Conn. to KP Rd.		N/A - 0.02		A -0.00			A		A			
30 <sup>th</sup> Ave. at Conn. To 31st		A		A			A		A			
32 <sup>nd</sup> at Conn. To KP Rd.		A		A			A		A			
Paradise Drive at 30 <sup>th</sup> Ave.	B - 0.02			C - 0.02			A - 0.01			A - 0.00		
Paradise Drive at 32nd Ave.	C			B			A - 0.00			A - 0.00		
Maku'u Drive at 30 <sup>th</sup> Ave.	B			B			A - 0.00			A - 0.00		
Maku'u Drive at 32 <sup>nd</sup> Ave.	B			B			A - 0.00			A - 0.00		
Maku'u Drive at 33 <sup>rd</sup> Ave.	B			B			A - 0.00			A - 0.00		

Source: SSFM International and Roger Dyar, P.E., from HDOT Data.

**Table 4-10: Levels of Service and V/C Ratios for Side Street Intersections in Study Corridor for the Preferred Alternative for Year 2038 for PM Peak Hour**

Intersection (All Stop Sign Controlled)	Eastbound			Westbound			Northbound			Southbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
34 <sup>th</sup> Ave. at Makuu Dr. Ext.	A - 0.03				N/A - 0.02					A		A
34 <sup>th</sup> Ave. at Auli'i St.	A - 0.08			A - 0.08			A - 0.01			A - 0.01		
34 <sup>th</sup> Ave. at Orchidland Dr.	A - 0.02			A - 0.01			B - 0.07			C - 0.62		
34 <sup>th</sup> Ave. at Ainaloa Blvd.	C			B			A - 0.02			A - 0.02		
34 <sup>th</sup> Ave. at Ilima St.	A			B			A - 0.00			A - 0.03		
Pohaku Cir. at Pohaku Pl.	A - 0.02			A - 0.06			A - 0.00			A - 0.01		
Pohaku Cir. at Kaloli Dr.		A			A - 0.00					A		A
Kaloli Dr. at 30 <sup>th</sup> Ave.	B			C			A - 0.02			A - 0.00		
30 <sup>th</sup> Ave. at Conn. to KP Rd.		N/A - 0.02		A - 0.00			A		A			
30 <sup>th</sup> Ave. at Conn. To 31st		N/A - 0.01		A - 0.00			A		A			
32 <sup>nd</sup> at Conn. To KP Rd.		N/A - 0.01		N/A - 0.01			A		A			
Paradise Drive at 30 <sup>th</sup> Ave.	B - 0.02			C - 0.02			A - 0.01			A - 0.00		
Paradise Drive at 32nd Ave.	C			B			A - 0.00			A - 0.00		
Maku'u Drive at 30 <sup>th</sup> Ave.	B			B			A - 0.00			A - 0.00		
Maku'u Drive at 32 <sup>nd</sup> Ave.	B			C			A - 0.00			A - 0.00		
Maku'u Drive at 33 <sup>rd</sup> Ave.	B			B			A - 0.00			A - 0.00		

Source: SSFM International and Roger Dyar, P.E., from HDOT Data.

In summarization, the Preferred Alternative will fulfill the Purpose and Need of the project from the standpoint of improving unsafe and poorly-operating intersections.

#### 4.2.2.4 Other Alternatives

Following is a brief synopsis of signal and roundabout performance with the other alternatives.

##### TSM Alternative:

While the TSM Alternative would not enlarge the cross-section of Kea'au-Pāhoa Road beyond the two lanes that exists today, it would improve intersections consistent with those described above for the Preferred Alternative, specifically signals, roundabouts, turn lanes, cross-walks, accommodations for transit, etc. It would also include access management improvements cited in **Section 2.2.2: Access Control Under the Preferred Alternative**. Since the TSM Alternative's improvements are shorter in timeframe than the Preferred Alternative, the Draft EA considered intersection operations in 2018 as well as 2038.

The two-lane TSM alternative will suffer from much greater congestion and delay than is forecast for the four-lane Preferred Alternative. In 2018, during the AM Peak hour, westbound through movements at intersections in the TSM alternative were found to operate at LOS E or LOS F (or a V/C ratio above 0.85) at six intersections between Ainaloa Boulevard and Pōhaku Place. Furthermore, two cross streets (Ka Ohuwalu Street and Kaluahine Street) have poor LOS, in largely from a lack of gaps to enter the highway. The PM Peak hour would have similar

capacity deficiencies at five intersections between Pōhaku Place and Maku'u Drive, as well as problems for cross-street traffic on Ka Ohuwalu Street and Pōhaku Place.

By 2038, intersections would deteriorate further under TSM. Almost every intersection from Kaluahine Street to the Kea'au Bypass will have through movements and some cross-street movements operating at an unacceptable level of service during both AM and PM peak hours; several cross streets as far east as Post Office Road will be also be affected by poor intersection operations on cross-street movements.

Of six roundabouts considered for the two-lane TSM Alternative in the Draft EA, only Kahakai Boulevard would operate at an acceptable Level of Service by 2038.

The TSM alternative would not meet the objectives of the Purpose and Need statement in improving intersection capacity and delay, and in some cases, safety.

### Alternative 3:

Alternative 3 would widen Kea'au-Pāhoa Road to four lanes between Kea'au Bypass and Ainaloa Boulevard, and retain two lanes between Ainaloa Boulevard and Pāhoa-Kapoho Road. The Draft EA considered two options: 1) providing nine traffic signals at major intersections throughout the entire corridor, or 2) providing six signals, roundabouts at Ainaloa and Kahakai Boulevards and a stop-sign-controlled right-in-right-out intersection at Old Pāhoa Road.

In 2038, the overall intersection LOS for all signalized intersections is LOS D. Highway through movements in the signalized intersections perform satisfactorily. Several unsignalized low-volume intersections would have comparatively poor LOS such as at Ka Ohuwalu and Kaluahine Streets. Additionally, a number of cross-street traffic movements would operate at a poor level of service. The optional Kahakai Boulevard roundabout would function adequately, but an Ainaloa Boulevard roundabout would be over capacity.

Traffic signal optimization and access management measures would improve conditions at some intersections under Alternative 3.

In summary, Alternative 3 offers improved operations at signals compared to No-Build, but it would still be worse than the Preferred Alternative, largely because only two lanes of roadway capacity would be maintained east of Ainaloa Boulevard. Some congestion and poor levels of service would persist in the PM peak hour in the eastbound direction. Therefore, Alternative 3 would somewhat meet the purpose and need from the standpoint of improving unsafe and poorly-operating intersections, but not to the same degree as the Preferred Alternative.

### Alternative 5:

Alternative 5 would widen Kea'au-Pāhoa Road to six lanes between the Kea'au Bypass and Paradise Drive, widen to four lanes between Paradise Drive and Kahakai Boulevard, and retain two lanes between Kahakai Boulevard and Pāhoa-Kapoho Road. All major intersections were modeled with traffic signals, as the wider cross-section would preclude single lane roundabouts.

The Draft EA noted that in 2038, during both the AM and PM peak hours, Alternative 5 would operate at a superior LOS overall. Most intersections with traffic signals would operate overall

at LOS A or B; Pāhoa-Kapoho Road and Old Pāhoa Road would operate at LOS C, which is very good. Most side street approaches to signals would be satisfactory, though some lower-volume side street approaches to stop sign controlled intersections would have a LOS E and F; these problems would be largely addressed through proposed access management improvements.

Overall, Alternative 5 would substantially improve all signalized intersections. At two locations, specifically Orchidland Drive in the AM Peak hour and Shower Drive in the PM hour, traffic operations and intersection LOS would be better than under the Preferred Alternative, since a six-lane roadway between the Kea'au Bypass and Paradise Drive would offer superior levels of capacity. Through traffic along Kea'au-Pāhoa Road would experience excellent operations, and signalized crossroads will have mostly good operations for traffic turning onto/off of Kea'au-Pāhoa Road, greatly improving safety in the corridor.

Alternative 5 would fulfill the Purpose and Need of the project from the standpoint of improving unsafe and poorly-operating intersections. It would be an incremental improvement over the performance of the Preferred Alternative but have much greater impacts from a six-lane roadway cross-section in the most populated portion of the corridor.

### **4.2.3 Roundabouts Implementation**

#### **Summary of Discussion in Draft EA**

As noted in **Section 2.2.3.3: Roundabouts**, a roundabout is a type of circular intersection that can be a viable way to control intersection traffic instead of a conventional signal. They offer a number of safety and performance benefits. The Draft EA considered roundabouts at length in Appendix C: Traffic Study. The discussion below is a summarization of the study.

HDOT's 2008 policy guideline on Modern Roundabouts does not permit multi-lane roundabouts at this time. Therefore the Draft EA analysis was limited to those alternatives and intersections with single-lane through movements. Roundabouts were modeled at six intersections in the TSM Alternative and Alternative 3.

The conclusion was that Kahakai Boulevard is the only location that acceptably accommodates 2038 volumes within a single-lane roundabout. Other intersections would have lengthy queues approaching the roundabout because of high volumes of through traffic on Kea'au-Pāhoa Road.

#### **New Issues or Clarification of Issues for Final EA**

Under the Preferred Alternative, three single-lane roundabouts will be constructed at Ainaloa Boulevard, Old Pāhoa Road, and Kahakai Boulevard in the first phase of project construction, while these areas are still only two lanes wide. These roundabouts will offer the community the opportunity to become familiar with roundabouts and how they work. The portions of the corridor closer to Kea'au would be widened while these roundabouts remain in operation on a two-lane highway. When the project construction phasing reaches the later stages and the intersections with Ainaloa Boulevard, Old Pāhoa Road and Kahakai Boulevard are to be widened to four lanes, a decision can be made at that time either to convert them to conventional

intersections with traffic signals, or HDOT can consider amending the roundabouts policy to allow multiple-lane roundabouts.

## **4.2.4 Safety**

### **Summary of Discussion in Draft EA**

As is discussed in greater detail in **Section 1.1.2.1: Safety** and in **Section 3.2.4: Safety**, the Kea'au-Pāhoa Road Corridor has very high crash rates, and several intersections with the highest crash rates statewide. The need to improve safety and reduce the numbers and rates of accidents is a compelling one that has driven much of the public concern for improvements in this corridor. The Draft EA provided a detailed analysis of the safety benefits that will come from modification of access and from signals or roundabouts, and suggested specific improvements at specific problem locations.

### **Preferred Alternative**

The Preferred Alternative will have a pronounced effect on improving safety in the corridor. The Draft EA conservatively calculated a crash reduction figure based upon crash reduction factors compiled by the Federal Highway Administration (FHWA). FHWA estimates are that there would be 31 percent fewer crashes in locations where travel lanes have been added, 15 percent reduction in crashes where a signal has been installed, a 44 percent reduction in crashes where a roundabout is installed, and a 20 percent reduction in crashes where shoulders have been widened. The overall total reduction in crashes with the Proposed Action or other Build alternatives is expected to be at least 25 percent, and it is likely that this reduction could be higher. The overall estimate is that at least 22 crashes a year and 25 injuries per year could be avoided. In addition, the conversion of four intersections to right-in-right-out configuration is estimated to prevent an additional 3 crashes per year.

### **Other Alternatives**

The No-Build Alternative will not improve safety. By maintaining a two-lane corridor, motorists will be unable to pass other vehicles without dangerous passing movements. No intersection improvements would be provided. As congestion increases, some turning movements will become increasingly more difficult than they are today, and motorists may need to undertake risky maneuvers or simply avoid travel in certain routes.

The TSM Alternative will provide moderate safety benefits, primarily at intersections where signals or roundabouts and crosswalks are provided. However, the TSM Alternative will not address safety in the roadway segments between intersections as it will offer no passing opportunities, divided median, separated pedestrian areas, or improved shoulders.

Alternatives 3 and 5 are expected to have safety improvements generally comparable to the Preferred Alternative, though some two-lane segments would remain in both.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## 4.2.5 Access Changes

### Summary of Discussion in Draft EA

The project will modify access throughout the corridor with the objective of improving safety and overall traffic operations. **Section 2.2.2: Access Control Under the Preferred Alternative** provides a detailed description. In general, access changes will come from use of a divided median (which will prevent left turns except at controlled locations), closure of cross-streets with a cul-de-sac, modification of some cross-street access to right-in-right-out, and new access roadways in subdivisions that will direct access to traffic-controlled locations. Access would be modified so that three-way intersections (T-intersections) could be consolidated into four-way traffic-controlled intersections (which will use traffic signals or roundabouts if feasible), thereby improving safety, particularly for those vehicles that wish to make a left turn to/from a cross-street and need to cross opposing flows of traffic.

### Preferred Alternative

Under the Preferred Alternative, travelers along the project corridor will need to change their traveling patterns. Because of divided medians, access to individual driveways that front onto Kea'au-Pāhoa Road will be changed in many cases to right-in-right-out access. Refer to **Section 4.15.7: Changes to Property Access**, for more information and a breakdown of impacts to driveways.

While driveway closures and other access changes will result in some minor inconvenience for some travelers as they have to perform U-turns or travel a longer route, this will be outweighed by the greater safety provided by limiting access to controlled locations.

Mitigation measures related to changes in travel patterns may require personal notifications and community education. While the long term effects of proposed improvements may be appreciated, it may be difficult for some motorists and residents to accept changes to personal routines. It is noted that, in interviews conducted for the Social Impact Assessment (see **Section 4.3.1: Social Impact Interview Findings**), some people indicated that they already avoid left hand turns from their street or driveways by traveling to a nearby street that provides turn lanes in the appropriate direction. Therefore, changing behaviors may not be a problem for some motorists.

### Other Alternatives

The No-Build alternative will have no effect on changing access in the corridor. As congestion increases, however, it will be much more difficult for travelers to make their desired travel movements.

The TSM alternative will result in some access changes, primarily from access management measures. However, it will retain the two-lane roadway configuration, and therefore, there would be no changes to driveway access.

Alternatives 3 and 5 are expected to have similar access modifications to those mentioned above for the Preferred Alternative, except where the corridors are two lanes in width.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## **4.2.6 Bicycles and Pedestrians**

### **Summary of Discussion in Draft EA**

One important objective of the project was to improve conditions for bicycles and pedestrians.

#### **Preferred Alternative**

The Preferred Alternative will have a positive effect on bicycle and pedestrian use in the corridor. All major signalized intersections and roundabouts (and other locations where appropriate) will have crosswalks with associated signage. Bicycles will be accommodated with a continuous shoulder that is eight feet in width, and special accommodations will be offered at roundabouts. Pedestrians will be provided with a separate walkway. Pedestrian and bicycle accommodations will be continuous through intersections. This will be an improvement over today, where shoulders often disappear to accommodate turn lanes. Landscape improvements will also improve the experience for non-motorized users of the corridor.

The grades in the corridor are generally flat to moderate, and therefore the Preferred Alternative will offer an attractive route for bicyclists once there are improved shoulders.

#### **Other Alternatives**

The No-Build Alternative will offer no new improvements to the corridor for bicycles or pedestrians. As congestion and traffic volumes continue to increase over time, it is expected that the roadway environment will become increasingly unsafe for bicycles and pedestrians. After construction of the Shoulder Lane Conversion Project is completed (see **Section 1.2.2.1: The Kea'au-Pāhoa Road Shoulder Lane Conversion Project**), the Pāhoa-bound shoulder between the existing Kea'au Bypass and Shower/Pōhaku Drives will be used as a temporary travel lane during the PM peak hour. Therefore, neither pedestrians nor bicycles could safely use this segment of shoulder during that period under the No-Build Alternative.

The TSM Alternative would offer some modest benefits to bicycles and pedestrians, primarily for those that choose to cross Kea'au-Pāhoa Road at a signal- or roundabout-controlled intersection. Crosswalks will be provided at such locations, and signals can offer a pedestrian-actuated button to allow a lengthier crossing period. Travel along Kea'au-Pāhoa Road itself (in the shoulders, which will not be reconstructed) generally will not be improved for bicycles or pedestrians.

Alternatives 3 and 5 would have comparable benefits for bicycles and pedestrians to the Preferred Alternatives.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## 4.2.7 Transit

### Summary of Discussion in Draft EA

One important objective of the project was to improve conditions for transit in the corridor. HDOT worked with the Hawai'i County Mass Transit Agency (MTA) to ensure MTA's needs were met.

### Preferred Alternative

The Preferred Alternative will permit MTA to expand and improve its Hele-On Service, particularly for transit-dependent persons. Transit improvements such as the installation of bus stops, bus pull outs, park and ride lots and other measures will increase transit usage and decrease the number of automobiles using the corridor.

Bus pull-outs are proposed along both sides of the roadway corridor near:

- Shower Drive
- Kaloli Drive
- Pōhaku Circle (Pāhoa - bound direction only)
- Orchidland Drive
- Paradise Drive
- Maku'u Drive
- Ainaloa Boulevard
- Maku'u Farmer's Market

Bus pull-outs near improved bus stops will enable buses to more safely transition into and out of traffic. Safer designs near bus stops, including crosswalks and signalization at busy intersections, will make conditions safer for passengers.

Bus service will be much more reliable when congestion is reduced and schedules are more consistent day to day. The travel time for bus trips will be reduced as overall congestion is likewise reduced. Schedule reliability will also be improved as traffic in the corridor is more predictable day to day.

### Other Alternatives

The No-Build Alternative will offer no new improvements to the corridor for the Hele-On Transit service or the passengers that use it. As congestion and traffic volumes continue to increase over time, it will be increasingly difficult for transit to maintain consistent schedules. If travel times increase because of congestion, it may make transit a less-competitive option for those that have the discretionary choice to drive. The existing roadway environment, which is not passenger friendly, will remain as it is today.

The TSM Alternative would provide some benefits as traffic control would be provided at intersections and bus pull-outs and bus stops would be built. However TSM would lack the

much greater capacity of the build alternatives and therefore travel times and schedule reliability would not improve markedly.

Alternatives 3 and 5 would offer all the transit improvements called for in the Preferred Alternative.

#### **New Issues or Clarification of Issues for Final EA**

A commenter on the Draft EA asked about provision of Park and Ride Lots in the corridor. The County of Hawai'i Mass Transit Agency investigated potential sites for Park and Ride facilities in Lower Puna in 2007. No further action has been taken since that time. However, a Park and Ride facility is being offered at the Maku'u Farmer's Market.

## **4.3 Social and Community Impacts**

A Social Impact Assessment (SIA) was performed for this project to gauge the community's sentiment about the Puna District today, the future of the area, and how Kea'au-Pāhoa Road project fits in with the future of Puna. The SIA is found in full in the Draft EA in Appendix G: Social Impact Assessment. Consideration of the needs of Environmental Justice groups is discussed in greater detail in **Section 4.3.3: Impacts on Environmental Justice Communities**.

### **4.3.1 Social Impact Interview Findings**

#### **Summary of Discussion in Draft EA**

- The SIA looked at the social impacts from the project. Confidential interviews were held in person or by phone. Interviewees were asked about their relationship to Kea'au-Pāhoa road (proximity, importance, involvement), their values and vision for Puna, use of the highway, and opinions on project alternatives.
- A broad cross section of the community included Title VI target populations (Environmental Justice groups) in the issues analysis.
- Of 39 interviewees, 30 lived in Puna, of whom 25 lived in the Immediate Study Area communities along Kea'au-Pāhoa Road (see **Figure 3-8: Immediate Study Area Communities**). Nine people, who were public and community service providers, lived outside Puna. Affiliations included community services, Hawai'i County or Puna organizations (including the Puna CDP), business/land owners, Community Associations or related services, and other affiliations, including KPAG members.
- Of 32 people residing in or serving Puna, ten lived in Puna less than ten year and five lived in Puna for ten to 19 years. Nine people moved to Puna 20 or more years ago. Six were lifelong residents.
- Interviewees reflected on what they liked about Puna's environment and lifestyle, and noted needs for increased services, improved infrastructure, sustainable communities,

better connectivity between subdivisions, and improved transit and accommodation of bicycles and pedestrians.

- About half of those interviewed traveled the corridor daily for work and school, often during peak times. The other half used Kea'au-Pāhoa Road on an as-needed basis, or had flexibility in their schedule. Interviewees had no positive experiences on Kea'au-Pāhoa Road. Peak hour travel was always perceived negatively. Safety concerns were cited: unsafe intersections, inconsiderate and impatient motorists, speeding, motorists passing on the right using the shoulder, motorists slowing to turn without using turn signals, and people carelessly pulling out of driveways. Interviewees expressed frustration about long travel times and congestion. Some motorists avoid making left turns.
- All interviewed agreed with the need to improve Kea'au-Pāhoa Road to increase safety, address congestion, and accommodate future growth. Interviewees were asked about positive and negative aspects of project alternatives. All five alternatives were presented to interviewees in the SIA. No input was received by the interviewers on the TSM Alternative; all comments focused on the Build Alternatives.
- The following general conclusions came out of the SIA interviews:
  - There is strong expectation for some improvement of the Kea'au - Pāhoa Road.
  - Dependency on Kea'au-Pāhoa Road for daily needs directly relates to the level of urgency to improve the corridor.
  - Interviewees in the Northeast portion of the Immediate Study Area (which trends younger, with larger families) had a greater urgency for improvements.
  - People seek balance between transportation solutions and scale of improvements.

### **Preferred Alternative**

The alternative later selected as the Preferred Alternative (Alternative 4 in the Draft EA) elicited the most positive comments. It was felt that the Preferred Alternative would solve immediate problems and provide some degree of future capacity, especially with anticipated growth in Pāhoa. A consistent four-lane corridor was felt to treat all communities equitably.

Negative characteristics related to long-range limitations on traffic flow; interviewees feared the region would eventually outgrow the four-lane road. Also, an extended four-lane highway would encourage faster speeds, whereas the PCDDP encouraged reducing vehicular speed. One person felt the Preferred Alternative is "overkill," and will encourage more growth in the corridor.

Commenters noted a great need for PMAR. They also advocated for alternative routes between subdivisions. The Preferred Alternative will not preclude development of PMAR and improved subdivision connection roads have been incorporated into the Preferred Alternative.

While signalized intersections improve safety and traffic flow, some people expressed concern they will encourage strip commercial development in the corridor. Roundabouts were viewed positively or negatively to those aware of them. Advocates of efficient traffic flow felt

roundabouts would not work because of the need for lower speeds and few travel lanes. Advocates of lower speeds supported roundabouts.

Some interviewees were concerned about the rural setting becoming too urban. Those using Kea'au-Pāhoa Road daily were willing to make compromises whereas those with discretionary use of the road wanted to explore options other than improving the corridor.

Interviewees wanted the Preferred Alternative to accommodate alternatives to vehicular traffic. Accommodations for buses, bike facilities and safe pedestrian crossings and walkways were considered a must.

### **Other Alternatives**

While all five alternatives were presented to interviewees for their opinions, no comments were received on the No-Build or TSM Alternatives. A number of the comments related above with regards to PMAR, signals, roundabouts, and alternative modes were applied to Alternatives 3 and 5 as well.

Interviewees felt that the most positive aspect of Alternative 3 is its feasibility and timing and believed it could be completed sooner than the other Build Alternatives. It would immediately reduce congestion in the most populated areas. Negative comments related to a perceived bottleneck at Ainaloa Boulevard and Alternative 3's long-range effectiveness. Alternative 3 was considered a "band-aid" alternative, and would not handle traffic efficiently as the region continues its growth trend.

Positive characteristics of Alternative 5 related to long-term traffic demand as the six-lane section would serve areas with the most undeveloped lots. Alternative 5 was thus seen as logical for the future. However, Alternative 5 elicited the most negative comments from its sheer width, the creation of two perceived bottlenecks/merges (at Paradise Drive and Kahakai Boulevard), and its feasibility for public acceptance. The six-lane portion was described as a freeway, contrary to the rural nature of the region. It was feared that a road of this magnitude would encourage increased speeds, and present more safety problems. Alternative 5 was also considered very costly for construction and property acquisition. The perceived level of property acquisition was considered negative, since it would be difficult to achieve public acceptance if property owners vehemently opposed condemnation. Interviewees believed that a six-lane roadway was not compatible with the many driveways in the corridor.

### **New Issues or Clarification of Issues for Final EA**

In commenting on the Draft EA, the County of Hawai'i Department of Planning asked if interviewees expressed any opinions on the TSM Alternative, as no comments are listed above. All interviewees were presented with information on all five alternatives but the responses received focused exclusively on the Build Alternatives.

### 4.3.2 Social Impacts Anticipated on the Project

#### Summary of Discussion in Draft EA

- Puna's significant growth and settlement patterns are fundamental to the public plans and policies reviewed in **Section 4.1.1: Consistency with Government Plans, Policies and Controls**, and the need to improve Kea'au-Pāhoa Road is repeatedly expressed. The proposed project is generally consistent with these objectives.
- The project also will inevitably alter the character of the immediate area.
- While a separate project, the community has placed a priority on the PMAR. Though part of the regional roadway system, the proposed project cannot, nor is it intended to, meet all the requirements of the regional system outlined in the PRCP and PCDP. The project corridor is under State jurisdiction. The responsibility for planning alternate routes or series of routes lies with the County of Hawai'i.

#### Preferred Alternative

The Preferred Alternative is consistent with community expectations to improve roadway safety, allow multi-modal uses along the corridor and increase mobility and capacity. It will generally address the PCDP recommended actions for the corridor.

Widening and improving Kea'au-Pāhoa Road will increase surfaces covered with asphalt and add visual demarcations, raised medians, traffic signals, roundabouts and signage typical of urban environments. This alteration in character of the immediate area is a direct and unavoidable impact. The Preferred Alternative will also alter the character of some local subdivision streets as they would be improved (brought up to county standards, and in some cases, paved from what is now a gravel roadway.)

A number of people interviewed for the Social Impact Assessment stated their opinions on the urgent need for PMAR. This sentiment was also expressed by many commenters on the Draft EA and at the public hearing for the Draft EA. The future of alternate routes is unknown at this time. While funding for preliminary engineering and environmental studies for a Puna Makai Alternate Route, or PMAR, is included in the Hawai'i County Capital Improvement Program, the monies have not been released as of this writing. The Preferred Alternative will not preclude constructing PMAR.

#### Other Alternatives

The No-Build Alternative would not create any direct impacts on the community from construction. However, deteriorating traffic delay and poor safety would continue to adversely affect the community in the future, and the No-Build Alternative would not be consistent with the PCDP's directives. It would not preclude PMAR.

The TSM Alternative will make modest improvements to intersections along the corridor, and have less of an effect on the character of the immediate area compared to the Preferred Alternative. Character would be modified within the subdivision roadways as described above.

The TSM alternative would improve safety only at intersections on Kea'au-Pāhoa Road. Congestion would still persist and the TSM Alternative generally is not consistent with the PCDP. It would not preclude PMAR.

Alternatives 3 and 5 would alter the character of the immediate area similar to the Preferred Alternative, though areas that would remain two lanes wide would be a lesser impact in this regard, and areas that would become six lanes wide would be a greater impact. Improvements would be made on local subdivision streets as noted above. Alternatives 3 and 5 would generally be consistent with the PCDP and would not preclude implementation of PMAR.

#### **New Issues or Clarification of Issues for Final EA**

The study area for the Preferred Alternative has been revised to include local streets within the Hawaiian Paradise Park and Orchidland subdivisions, as noted in **Section 2.2.2: Access Control Under the Preferred Alternative**. These access improvements will help support the PCDP Village and Town Center concept. The discussion above has been supplemented to address these improvements within subdivisions.

### **4.3.3 Impacts on Environmental Justice Communities**

#### **Summary of Discussion in Draft EA**

- As described in greater detail in **Section 3.3.2: Environmental Justice Communities in Immediate Study Area**, Title VI of the Civil Rights Act of 1964 and Executive Order 12898 direct federal agencies to avoid discrimination of minority and low-income populations by ensuring federal actions do not result in disproportionately high and adverse human health or environmental effects on minority and low-income populations (Environmental Justice communities). Hawai'i's Act 294 (2006) also protects these groups. HDOT's Office of Civil Rights' (OCR) Title VI Plan outlines policies and procedures to comply with these laws.
- The study area has a high presence of Title VI/Environmental Justice target populations.
- Over one-fifth of families in South Puna, and specifically Orchidland, Ainaloa, Hawaiian Acres, Hawaiian Beaches/Shores and Nanawale had incomes below poverty level. Notably high levels of poverty were found in families headed by single females in Ainaloa (77.3 percent), Nanawale (57.4 percent), Orchidland (50.0 percent), Hawaiian Beaches (49.5 percent) and Pāhoa (47.2 percent).
- The study area is racially diverse. Some notable minority populations exceed county averages, such as Native Hawaiians/Pacific Islanders in Pāhoa (12.3 percent), Nanawale (21.2 percent), Hawaiian Beaches (13.5 percent), Orchidland (12.9 percent) and Ainaloa (12.2 percent).

#### **Preferred Alternative**

The Preferred Alternative will benefit Environmental Justice population by offering:

- Improved traffic circulation, with safer and more efficient travel from one community to another, as well as to services, such as health care and schools, goods and employment. HDOT's Title VI plan defines adverse impacts as "increased traffic congestion, isolation, exclusion or separation of racial or ethnic minority or low-income individuals within a given community or from the broader community."
- Faster and more efficient emergency access to communities all along the proposed corridor, thereby ensuring equal access to Title VI/Environmental Justice target populations.
- Provisions for multi-modal transportation. Owning a vehicle may be prohibitive low income persons and alternative modes provide equitable options. The Hele-On bus system is presently free for all passengers, including transit-dependent Title VI/Environmental Justice populations. The Preferred Alternative will enhance transit and other modes for target populations by including a widened shoulder for bicycles and pedestrians, and bus pullouts.
- Support for village, community and neighborhood centers proposed in the PCDP. For Environmental Justice populations, these centers will help to lower transportation costs and provide economic and lifestyle choices.
- A much safer environment to people using all modes of travel, including transit-dependent persons, bicyclists, and pedestrians that are members of Environmental Justice groups. Motorists will benefit as well.
- An equitable investment to Environmental Justice populations that have been underserved by past public investments in infrastructure. As described in **Section 3.3.2.3: Incorporation of Title VI and Environmental Justice Requirements into the Proposed Project**, in 2000, a Sustainability Committee, comprised of citizens of Puna and Ka'u, filed a discrimination complaint against HDOT and Hawai'i County for overlooking Title VI/Environmental Justice populations in long range planning efforts. The complaint was upheld. The Preferred Alternative is one effort to address Title VI requirements.

The Preferred Alternative focused on minimizing direct impacts to adjacent parcels and avoiding relocations. During right of way acquisition, HDOT will identify those properties requiring right-of-way acquisition or relocations that are occupied by those with low incomes. Acquisition of dwellings and businesses or portions of property will be conducted according to HDOT's Right-of Way Procedure Manual to ensure equitable treatment of all businesses and persons. Further, during construction, Title VI reviews of program activities will ensure compliance and appropriate corrective actions.

For all the reasons cited above the Preferred Alternative will not create disproportionately high and adverse human health or environmental effects on minority and low-income populations.

### Other Alternatives

While it will have minimal direct effects, the No-Build Alternative would adversely impact Environmental Justice populations. Residents of Lower Puna have indicated a perception that their community has been underserved by community services and investments, including provision of transportation. The No-Build Alternative would maintain the status quo. As

congestion worsens, this would adverse effect on the quality of life for Environmental Justice populations. It would be more difficult for these persons to gain access to work, social services, education, and healthcare. Safety will remain a growing concern for this group, including motorists, bicyclists, transit users, and pedestrians.

The TSM Alternative would offer modest improvements to transportation in the corridor, with few direct adverse effects, but it will not achieve the purpose and need for the project. While it would not have a direct adverse effect on underserved minority or low-income persons, it would not represent a substantial investment in the community that has been called for by members of the public. Congestion would still increase and amenities for pedestrians would only be offered at intersections.

Alternatives 3 and 5 would provide the same general benefits for Environmental Justice communities noted for the Preferred Alternative.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

### **4.3.4 Impacts on Community Facilities**

#### **4.3.4.1 Medical Facilities**

##### **Summary of Discussion in Draft EA**

- Kea'au-Pāhoa Road is a primary route from the Immediate Study Area to Hilo Hospital, and is central to the service populations of regional facilities.

##### **Preferred Alternative**

The Preferred Alternative will have a positive impact on for those traveling to and from these facilities by improving traffic flow and safety conditions. As the project proceeds, it is recommended that medical facilities in the area be included in information programs to help staff and facility patients prepare for construction-related activities that may affect travel to and from these facilities.

##### **Other Alternatives**

Increasing congestion under the No-Build Alternative would likely compromise access to medical facilities. The TSM Alternative would provide some congestion and safety benefits, though not to the same magnitude as the Build Alternatives. Alternatives 3 and 5 would offer benefits comparable to the Preferred Alternative.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

#### **4.3.4.2 Educational Facilities**

##### **Summary of Discussion in Draft EA**

- While there are several schools (both public and charter schools) in close proximity to Kea'au-Pāhoa Road as noted in **Section 3.3.4.2: Educational Facilities**, none will experience direct impacts on their properties from the project.

##### **Preferred Alternative**

The Preferred Alternative will have a positive impact on the students and staff of the area's schools because they will improve existing traffic flows and safety conditions, and accommodate projected enrollment increases. Congested PM Peak Hour conditions along the Kea'au Bypass (which runs behind Kea'au High School) will be alleviated with the elimination of a bottleneck further down Kea'au-Pāhoa Road. As the project proceeds, it is recommended that school officials and parent groups be included in information programs to help them in prepare for construction-related changes. There may be localized delays in construction zones, including school-related traffic, which will be mitigated through public information efforts.

##### **Other Alternatives**

Increasing congestion under the No-Build Alternative will likely compromise access to educational facilities.

The TSM Alternative will have a modest beneficial effect on congestion and safety at intersections, and school traffic will be some of the beneficiaries of this improvement. TSM will not improve congestion or safety outside of intersection areas.

Alternatives 3 and 5 will provide benefits to school traffic similar to that of the Preferred Alternative.

##### **New Issues or Clarification of Issues for Final EA**

In its comments on the Draft EA, the Hawai'i Department of Education asked for an analysis of school-related traffic to be broken out of the traffic analyses because schools are a significant generator of traffic during certain hours of the school day. They also requested clarification on what impact construction would have on school-related traffic.

The traffic counts and analyses considered peak hour traffic, some of which are school-related traffic. The trip generation effort that determined predicted future traffic levels on this project considered all types of trips, including home-to-work, home-to-school, etc. The model is not detailed enough to specifically break out school-related traffic at any given location. Given that no schools are in immediate proximity of the area to be reconstructed on Kea'au-Pāhoa Road, there will be no direct impacts on traffic entering or exiting the schools themselves, and no direct impacts on internal circulation at schools. Text has been clarified above to address the effects of construction on school-related traffic.

#### **4.3.4.3 Police, Fire, and EMS Services**

##### **Summary of Discussion in Draft EA**

- Currently, emergency vehicles are slowed by traffic congestion conditions, particularly during traffic peak hours.

##### **Preferred Alternative**

The Preferred Alternative, which will add a through lane of traffic in each direction along the entire corridor, will significantly improve the passage of emergency vehicles as there will be more ability to pass stopped vehicles. It will also positively impact police protection services by improving traffic flow and safety.

The Preferred Alternative's wider highway and reduced congestion may also encourage aggressive driving actions, and consultation with the Hawai'i Police Department is recommended to coordinate roadway improvements that could deter such actions.

##### **Other Alternatives**

The No-Build Alternative would result in a worsening of the ability for police to respond to calls as congestion would increase over time.

The TSM Alternative would provide some safety benefit from improvements at intersections, though it would not improve safety or capacity between intersections, nor would it reduce congestion to the level of the Build Alternatives.

Alternatives 3 and 5 would provide similar benefits to those of the Preferred Alternative where additional lane capacity is added.

##### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## **4.4 Air Quality**

### **Overview**

- There are several different types of air impacts that are considered in this section, which has been greatly summarized from the analyses performed in Appendix F: Air Study in the Draft EA. Both microscale (intersection-level) and mesoscale (regional-level) analyses were performed. A qualitative assessment of mobile source air toxics was prepared as well. There are also potential temporary impacts from fugitive dust and machinery emissions in construction.
- Section 3.4: Climate and Air Quality in the Draft EA describes the federal and state Ambient Air Quality Standards (AAQS).

## 4.4.1 Microscale Air Quality Impacts

### Summary of Discussion in Draft EA

- Roadway intersections are one of the primary air quality concerns because of traffic congestion and because of the increase in vehicular emissions associated with traffic queuing. Microscale analyses were performed at eight major intersections to estimate the most extreme ambient carbon monoxide concentrations.
- Modeling was performed for both existing (2006) and 2038 conditions in both the AM and PM peak hours for the Build Alternatives and No-Build. Signalization provides the most conservative case for modeling as vehicle queues and delays at roundabouts are generally lower than at a signal in the same location. Therefore, modeling was only performed for traffic signals at locations that could contain roundabouts.
- Current US EPA models for air emissions and meteorological dispersion were used. Modeling used all of the most conservative assumptions for meteorological conditions, which in combination are likely more conservative than would be expected in the real world. Such conditions might occur less than once a year, and likely would never occur during AM or PM Peak hours, which was what was modeled.
- A summary of the calculated one-hour ambient CO concentrations in milligrams per cubic meter is found in **Table 4-11: Modeled One-Hour CO Concentrations at Corridor Intersections (mg/m<sup>3</sup>)**. Estimated eight-hour concentrations are indicated in **Table 4-12: Modeled Eight-Hour CO Concentrations at Corridor Intersections (mg/m<sup>3</sup>)**.

**Table 4-11: Modeled One-Hour CO Concentrations at Corridor Intersections (mg/m<sup>3</sup>)**

Intersection of Kea'au-Pāhoa Road With:	2006 Existing		2038 No-Build		2038 Alternative 3		2038 Preferred Alternative		2038 Alternative 5	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Opukahaia Street	7.2	3.8	4.8	3.2	4.8	3.1	4.8	3.1	4.5	3.0
Shower Drive	8.4	3.7	5.4	3.2	5.1	3.1	5.1	3.1	4.5	3.0
Kaloli Drive	6.3	3.7	5.9	3.1	5.5	2.4	5.5	2.4	5.1	2.8
Orchidland Drive	5.0	3.2	5.0	2.6	5.2	2.8	5.2	2.8	4.6	2.8
Old Pāhoa Road	4.5	2.8	5.0	2.4	5.1	2.6	4.3	2.6	4.3	2.6
Kahakai Boulevard	6.2	2.6	5.0	2.4	3.4	1.7	3.0	1.7	3.4	1.7
One-Hour CO State of Hawai'i Ambient Air Quality Standard: 10 mg/m <sup>3</sup>										
One-Hour CO National Ambient Air Quality Standard: 40 mg/m <sup>3</sup>										

Source: BD Neal and Associates

**Table 4-12: Modeled Eight-Hour CO Concentrations at Corridor Intersections (mg/m<sup>3</sup>)**

Intersection of Kea'au-Pāhoa Road With:	2006 Existing	2038 No-Build	2038 Alternative 3	2038 Preferred Alternative	2038 Alternative 5
Opukahaia Street	3.6	2.4	2.4	2.4	2.2
Shower Drive	4.2	2.7	2.6	2.6	2.2
Kaloli Drive	3.2	3.0	2.8	2.8	2.6
Orchidland Drive	2.5	2.5	2.6	2.6	2.3
Old Pāhoa Road	2.2	2.5	2.6	2.2	2.2
Kahakai Boulevard	3.1	2.5	1.7	1.5	1.7
Eight-Hour CO State of Hawai'i Ambient Air Quality Standard: 5 mg/m <sup>3</sup>					
Eight-Hour CO National Ambient Air Quality Standard: 10 mg/m <sup>3</sup>					

Source: BD Neal and Associates

### Preferred Alternative

Both one-hour and eight-hour CO concentrations for the Preferred Alternative are calculated to remain well within both the national and state standards in 2038.

Mitigation of long-term traffic related air pollution is not warranted, given that standards would not be exceeded and changes in pollution levels will generally be beneficial or neutral. Impacts from vehicular emissions could be further reduced through travel demand measures such as carpools and transit, adjusting school and business hours, and encouraging telecommuting. Three roundabouts proposed will offer another measure for further reducing pollution levels.

### Other Alternatives

Concentrations of CO under the No-Build Alternative will increase slightly at several locations in 2038 compared to existing levels, but in all cases would be well below national and state standards.

The TSM Alternative was not modeled as part of this effort, but would be expected to fall somewhere between the Build Alternatives and the No-Build Alternative, and in any case, would be within national and state standards.

Alternatives 3 and 5 have modeled levels of CO well within standards, like the Preferred Alternative. Alternative 5 would have concentrations of CO slightly below the Preferred Alternative because of the wider six-lane cross-section between Kea'au and Paradise Drive.

### New Issues or Clarification of Issues for Final EA

The intersections of Ilima Street and Paradise Drive were modeled in the Draft EA. The Preferred Alternative as now defined will close off Ilima Street with a cul-de-sac, and Paradise Drive will be modified to right-in access only. Therefore, these two intersections have been removed from the tables above.

## 4.4.2 Mesoscale Air Quality Impacts

### Summary of Discussion in Draft EA

- Regional emissions associated with the project were considered as part of the mesoscale analysis, which evaluated gross annual emissions from the roadway of carbon monoxide (CO), nitrogen oxides (NOx) and volatile organic compounds (VOC) occurring within the study area for 2006 and 2038. The mesoscale analysis considered Vehicle Miles of Travel, vehicle speed, and vehicle mix and year, as future emissions will decline when older, more-polluting vehicles are retired.
- CO, NOx and VOC emissions from traffic in the project area during likely account for a few percent of total island-wide emissions. All emissions will increase from 2006 to 2038 under all alternatives, including No-Build.
- Table 4-13: Results of Mesoscale Analysis** shows the calculated tons of pollutants generated each year from Kea'au-Pāhoa Road in the mesoscale analysis.

**Table 4-13: Results of Mesoscale Analysis**

Year and Alternative	Emissions (tons/year)		
	CO	NOx	VOC
2006 Existing	780	93	63
2038 No-Build Alternative	914	36	51
2038 TSM (Alternative 2)	909	36	54
2038 Alternative 3	945	37	56
2038 Preferred Alternative	955	37	55
2038 Alternative 5	930	36	50

Source: BD Neal and Associates

By the year 2038, under the No-Build Alternative, CO emissions within the project area are estimated to increase by about 17 percent compared to existing emissions. On the other hand, VOC emissions are estimated to decrease by about 19 percent, and NOx emissions are estimated to decrease by about 61 percent.

### Preferred Alternative

The Preferred Alternative will result in a slight, but not appreciable increase in emissions compared to the No-Build Alternative.

These estimates do not fully reflect the potential benefits of the access management improvements in terms of the area-wide emissions from motor vehicle traffic, since they only looked at gross vehicle miles traveled on Kea'au-Pāhoa Road itself. The access management improvements will improve traffic flow on cross streets, reduce traffic queuing and reduce excess emissions from cross-street traffic idling and accelerating at the intersections.

## **Other Alternatives**

The TSM Alternative would provide for slightly lower regional CO emissions than any of the Build Alternatives; this can be attributed to lower speeds on Kea'au-Pāhoa Road. Alternative 5 would provide for slightly lower VOC emissions and would have the lowest CO emissions of the three Build alternatives. None of the other alternatives would result in substantial changes in the amounts of emissions compared to No-Build.

## **New Issues or Clarification of Issues for Final EA**

As noted above, the inclusion of access management improvements in the Preferred Alternative would mitigate the slightly higher levels of regional emissions calculated.

### **4.4.3 Mobile Source Air Toxics**

#### **Summary of Discussion in Draft EA**

- Besides the criteria air pollutants for which there are National Ambient Air Quality Standards (NAAQS), the US EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries). Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the Clean Air Act.
- Modeling tools for MSATs are very limited. FHWA guidance presently focuses on Vehicle Miles Traveled (VMT) to qualitatively assess MSAT emissions in an alternatives comparison. There are no differences in the estimated VMT for the year 2038 amongst the project alternatives, including the No-Build Alternative. This is because Kea'au-Pāhoa Road is the only available roadway for arterial traffic in the region.
- The project will include roadway widening, signalization, and roundabouts, all of which could affect average travel speeds. The relationship between speeds and MSAT emission rates is not well established. Assuming average travel speed is not a factor, the identical VMT for all alternatives means that MSATs emissions would be unchanged regardless of alternative.
- Emissions will likely be lower than present levels in 2038 as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent from 2000 to 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions are likely to be lower in the future.

## **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

#### 4.4.4 Construction Impacts on Air Quality

##### Summary of Discussion in Draft EA

- Two types of short-term direct and indirect impacts on air quality could potentially occur during project construction: fugitive dust, and equipment exhaust emissions. Indirectly, there also could be short-term impacts from slow-moving construction equipment traveling to and from the project site and from the disruption of traffic due to construction.
- State of Hawaii Air Pollution Control Regulations prohibit visible fugitive dust emissions from construction activities at the project boundary. Dust control measures include watering, chemical soil stabilizers, mulching and wind screens. Regulations stipulate that open bodied trucks be covered at all times when in motion if transporting materials that could be blown away. Road cleaning or tire washing may be appropriate to minimize dirt tracked onto paved surfaces. Paving and/or establishment of landscaping as early in the construction schedule as possible can also lower potential fugitive dust emissions.
- On-site mobile and stationary construction equipment will be required to be maintained with current emission control equipment.
- Indirectly, slow-moving construction vehicles on roadways leading to and from the project area could obstruct the normal traffic flow. This impact can be mitigated by moving heavy construction equipment during periods of low traffic. Road closures would be avoided during peak traffic periods to the extent possible to minimize air pollution impacts. With careful planning and attention to dust control, most potential short-term air quality impacts from construction can be mitigated.

##### New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

### 4.5 Noise

The principles of noise and the existing noise levels in the study area are discussed in **Section 3.5: Noise**.

#### 4.5.1 Future Year Noise Impacts and Mitigation

##### Overview

- Refer back to **Section 3.5.2: Noise Guidelines, Standards and Regulations** for a description of those noise levels and increases in noise that are considered impacts warranting further consideration of mitigation. Future noise levels were modeled for the design year 2038.

### **New Issues or Clarification of Issues for Final EA**

The Draft EA considered noise impacts solely along Kea'au-Pāhoa Road. With the inclusion of access management measures into the Preferred Alternative, additional analysis was subsequently performed for the Final EA to consider impacts along new subdivision roads.

**Section 4.5.1.2: Future Noise Along Access Management Roadways** below contains the new modeling effort.

#### **4.5.1.1 Future Noise Along Kea'au-Pāhoa Road**

##### **Summary of Discussion in Draft EA**

- Section 4.5: Noise in the Draft EA contained a detailed noise analysis that analyzed future changes in noise levels at 182 properties (mostly single-family homes) along Kea'au-Pāhoa Road. Following is a brief summarization of the Draft EA's findings.
- Traffic noise levels along Kea'au-Pāhoa Road were calculated using the FHWA's Traffic Noise Model Version 2.5, a computer model that calculates noise at receivers based on traffic volumes, speeds, terrain, and physical location of the roadway relative to the receivers.
- Conditions modeled included AM and PM Peak Hours, Existing and future-year (2006 and 2038 respectively). Two scenarios were modeled – the No-Build Alternative, and the most conservative (widest) Build scenario possible, specifically, a combination of Alternative 5 (a six-lane cross-section from the Kea'au Bypass to Paradise Drive) and the Preferred Alternative (a four-lane cross-section from Paradise Drive to the southern terminus of the project at Pāhoa-Kapoho Road). Therefore, the scenario modeled was more conservative than the Preferred Alternative, which would have four lanes for the entire corridor.
- The traffic noise analysis was based on the traffic study's AM and PM traffic volumes generated for the project. Noise level measurements and traffic counts taken in the field were used to validate the traffic noise model prediction software. Speeds were conservatively assumed to be 55 miles per hour, though actual operating speeds, particularly under a no-build scenario, would be expected to be lower.
- As was noted in the discussion on existing conditions, 117 receivers out of 182 are calculated to already approach or exceed the Hawai'i/FHWA Noise Abatement Criteria (NAC) using 2006 traffic volumes. Therefore, a majority of homes already bordering on Kea'au-Pāhoa Road are already subjected to high noise levels. Noise will increase further in the future strictly from increases in traffic over time.

##### **Preferred Alternative**

Sound level increases of 1.3 dBA to 5.5 dBA over existing (2006) levels are predicted for the 2038 Build Alternative and vary over the length of the roadway. The most pronounced increases occur between Pōhaku Place and Maku'u Drive. Since none of these increases are greater than 15 dBA, none of the future noise levels would "substantially exceed" existing levels according to HDOT's definition in their noise policy.

The projected increase in vehicular traffic noise levels along Kea'au-Pāhoa Road itself due specifically to the Preferred Alternative is demonstrated by comparing the difference between 2038 No-Build levels and 2038 Build levels. The increase associated solely from the Preferred Alternative is expected to vary from 0 to 2.5 dB, depending on the noise receiver location. An increase of less than 3 dB is usually considered to be below the threshold of perceptible level change for humans and is, therefore, not considered to be significant. Therefore, the overall change from the future 2038 No-Build scenario to the worst-case Build scenario is expected to be imperceptible.

Under the Preferred Alternative, traffic noise levels will increase over No-Build Levels such that an additional 16 receivers (166 total) out of 182 properties along Kea'au-Pāhoa Road are calculated to approach or exceed the FHWA and HDOT criteria. This reflects an increase of 49 over existing conditions; 117 receivers already exceed the criteria.

### **Other Alternatives**

The No-Build Alternative will not directly create any new noise impacts, though as noted above, noise will increase over time just from increases in traffic. The TSM Alternative is expected to have similar noise levels to the No-Build Alternative as most improvements will be limited to the vicinity of intersections and the number of travel lanes will not increase. A sound level increase of 0.2 dBA to 3.7 dBA over existing (2006) levels is predicted for the No-Build Alternative in 2038. In 2006, 117 receivers out of 182 were estimated to exceed the NAC. By 2038, under the No-Build Alternative, an additional 33 receivers will approach or exceed the NAC for a total of 150 receivers out of 182.

Alternatives 3 and 5 will have comparable levels of noise to the Preferred Alternative. Alternative 5 will have slightly higher levels of noise in the six-lane segment of the corridor because the nearest traffic lane will be closer to homes; this six-lane cross-section was considered as part of the modeling as noted above. The two-lane portions of both Alternatives 3 and 5 will have slightly lower noise levels than the four-lane Preferred Alternative for the same reason. However, since the overall difference in noise levels between the most conservative conditions modeled and the No-Build Alternative will generally be imperceptible (2.5 dBA or less as noted above), the comparative differences in noise between the Preferred Alternative, Alternative 3, and Alternative 5 should be imperceptible as well.

### **New Issues or Clarification of Issues for Final EA**

The study area for the Preferred Alternative has been revised to include local streets within the Hawaiian Paradise Park and Orchidland subdivisions, as noted in the section that follows.

#### **4.5.1.2 Future Noise Along Access Management Roadways**

With the selection of the Preferred Alternative and the inclusion of the Access Management improvements discussed in **Section 2.2.2: Access Control Under the Preferred Alternative**, an additional analysis was performed for the Final EA to determine what noise impacts would result from introducing new roads or improving existing roads in the subdivisions bordering on

Kea'au-Pāhoa Road. As noted in **Section 3.5.4.2: Modeled Existing Noise Levels Along Access Management Roadways**, this analysis used the FHWA Traffic Noise Model Look-up Tables Software because the roadways are two-lane rural streets with low traffic volumes.

**Table 4-14: Calculated Change in Noise Level from Existing to 2038 Along Access Management Roadways** provides an overview of the noise impacts associated with the new and improved access management roadways.

### **Preferred Alternative**

For the existing access management roadways that will be paved or improved (R1 to R3) under the Preferred Alternative, the change in noise level is directly correlated to the change in traffic volume predicted for these roadway segments in 2038. The results show that the properties located adjacent to Pōhaku Circle and 34th Avenue will experience a negligible change in traffic noise in the future, less than 3 dBA. However, a traffic volume increase is predicted for Uhaloa Avenue, with noise approximately 7 to 9 dBA above the existing ambient environment. This future noise increase will be noticeable to the residents who live along this road.

Several new roadway segments (R4 to R7) are proposed as part of the overall improvements project. Based on the future volumes projected for these roadway extensions, peak hour traffic noise levels in 2038 will range from 41 dBA to 59 dBA at a distance of 35 feet from the roadway. This corresponds to a noise level increase of up to 9 dB above the existing ambient environment. This new traffic noise will be noticeable to the residents immediately adjacent to the proposed roadway extensions.

Although the future increase in noise level will be noticeable by residents along these improved subdivision roads, traffic noise at locations 35 feet or more from the access management roadways is well within the FHWA's noise design goal of 67 dBA. Furthermore, the increase in noise level due to the roadway improvements is less than 15 dBA and therefore does not "substantially exceed" existing levels, in compliance with HDOT's traffic noise policy.

### **Other Alternatives**

The No-Build Alternative will not result in any of the access management modifications and therefore would not create any of the impacts cited above.

The TSM Alternative, Alternative 3, and Alternative 5 would have included the access management measures and therefore would have identical impacts to those cited above.

**Table 4-14: Calculated Change in Noise Level from Existing to 2038 Along Access Management Roadways**

Roadway	Access Management Roadway	Total Estimated Existing Noise at 35 feet from Centerline (dBA)*		Preferred Alternative Calculated 2038 Overall Noise (dBA)		Change in Calculated 2038 Overall Noise (dBA)	
		AM	PM	AM	PM	AM	PM
R-1	Pōhaku Circle between Pōhaku Pl. and Kaloli Drive Extended	51 - 53	51 - 53	53 - 54	53 - 54	1 - 2	1 - 2
R-2	34th Avenue between Auli'i Street and Maku'u Drive Extended	51 - 53	51 - 53	53 - 55	54 - 55	2	2 - 3
R-3	Uhaloa Avenue (32nd Ave.) between Orchidland Drive Extended and Paradise Drive	51 - 53	51 - 53	60	60	7 - 9	7 - 9
R-4	Kaloli Drive Extension	51 - 53	51 - 53	53 - 54	53 - 54	1 - 2	1 - 2
R-5	Maku'u Drive Extension	51 - 53	51 - 53	58 - 59	60	6 - 7	7 - 9
R-6	Orchidland Drive Extension	51 - 53	51 - 53	57 - 58	57 - 59	4 - 6	6 - 7
R-7	Connector between Uala and Puakalo	51 - 53	51 - 53	51 - 53	51 - 53	0	0

Source: DL Adams Associates

\*This data is from **Table 3-21: Calculated 2006 Peak Hour Noise Levels on Access Management Roadways**

## **4.5.2 Mitigation of Project-Related Noise**

### **4.5.2.1 Mitigation of Noise Along Kea'au-Pāhoa Road**

#### **Summary of Discussion in Draft EA**

- Although the added lanes under the Preferred Alternative do not substantially increase future traffic noise levels over the no-build alternative noise levels, a traffic noise impact still occurs since the traffic noise levels exceed the FHWA/HDOT criteria. Therefore, noise abatement measures must be considered.
- Consideration of abatement consideration weighs the abatement benefits, costs, and overall social, economic, and environmental effects. The FHWA considers a 5 dB reduction in noise level to be significant. Abatement measures need to be economically reasonable (meet a monetary cost guideline per mitigated property) and feasible (i.e., acceptable to the affected residents).
- Possible mitigation measures, listed in order of effectiveness, include air-conditioning/forced ventilation, construction of noise barriers, acquisition of unimproved property (to buffer/preempt development), and traffic management measures (restrictions of speed, vehicle types, etc.).
- A review of the feasibility of barriers was made based on the impacted locations in the corridor. Noise barriers would not be feasible on this project as the numerous breaks in the wall needed for driveways would compromise the ability of the barrier to adequately attenuate noise for the required 5 dB reduction. Noise barriers typically are only feasible on limited-access highways where a continuous barrier can block affected receivers from the roadway noise.
- HDOT will determine if any of these noise mitigation measures are feasible and reasonable at affected properties in later stages of design when exact impacts can be determined. If noise mitigation is feasible and reasonable, HDOT will work with property owners to implement these measures.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

### **4.5.2.2 Mitigation of Noise Along Access Management Roadways**

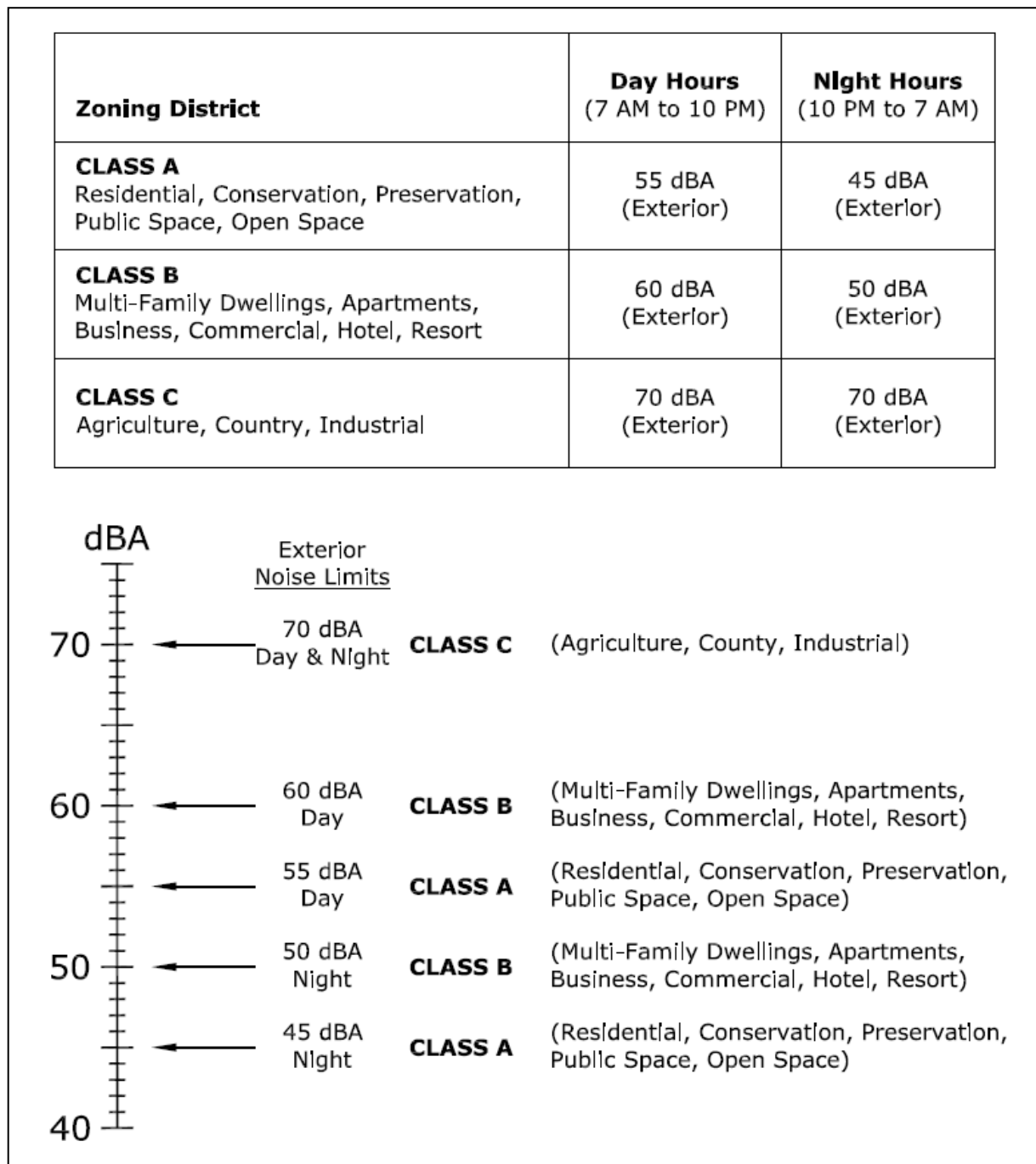
Traffic noise levels along the access management roadways are well with FHWA and HDOT's design goals, and the increase in noise is not enough to justify consideration of noise mitigation according to HDOT's Traffic Noise Policy. Therefore, noise mitigation for residences along the access management roadways is not warranted.

### 4.5.3 Construction Noise Impacts and Mitigation

#### Summary of Discussion in Draft EA

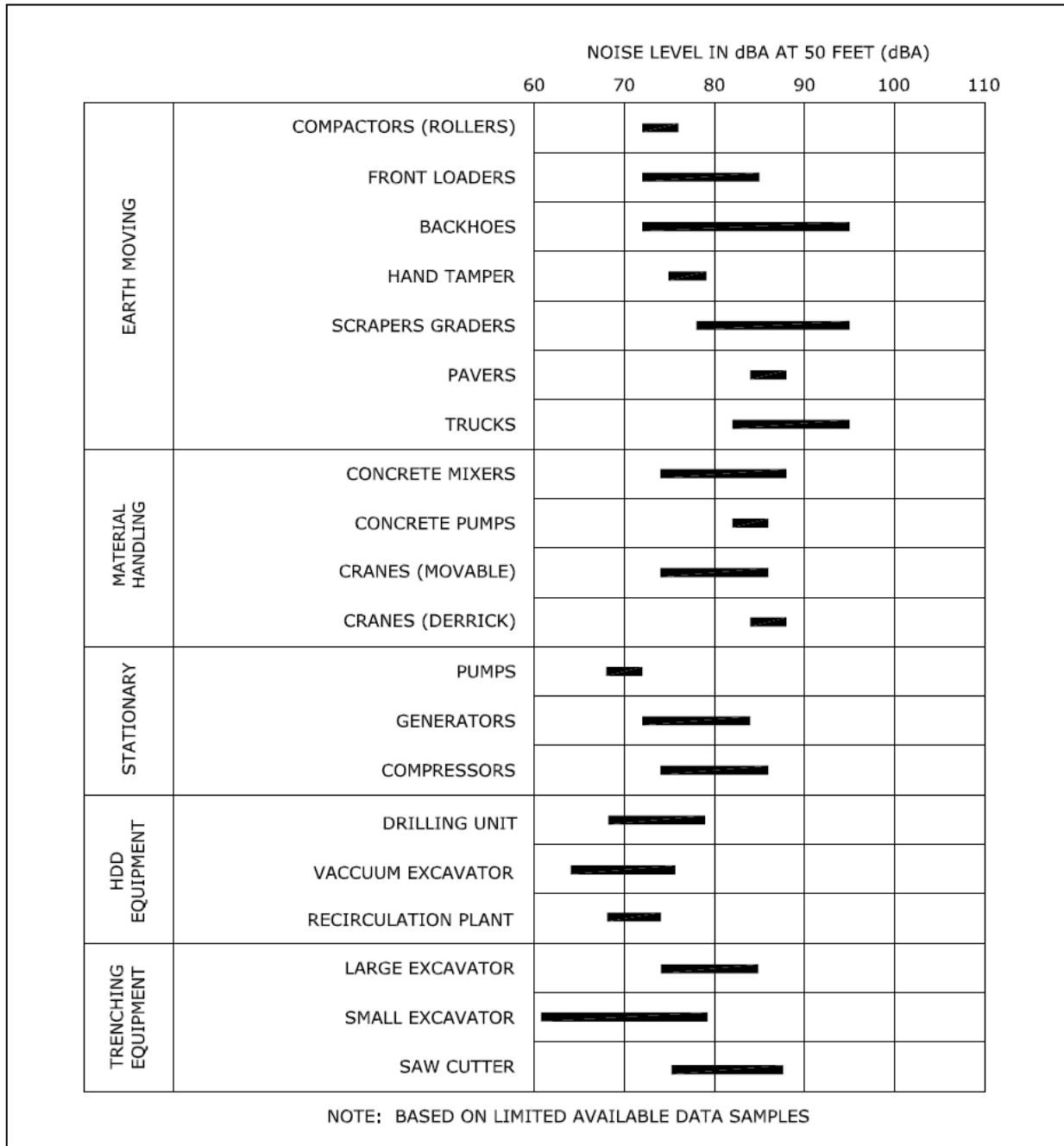
- The State of Hawai'i Community Noise Control Rule at Chapter 11-46 of the Hawai'i Administrative Rules does not address most moving sources, such as vehicular traffic noise but does regulate construction noise. Project activities shall comply with the Administrative Rules of Chapter 11-46.
- Specified maximum permissible noise levels enforced by the State Department of Health (DOH) shall not be exceeded beyond the property line for more than 10% of the time during any 20-minute period. Refer to **Figure 4-1: Hawai'i Maximum Permissible Sound Levels for Various Zoning Districts**.
- Where construction noise exceeds, or is expected to exceed the DOH's "maximum permissible" property line noise levels, a permit must be obtained from DOH to allow the operation of equipment emitting noise in excess of the "maximum permissible" levels.
- Much of the project area contains residences and businesses along sensitive to impacts of construction noise. Actual construction noise levels will depend on construction methods. Typical ranges of equipment noise are shown in **Figure 4-2: Typical Sound Levels from Construction Equipment**.
- Construction noise is expected to exceed the daytime limits and a permit will be obtained from the State DOH to allow the operation of construction equipment. Refer to the Draft EA for the types of equipment and construction practices that will create noise. To obtain a construction noise permit, the Contractor will submit a noise permit application to the DOH, which describes the activities. Prior to issuing the noise permit, the DOH may require action by the Contractor to incorporate noise mitigation into the construction plan. The DOH may also require the Contractor to conduct noise monitoring or community meetings inviting the neighboring residents and business owners to discuss construction noise. The Contractor will use reasonable and standard practices to mitigate noise, such as ensuring mufflers are on diesel and gasoline engines, using properly tuned and balanced machines, etc. However, the DOH may require additional noise mitigation, such as temporary noise barriers, or time of day usage limits for certain kinds of construction activities.
- Specific permit restrictions for construction activities in the Noise Control Rule forbid noise in excess of the maximum permissible sound levels before 7:00 AM and after 6:00 PM on weekdays, before 9:00 AM and after 6:00 PM on Saturday, and at any time on Sundays and on holidays." Very loud pieces of equipment such as hoe rams, larger jack hammers, high pressure sprayers, chain saws, and pile drivers are limited to the hours between 9:00 AM and 5:00 PM on weekdays. Therefore, noise mitigation for construction activities will be addressed using project management, such that the time restrictions within the State DOH permit are followed.

**Figure 4-1: Hawai'i Maximum Permissible Sound Levels for Various Zoning Districts**



Source: DL Adams Associates, Based on Hawai'i Department of Health

**Figure 4-2: Typical Sound Levels from Construction Equipment**



Source: DL Adams Associates

### **New Issues or Clarification of Issues for Final EA**

In its comments on the Draft EA, the Hawai'i Department of Health noted the need to comply with Chapter 11-46. The Draft EA noted the project will comply with Chapter 11-46, and similar information is provided in the preceding section as well.

Since the issuance of the Draft EA, the Preferred Alternative has added access management measures that will improve subdivision roads. All the mitigative measures cited in this section would also apply to improvements on subdivision roads or new roads.

## **4.6 Biological Resources**

### **4.6.1 Flora**

#### **Summary of Discussion in Draft EA**

- As noted in **Section 3.6.1: Flora**, much of the property in immediate proximity to Kea'au-Pāhoa Road and along the access management roads has been disturbed by development, mostly residential.
- In less-developed portions of the corridor, the vegetation along the corridor is a patchwork of native 'ōhi'a-uluhe forest, mostly degraded by invasive species, but in some cases almost pristine. None of the area is designated as conservation, and most will eventually be disturbed as development continues, regardless whether the highway is reconstructed.
- No rare, threatened or endangered species were found in the field surveys performed for this project.

#### **Preferred Alternative**

Along Kea'au-Pāhoa Road, the Preferred Alternative will convert a narrow strip of vegetation immediately next to the existing roadway to roadway right-of-way. Improved subdivision roads that are paved and/or widened for access management measures will have a similar loss of a strip of vegetation. Several new roadway extensions (Maku'u Drive, Kaloli Drive, Orchidland Drive, a connector between 31<sup>st</sup> and 30<sup>th</sup> Avenues) will be constructed in subdivisions through what is now mostly undeveloped, but disturbed lands that do not contain important native communities. Given the disturbed nature of the areas to be affected and the lack of important botanical resources, the Preferred Alternative is not expected to have any direct adverse impact on the botanical resources or vegetation of Puna or the island of Hawai'i.

In order to minimize indirect adverse impacts, care should be taken during and after the construction of the road to avoid introduction of any invasive alien species particularly on equipment from other islands or the mainland. If efforts are undertaken to landscape with appropriate native species, the project could benefit the biological resources of the area.

## **Other Alternatives**

The No-Build Alternative will have no direct effect on vegetation in the study corridor.

The TSM Alternative will have a minimal effect on vegetation along Kea'au-Pāhoa Road itself as construction would be limited to minor improvements near intersections. Within subdivisions, the access management improvements have impacts comparable to those of the Preferred Alternative.

Alternatives 3 and 5 would impact vegetation much like the Preferred Alternative. Along Kea'au-Pāhoa Road itself, the six-lane cross-section of Alternative 5 would impact a slightly wider strip. Given the overall disturbed condition of the affected vegetation, this is not a substantial difference in impact. Similarly, Alternatives 3 and 5 would affect a slightly narrower strip than the Preferred Alternative where they are only two lanes wide; impacts would be comparable. Both Alternatives 3 and 5 would affect vegetation along the access management roadways, with identical effects to that of the Preferred Alternative.

## **New Issues or Clarification of Issues for Final EA**

Since the issuance of the Draft EA, the Preferred Alternative has added access management measures that will improve subdivision roads, and these areas were visited for this Final EA. All the mitigative measures cited in this section would also apply to improvements on subdivision roads or new roads.

## **4.6.2 Fauna**

### **Summary of Discussion in Draft EA**

- As described in greater detail in **Section 3.6.2: Fauna**, the corridor contains low diversity and low densities of avian species, in large part to the disturbance caused by the existing roadway.

### **Preferred Alternative**

Under the Preferred Alternative, the modification of the current habitat within the proposed right-of-way or along access management roadways is not expected to result in substantial impacts to any avian or mammalian species currently listed as threatened, endangered or proposed for listing under either the Federal, or State of Hawai'i endangered species programs. This opinion is based on the fact that relatively simple minimization measures, described in the sections that follow, can be implemented to reduce the potential for deleterious impacts to occur as a direct result of this action on the four listed species that are known to occur in the project area.

Based on the habitat along Kea'au-Pāhoa Road or the access management roadways, it is not expected that the improvements proposed to the existing roadway will result in any deleterious impacts to any migratory shorebird species.

The Federal Highway Administration (FHWA) has engaged in consultation with the US Fish and Wildlife Service (USFWS) as required under Section 7 of the Endangered Species Act. The Section 7 consultation concluded with a determination that the proposed action will be “Not Likely to Adversely Affect” (NLAA) any listed species covered in the consultation. The sections that follow outline the kinds of minimization measures that will be agreed to and implemented as part of the project in compliance with the Section 7 consultation. Section 7 documentation is found in **Appendix O: Section 7 Documentation**.

### **Other Alternatives**

The No-Build Alternative would have no direct effect on fauna in the study corridor. The TSM Alternative would have a minimal effect as construction would be generally limited to minor improvements near intersections.

Alternatives 3 and 5 would have identical impacts to the Preferred Alternative on fauna in the study area, and identical mitigative measures would be applied.

### **New Issues or Clarification of Issues for Final EA**

Since the issuance of the Draft EA, the Preferred Alternative has added access management measures that will improve subdivision roads. All the mitigative measures cited in the sections that follow would also apply to improvements on subdivision roads or new roads.

As noted above, Section 7 consultation with the USFWS has been completed since the Draft EA was issued.

#### **4.6.2.1 Hawaiian Hawk**

##### **Summary of Discussion in Draft EA**

- The principal potential impact of the Preferred Alternative on Hawaiian Hawks is if active nests are disturbed during clearing and grubbing.

##### **Preferred Alternative**

There is very little suitable hawk nesting habitat along Kea'au-Pāhoa Road except for the last 500 meters (1,640-feet) of right-of-way near Pāhoa-Kapoho Road. Large exotic albizia trees in this area could be used by hawks as nest trees. A similar area with albizia trees was identified along the proposed access-management extension of Kaloli Drive when botanical surveys were updated to include the access management measures.

To minimize potential disturbance on nesting Hawaiian Hawks from clearing and grubbing, it is recommended that an audio playback nesting survey be conducted for hawks within a kilometer of both areas noted to have albizias if clearing will occur during the Hawaiian Hawk nesting period. Typically such surveys are conducted in January.

Individual foraging hawks could be temporarily disturbed by construction activity. Potential disturbance to foraging Hawaiian Hawks is not likely to be significant, as there are miles and miles of suitable foraging habitat surrounding the length of the project corridor.

### **Other Alternatives**

The No-Build Alternative would have no direct effect on hawks in the study corridor. The TSM Alternative would have a minimal effect as construction would be generally limited to minor improvements near intersections.

Alternatives 3 and 5 would have a somewhat lesser impact on albizia trees near the southern end of the corridor as it would remain two lanes wide under both of these alternatives. Identical mitigative measures would be applied.

### **New Issues or Clarification of Issues for Final EA**

Since the issuance of the Draft EA, the Preferred Alternative has added access management measures that will improve subdivision roads and an area with albizia trees was identified along the proposed extension of Kaloli Drive. The mitigative measures cited above would also be implemented on construction in this area.

## **4.6.2.2 Hawaiian Petrel and Newell's Shearwater**

### **Summary of Discussion in Draft EA**

- The principal potential threat that the construction and operation of the project poses to Hawaiian Petrels and Newell's Shearwaters comes from birds potentially being downed after becoming disoriented by lights associated with night time construction, or by street lights. However, multi-year ornithological radar studies conducted in the general project area have detected extremely small passage rates of these species through the area (Day and Cooper 2003).

### **Preferred Alternative**

To reduce the potential for interactions between nocturnally flying Hawaiian Petrels and Newell's Shearwaters with external lights and man-made structures, it is recommended that if nighttime construction is necessary, all lights associated with the construction activities should be shielded and or directed at the ground.

Following build-out of the Preferred Alternative, it is recommended that any streetlights that may be required for public safety reasons along the new road be shielded (Reed et al. 1985, Telfer et al. 1987). This measure would serve the dual purpose of minimizing the threat of disorientation and downing of Hawaiian Petrels and Newell's Shearwaters, while at the same time complying with the Hawaii County Code § 14 - 50 et seq. which requires the shielding of exterior lights so as to lower the ambient glare caused by unshielded lighting to the astronomical observatories located on Mauna Kea.

### **Other Alternatives**

The No-Build would not include any construction or placement of new lights.

The TSM Alternative, Alternative 3, and Alternative 5 would all have comparable impacts to the Preferred Alternative in the placement of street lights, and would incorporate similar mitigative measures to those cited above.

### **New Issues or Clarification of Issues for Final EA**

Since the issuance of the Draft EA, the Preferred Alternative has added access management measures that will improve subdivision roads. Similar shielding is proposed for any lights that would be constructed along these roads.

### **4.6.2.3 Hawaiian Hoary Bat**

#### **Summary of Discussion in Draft EA**

- The principal potential impact that the project poses to bats is during the clearing and grubbing phases of construction as vegetation is removed. The removal of vegetation may temporarily displace individual bats, which may use the vegetation for roosting. As bats use multiple roosts within their home territories, potential disturbance resulting from vegetation removal is likely to be minimal. During the pupping season, females carrying their pups may be less able to rapidly vacate a roost site as vegetation is cleared. Additionally, adult female bats sometimes leave their pups in the roost tree while foraging, and very small pups may be unable to flee a tree that is being felled.

#### **Preferred Alternative**

The Preferred Alternative will require the removal of some vegetation. Potential adverse effects from removal of vegetation can be avoided or minimized by not clearing woody vegetation taller than 4.6 meters (15 feet), between April 15 and August 15, the period in which bats are potentially at risk from vegetation clearing.

### **Other Alternatives**

The No-Build would not require any removal of vegetation.

The TSM Alternative would remove minimal vegetation, but would adhere to the mitigative measure cited above to protect bats.

As noted above in **Section 4.6.1: Flora**, Alternatives 3 and 5 would impact vegetation much like the Preferred Alternative, with some minor differences depending on the cross-section of the roadway. Both Alternatives 3 and 5 would affect vegetation along the access management roadways identical to that of the Preferred Alternative. In all cases, mitigation that limits vegetation removal to the schedule cited above would minimize adverse effects on bats.

### **New Issues or Clarification of Issues for Final EA**

Since the issuance of the Draft EA, the Preferred Alternative has added access management measures that will improve subdivision roads. Mitigative measures for vegetation removal is proposed along these roads as well as along Kea'au-Pāhoa Road.

#### **4.6.2.4 Migratory Shorebirds**

##### **Summary of Discussion in Draft EA**

- Two migratory indigenous shorebird species, Pacific-Golden Plover (*Kolea*, or *Pluvialis fulva*), and Ruddy Turnstone ('akekeke, or *Arenaria interpres*) use resources within the general project area on a seasonal basis, as noted by comments received by the public prior to the Draft EA's release. Neither species is threatened or endangered.
- There is little suitable shorebird habitat for these or other wide-ranging shorebird species in the study area. Impacts on these species will be negligible and not requiring mitigation.

##### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

#### **4.6.3 Aquatic Biota**

##### **Summary of Discussion in Draft EA**

- Field surveys in the corridor, described in **Section 3.6.3: Aquatic Biota**, documented few aquatic resources in the corridor. No listed (or proposed for listing) species were found.

##### **Preferred Alternative**

There is limited potential impact to aquatic habitat under the Preferred Alternative, given the lack of aquatic resources identified during the field surveys and the intermittent nature of the water in the unnamed stream. Aquatic resources at the unnamed stream are limited to ephemeral pools formed in depressions in the basalt bed, seen some distance from the vicinity of the highway crossing.

Any impacts to the limited aquatic resources in the study area will be mitigated with use of Best Management Practices and National Pollution Discharge Elimination System (NPDES) permitting as needed during construction to limit sedimentation or deposition of soil in streams. Treatment of runoff through swales or structures such as drywells or infiltration trenches will prevent pollutants from entering waterways.

##### **Other Alternatives**

The No-Build Alternative (Alternative 1) will have no direct effect on aquatic species in the study corridor.

The TSM Alternative (Alternative 2) will have a minimal effect on aquatic species as construction would be generally limited to minor improvements near intersections.

The limited impacts under Alternatives 3 and 5 would affect the same resources as the Preferred Alternative and be similarly mitigated.

#### **New Issues or Clarification of Issues for Final EA**

Since the issuance of the Draft EA, the Preferred Alternative has added access management measures that will improve subdivision roads, and these areas were visited for this Final EA in January, 2011. No flowing water or channels of any significance were identified. All the mitigative measures cited in this section would also apply to improvements on subdivision roads or new roads.

## **4.7 Water Resources**

Refer to the Draft EA for a much more detailed assessment of Water Resources in the study areas. Field visits of water resources were made in May, 2009 for Kea'au-Pāhoa Road itself and in January, 2011 for access management areas that were added to the study area.

### **4.7.1 Surface and Groundwater**

#### **Summary of Discussion in Draft EA**

- There are very limited surface water resources discussed in **Section 3.7.1: Surface and Groundwater** that will be affected by the project. As noted in the May 21, 2009 survey, the only water present within the project area was located in small, isolated pools in the tributary north of the larger channel of the unnamed stream and in a center culvert at 0.2 mi (0.3 km) south of the Kea'au Bypass merge (before Opukahaia Street).

#### **Preferred Alternative**

Given the lack of aquatic resources identified during the field surveys and the intermittent nature of the water in the unnamed stream, there is limited potential for the Preferred Alternative to affect surface water resources. This conclusion holds true for the unnamed stream because aquatic resources here are limited to ephemeral pools formed in depressions in the basalt bed, seen some distance away from the vicinity of the highway crossing.

Any impacts to the limited aquatic resources in the corridor will be mitigated with use of Best Management Practices (BMPs) and National Pollution Discharge Elimination System (NPDES) permitting as needed during construction to limit sedimentation or deposition of soil in streams.

Coordination with the US Army Corps of Engineers, as described in **Section 3.7.1: Surface and Groundwater**, will continue, and a determination on the jurisdictional status on the unnamed stream will occur after submission of this EA document. While it is not expected to be likely, if necessary, a Department of Army permit would be obtained for impacts on Waters of the US.

After the Preferred Alternative is completed and open for operation, stormwater quality could degrade with urban development and increased impervious surfaces, as various pollutants are introduced into the stormwater runoff. Therefore, the quality of storm water runoff leaving the roadway corridor is of concern. HDOT requires that the project provide permanent water quality treatment of the roadway runoff prior to discharging off right-of-way. The Preferred Alternative will incorporate permanent BMPs in conformance with HDOT standards and good engineering practice to accomplish this goal.

The first half-inch of runoff during a storm is referred to as the Water Quality Volume (WQV) or the "first-flush" volume (FHWA- HEC-22). This portion of the runoff from a storm contains measurably more suspended solids plus other contaminants per cubic foot than would be expected in runoff occurring later in the storm. Accepted permanent BMP practice is to provide at least for on-site storage and disposal of this first-flush runoff.

Permanent BMPs that would be considered during final design include detention basins, infiltration facilities and/or drywells. Each of these facilities provide temporary storage to control peak flow and would also provide permanent storage and infiltration area in order to control both the increase in storm volume and the first-flush discharge resulting from the project. A full assessment of all available BMP's would be provided during final design of the project to optimize water quality benefits.

The proposed permanent BMP facilities will fit entirely within the proposed right of way limits as linear infiltration facilities. No additional right-of-way is anticipated beyond the highway corridor extents, to accommodate the BMP facilities.

Impacts on groundwater are expected to be minimal. Treatment of runoff will prevent pollution from percolating down to groundwater through the permeable soil and lava found in the study area. No underground injection is expected.

### **Other Alternatives**

The No-Build Alternative will have no direct effect on surface or groundwater in the study corridor.

The TSM Alternative will have a minimal effect as construction would be generally limited to minor improvements near intersections.

Impacts under Alternatives 3 and 5 would affect the same resources as the Preferred Alternative and be similarly mitigated.

### **New Issues or Clarification of Issues for Final EA**

Since the issuance of the Draft EA, the Preferred Alternative has added access management measures that will improve subdivision roads, and these areas were visited for this Final EA in January, 2011. No flowing water or channels of any significance were identified. All the mitigative measures cited in this section would also apply to improvements on subdivision roads or new roads.

## 4.7.2 Wetlands

### Summary of Discussion in Draft EA

As noted in **Section 3.7.2: Wetlands**, there is one depression area that exhibits some wetland characteristics, specifically positive vegetation and hydrology indicators, and a possible soil indicator requiring more in-depth study. However, this depression is not expected to be classified as a jurisdictional wetland under the regulatory oversight of the US Army Corps of Engineers. Therefore, no Department of the Army Permit under Section 404 of the Clean Water Act is anticipated to be necessary for any impacts on this area, pending the Corps' final determination of jurisdiction.

### Preferred Alternative

While nonjurisdiction removes federal permitting requirements, Executive Order 11990 (Protection of Wetlands) requires that federal projects minimize harm to wetlands over and above any permit issues. Therefore, as design of the Preferred Alternative proceeds, this area will be avoided to the greatest degree possible, and impacts minimized.

To minimize impacts upon this area, Best Management Practices (BMPs) will be followed during construction to limit sedimentation or deposition of soil within this depression. Treatment of runoff through Permanent BMPs as described in **Section 4.7.1: Surface and Groundwater** will also protect water quality in this area.

### Other Alternatives

The No-Build and TSM Alternatives will have no impact upon wetlands.

Alternative 3 would affect the same potential wetland area as the Preferred Alternative, and impacts would be minimized in a similar fashion.

Alternative 5 would have a somewhat wider six-lane cross-section in the vicinity of the potential wetland and therefore may pose greater challenges on minimizing or avoiding impacts on this resource.

### New Issues or Clarification of Issues for Final EA

Since the issuance of the Draft EA, the Preferred Alternative has added access management measures that will improve subdivision roads, and these areas were visited for this Final EA in January, 2011. No wetlands were identified.

## 4.7.3 Floodplains and Hydrology

### Summary of Discussion in Draft EA

- As noted above in **Section 3.7.3: Floodplains and Hydrology**, the entire region of lower Puna that includes Kea'au-Pāhoa Road is designated as Zone X under the National Flood Insurance Program. Thus, none of the study area contains an area regulated as a floodway.

- Engineering analyses considered precipitation, watersheds and upstream topography, soils, and the existing and future land uses. Using this information, designers estimated the design flow at each of 35 locations with drainage structures. Designers determined the adequacy of the existing drainage features, and, where necessary, will recommend new or replacement drainage measures order to meet current highway design standards. Proposed changes to drainage within the corridor are documented at length in the Draft EA in Appendix L: Culvert Drainage Study.

### Preferred Alternative

The Preferred Alternative will increase the amount of impervious pavement, and therefore its design will accommodate larger volumes and peak flow rates of runoff. Permanent Best Management Practices (BMPs) that would be considered during final design include detention basins, infiltration facilities and/or drywells. Refer to Appendix M: Pavement Drainage Report & BMP Assessment in the Draft EA for more information. Sizing of storage for the detention and treatment of runoff during final design will ensure that the rate and quantity of peak flow from roadway runoff will meet HDOT standards. Drainage features will detain and dispose of the runoff from storm events and release water over a longer time period to prevent flooding.

As an Arterial Roadway, bridges shall be designed for a minimum of a 1 in 50 year flood, without damage and to provide at least two feet of clearance between the water surface and the low chord of the bridge. The bridge structure is to be analyzed for the both the 1 in 50 year and the 1 in 100 year flood event, and shall also be designed for scour protection and countermeasures. Bridge design will avoid increasing backwater, to ensure there is no flooding upstream.

Widening to four lanes under the Preferred Alternative will require longer culverts, and possibly larger culverts, to ensure no adverse change in the flow of drainage across the highway. Culvert designs will accommodate a 50-year flow, and avoid ponding, erosion, and scouring.

To improve drainage in the area of the unnamed stream near the Waipāhoehoe Bridge, a 1930s-era abandoned concrete bridge immediately upstream (mauka) of Kea'au-Pāhoa Road will be removed as part of the Shoulder Lane Conversion project, described in **Section 1.2.2.1: The Kea'au-Pāhoa Road Shoulder Lane Conversion Project**, which will take place prior to the improvements discussed in this Environmental Assessment.

There is little drainage infrastructure observed in the subdivision areas visited for this Final EA in January, 2011. No flowing water or channels of any significance were identified. Design of access management roads will consider drainage needs from runoff on the roads as well as the movement of drainage across these roads and downstream properties that could be affected. This should be beneficial to properties within the subdivisions.

### Other Alternatives

The No-Build Alternative would have no effect on drainage in the corridor. Low spots that experience ponding during strong storms would continue to have this problem during future storm events.

Similarly, the TSM Alternative would have a minimal effect on drainage along Kea'au-Pāhoa Road itself, as most improvements would be limited to the immediate vicinity of intersections. Drainage Improvements would be made along subdivision roads as described for the Preferred Alternative.

Alternatives 3 and 5 would have similar drainage implications to the Preferred Alternative. Along Kea'au-Pāhoa Road, Alternative 5 would require longer and possibly larger culverts than the Preferred Alternative in the segment that is six lanes wide. Drainage Improvements would be made along subdivision roads as described for the Preferred Alternative.

#### **New Issues or Clarification of Issues for Final EA**

As noted above, since the issuance of the Draft EA, the Preferred Alternative has added access management measures that will improve subdivision roads. Drainage design would consider the effects of drainage along these roads.

## **4.8 Geographic Setting and Natural Hazards**

### **4.8.1 Geology**

#### **Summary of Discussion in Draft EA**

- Refer to **Section 3.8.1: Geology** for an overview of the geology of the area. The Kazumura Cave is known to cross under Kea'au-Pāhoa Road in the vicinity of its intersection with Orchidland Drive, and the Pāhoa Cave crosses the corridor north of Kahakai Boulevard.

#### **Preferred Alternative**

Construction of the Preferred Alternative could possibly result in the opening or discovery of lava tubes. While a number of lava tubes, including the Kazumura Cave, are documented in the area, there might be others that have not been identified to date. The depth to these lava tubes below the existing terrain generally has not been established; profile views shown in the Allred and Allred (1997) study suggest that the upper portion of the lava tube typically lies within ten to twenty meters of the surface. The Preferred Alternative could potentially breach or cause adverse direct or indirect impacts to the Kazumura Cave or other caves throughout the corridor, many of which are poorly documented.

**Sections 4.9.1: Archaeological Resources** and **4.9.2: Historic Resources** below discuss measures for archaeological monitoring to avoid or minimize effects on lava tubes (and other resources) throughout the length of the corridor. Impacts to the Kazumura Cave (or any other cave) underlying the current project area could adversely impact any cultural resources that may be present in these caves.

#### **Other Alternatives**

The No-Build Alternative would not create any impacts on lava tube caves.

The TSM Alternative, Alternative 3, and Alternative 5 could all potentially impact on the Kazumura Cave, which is in close proximity to intersection improvements proposed at Orchidland Drive.

#### **New Issues or Clarification of Issues for Final EA**

Since the issuance of the Draft EA, the Preferred Alternative has added access management measures that will improve subdivision roads. The Archaeological Inventory Survey investigated resources along the subdivision roads, including lava tube caves. Refer to Section **4.9: Cultural Resources** for more information.

### **4.8.2 Natural Disasters**

#### **Summary of Discussion in Draft EA**

- Until an alternate parallel route can be constructed, Kea'au-Pāhoa Road will remain the only route into and out of Lower Puna. In the event of a natural disaster such as an earthquake, lava flow, hurricane or tsunami, it would serve as the primary evacuation route for Civil Defense needs and it also is the primary route first responders use to reach local subdivisions and transport people to Hilo Medical Center, the region's only hospital.

#### **Preferred Alternative**

In the event of an evacuation, the Preferred Alternative would increase the capacity of the highway to four lanes wide. This widening would also enable a temporary contra-flow configuration to allow a third travel lane to evacuate even greater numbers of vehicles in an emergency.

#### **Other Alternatives**

The No-Build Alternative will not improve Kea'au-Pāhoa Road and as a result, will leave the area vulnerable in the event of an evacuation.

While the TSM Alternative will make minor improvements to intersections, it will not appreciably increase the capacity of the highway overall, which will remain two lanes wide.

Alternative 3 would offer some of the benefits cited above where it is four lanes wide, though south of Ainaloa Boulevard, it would remain two lanes wide.

Alternative 5 would offer even greater capacity for evacuation in the six-lane segment north of Paradise Drive, though it would remain two lanes wide on the Pāhoa bypass.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## 4.9 Cultural Resources

The Archaeological Inventory Survey is under review by the State Historic Preservation Division (SHPD).

### 4.9.1 Archaeological Resources

#### Summary of Discussion in Draft EA

- The archaeological survey performed for the Draft EA did not identify any archaeological resources along Kea'au-Pāhoa Road itself that would be impacted by highway widening. In part, this was a result of low visibility of much of the undisturbed areas within the corridor. Nonetheless, two historic properties were identified as described below in **Section 4.9.2: Historic Resources**.

#### New Issues or Clarification of Issues for Final EA

In their comments on the AIS and the Draft EA, the State Historic Preservation Division (SHPD) noted that the Access Management Roadways proposed above in **Section 2.2.2: Access Control Under the Preferred Alternative** had not been formally assessed for cultural resource impacts. Therefore, with the incorporation of these Access Management Roadways into the Preferred Alternative, a supplementary Archaeological Inventory Survey was performed.

#### Preferred Alternative

While no archaeological resources were identified during the Draft EA's assessment of Kea'au-Pāhoa Road, or the subsequent field review of the access management roadways, it is possible that archaeological resources could be encountered with construction of the Preferred Alternative. Based on the project team's research of the project area and its importance as a thoroughfare in the past, and into the future, it is recommended that as a mitigative measure, archaeological monitoring of construction activities take place during all phases of construction where there is ground disturbance.

Archaeological monitoring will potentially prevent accidental damage to the Kazumura Cave system and its associated features. Monitoring of construction activities will also prevent access or damage to the ancient trails system that abuts the corridor. Further, on-site monitors will be able to point out archaeological features and trails alongside the roadway from areas of low visibility during the archaeological survey, or in areas of increased visibility due to vegetation clearance during the construction phase. Specifics of the archaeological monitoring will be addressed in the archaeological monitoring plan to be reviewed and approved by the State Historic Preservation Division (SHPD). This monitoring program will facilitate the identification and proper treatment of any burials that might be discovered during project construction, and will gather information regarding the project's non-burial archaeological deposits, should any be discovered.

## Other Alternatives

The No-Build Alternative would not have any effect on archaeological resources.

The TSM Alternative would have a much-limited scale of construction compared to the Preferred Alternative. Nonetheless, there still would be potential for encountering archaeological resources, and the same mitigation (archaeological monitoring) would be proposed under TSM.

Alternatives 3 and 5 would have a very similar likelihood of encountering archaeological resources during construction as the Preferred Alternative. There would be an incrementally higher likelihood of encountering archaeological resources where the cross-section is six-lanes-wide, and a lower chance where the cross-section remains two lanes wide. In all cases, mitigation would be proposed as per the Preferred Alternative.

## 4.9.2 Historic Resources

### Overview

During the studies performed for the Draft EA, one historic property, a 1930s-era concrete bridge was identified within the Area of Potential Effect (APE). A second historic property, a cemetery, lies just beyond the APE and was previously identified (State of Hawai'i, Department of Transportation 1979). Both historic properties identified within the survey area are recommended eligible to the Hawai'i and National Registers:

- SIHP # 50-10-44-26874, 1930s Bridge, Criterion D
- SIHP # 50-10-55-7388, Sacred Heart Catholic Church cemetery, a component of the Pāhoa Historic and Commercial District, Criterion D

Although the proposed project will most likely alter a small portion of the historic fabric of Kea'au-Pāhoa Road, this alteration is suggested to represent routine maintenance to an in-use road that is consistent with the Secretary of the Interior's standards for the treatment of historic properties (36 CFR part 68). A project specific effect determination of "no adverse effect" is warranted for the proposed road widening project overall.

### 4.9.2.1 SIHP # 50-10-44-26874, Circa 1930s Concrete Slab Bridge and Roadway

#### Summary of Discussion in Draft EA

- This bridge will be demolished as part of the separate Shoulder Lane Conversion project described in **Section 1.2.2.1: The Kea'au-Pāhoa Road Shoulder Lane Conversion Project**, and therefore the bridge will no longer be present at the time that the project covered in this EA is constructed. This bridge is not listed on the State of Hawai'i Historic Bridge inventory.
- While the Kea'au-Pāhoa Road Improvements project would have no effect on the bridge, because it is presently within in the defined Area of Potential Effect, the Archaeological Impact Survey treated it as if it might be affected by this Kea'au-Pāhoa Road improvements

project. Under Federal Section 106 guidelines a project specific effect determination of “no adverse effect” is warranted for the proposed road widening project with the understanding that the recommended mitigation measures will be acted upon. Because the project must also comply with Hawai'i State historic preservation review legislation (HAR Chapter 13-275), a project effect recommendation of “effect, with proposed mitigation commitments” is warranted.

- A separate Final Environmental Assessment for the Shoulder Lane Conversion was issued in April 2010. The Archaeological Inventory Survey for that project (Haun and Henry, 2008) found the bridge was significant under Criterion D, consistent with the finding in this study. Haun and Henry's recommendation is that their documentation adequately documents the site and no further work or preservation is recommended.

### **Preferred Alternative**

The Preferred Alternative will not have any direct impact on this bridge, and therefore is considered to have “no effect” on the historic bridge for reasons cited above.

Data recovery in the form of Historic American Building Survey and Historic American Engineering Record (HABS/HAER) documentation of the bridge is recommended, consistent with the finding in the Archaeological Impact Survey performed for the Shoulder Lane Conversion Project. Consultation with and the approval of the SHPD with the mitigation proposed above is recommended prior to any proposed alteration to SIHP # 50-10-44-26874.

### **Other Alternatives**

Neither the No-Build Alternative, TSM Alternative, Alternative 3, nor Alternative 5 would have any effect on this bridge for the same reason outlined above. The identical mitigation of data recovery would be proposed if any of these alternatives had been selected.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## **4.9.2.2 SIHP # 50-10-55-7388, Sacred Heart Catholic Church Cemetery**

### **Summary of Discussion in Draft EA**

- During project planning a great deal of effort was put into insuring that the project Area of Potential Effect did not encroach on the Sacred Heart Church property component of the Pāhoa Historic and Commercial District designated as SIHP # 50-10-55-7388.
- The Sacred Heart Church property improvements, specifically a Meditation Path, are immediately adjacent to, but do not intrude into, the existing and future road right-of-way or into the designated Area of Potential Effect.

### **Preferred Alternative**

The Preferred Alternative will have no effect on the Sacred Heart Church cemetery.

A temporary construction barrier is proposed as an appropriate precaution given the proximity of the church property to insure that project related activities do not stray outside of the APE. Specifically, the erection of continuous, orange-web "event fencing" or some similar barrier is recommended prior to any project related work within 50 feet of the Sacred Heart Catholic Church property. This interim protection could be carried out and documented under monitoring archaeologist supervision.

### **Other Alternatives**

Neither the No-Build Alternative, TSM Alternative, Alternative 3, nor Alternative 5 would have any effect on this cemetery as no alternative would encroach into the church property. In the case of Alternatives 3 and 5, the highway would remain two lanes wide next to the cemetery, compared to four lanes wide under the preferred alternative. The identical mitigation of a temporary barrier to buffer the property during construction would be proposed if any of these alternatives had been selected.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## **4.9.2.3 Lava Tubes**

### **Summary of Discussion in Draft EA**

- No entrances to lava tubes were identified during the inventory survey for the Draft EA, even though Background research has indicated that there are lava tubes in the vicinity of the southern portion of the project corridor. The research indicated that findings in one of the lava tubes indicated this area was utilized by pre-contact Hawaiians. Thus it is possible that subsurface historic properties, associated with pre- and possibly post-contact land use, are present within the southern portion of the project corridor.

### **New Issues or Clarification of Issues for Final EA**

### **Preferred Alternative**

Even though the project will not impact known entrances to a lava tube cave, entrances are often obscured. In order to mitigate the potential damage to these potential historic properties within the project area, it is recommended that project construction proceed under an archaeological monitoring program. Specifics of the archaeological monitoring will be addressed in the archaeological monitoring plan to be reviewed and approved by the State Historic Preservation Division. This monitoring program will facilitate the identification and proper treatment of any burials that might be discovered during project construction involving any earth movement, and will gather information regarding the project's non-burial archaeological deposits, should any be discovered.

## **Other Alternatives**

The No-Build Alternative would not have any effect on lava tubes.

The TSM Alternative would have a much-limited scale of construction compared to the Preferred Alternative. Nonetheless, there still would be potential for encountering lava tubes, and the same mitigation (archaeological monitoring) would be proposed under TSM.

Alternatives 3 and 5 would have the same chance of encountering lava tubes during construction as the Preferred Alternative. Identical mitigation would be proposed.

### **4.9.2.4 Roadside Memorials**

#### **Summary of Discussion in Draft EA**

- Six roadside memorials that are not historic properties were identified within the project area. HDOT has a Roadside Memorials Policy, which states that memorials are permitted under certain conditions but must be removed within 30 days, otherwise, "the Department will remove and dispose of the memorial." Thus current HDOT policies allow removing these ad-hoc shrines. However, in the interests of good public relations with the concerned families and friends it is recommended that consideration be given to avoidance and that if the road improvements require the removal of these memorials that notification of intended removal be posted on each memorial 30 days prior to removal.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

### **4.9.3 Cultural Practices**

#### **Summary of Discussion in Draft EA**

- As noted above in **Section 3.9.4: Cultural Practices**, the Cultural Impact Assessment (CIA) found no locations of traditional cultural practices occurring along the corridor, with the exception of the activities that are ongoing at the Maku'u Farmers Market Association site where ongoing cultural activities still survive into the 21<sup>st</sup> century.
- HDOT and DHHL have recently worked together to improve the access from the Maku'u Farmers Market to Kea'au-Pāhoa Road into a new intersection, constructed in 2008-2009 that better serves the site, providing a left-turn lane for Pāhoa-bound traffic to access the property. It is anticipated that future cooperation in a similar vein, along with mitigation described below, will ensure that improvements to Kea'au-Pāhoa Road enable the Maku'u Farmers' Market and activities on the site to continue to thrive.

#### **Preferred Alternative**

The design of the roadway in the vicinity of this site has been focused on avoiding impacts on the site to the greatest degree possible. Under the Preferred Alternative, a bus stop and bus

pullout area will help improve accessibility of the site to transit-dependent persons but will affect a narrow strip of the property immediately next to Kea'au-Pāhoa Road. With a four-lane cross-section under the Preferred Alternative, impacts will be limited to the need to relocate power poles in the area and to provide the bus stop and pullout area.

Based on issues raised during the telephone and talk story in-person interviews with local *kūpuna* (elders) and/or *kama'āina* (native born), the following mitigative measures are proposed to avoid impacts under the Alternative 4:

- Archaeological monitoring, as described above in **Sections 4.9.1: Archaeological Resources** and **4.9.2: Historic Resources** to avoid or minimize impacts on lava tubes and other potential archaeological resources that were not identified during the archaeological field inventory due to poor visibility.
- Once trails and sites are located that potentially will be impacted by their visibility to the public and passersby within the corridor, mitigation measures can be implemented to mask and buffer the sites with native vegetation, thereby restoring some of the traditional fauna to the region once more.
- Extra safety measures should be in place to prevent damage to equipment and persons working on the new highway, especially in the region that the Kazumura cave was previously located.
- W.H. Shipman, the largest landowner in the project area, has requested that access points to their agricultural areas remain open. Keeping these access points open will ensure safe and continued access to farming areas along the route.
- Finally, ongoing activities at the Maku'u Market should be preserved as a center of Hawaiian culture along the project corridor route. This area should be avoided to avoid damage to existing cultural plantings and ongoing areas of use on the Maku'u Market Association lands. These lands and the activities ongoing on them meet the requirements listed in accordance with Hawai'i State Historic Preservation Statute (Chapter 6E) guidelines for Traditional Cultural Properties (TCPs) of ongoing cultural significance and may be eligible for inclusion on the State Register of Historic Places, under significance criteria (HAR §13-275-6), Criterion E which states to be significant an historic property shall:
  - a. Have an important value to the Native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events or oral accounts—these associations being important to the group's history and cultural identity.
  - b. Native Hawaiian traditional practices that are ongoing at this location have been ongoing in some cases for 80 years. Additionally, it is the last remaining site on this corridor where traditional Hawaiian cultural practices are still promoted, taught, observed and transmitted to the next generation, thereby preserving and perpetuating their importance to the history and cultural identity of the Hawaiian

people residing in the Puna area and beyond, and therefore this site may be eligible under Chapter 6E guidelines for Traditional Cultural Properties.

### **Other Alternatives**

Neither the No-Build Alternative nor the TSM Alternative will have an effect on any Cultural Practices in the Kea'au-Pāhoa Road corridor.

Alternative 3 will not increase the number of near the Maku'u Farmers Market and is anticipated to have no impact with the exception of the bus stop and bus pullout area.

Alternative 5 will widen the corridor to four lanes and impacts on the Maku'u Farmers Market would be identical to those of the Preferred Alternative.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## **4.10 Parks and Recreational Resources**

### **Summary of Discussion in Draft EA**

- There are no parks or recreational resources in immediate vicinity of Kea'au-Pāhoa Road.

### **Preferred Alternative**

The Preferred Alternative will not create any direct impacts on parks or recreational resources as there are none in the immediate vicinity of Kea'au-Pāhoa Road.

As noted above in **Section 3.10: Parks and Recreational Resources**, Hawai'i County Department of Parks and Recreation has investigated the concept of a park beside Kea'au-Pāhoa Road adjacent to the new Pāhoa Fire Station. The project has not been programmed by the county as part of any long-term plans, and no conceptual design plans have been produced to date. (Personal Communication, Robert Fitzgerald, County of Hawai'i Director of Parks and Recreation, 11/12/09). Several feet of right-of-way would need to be acquired from the County in this area for the Preferred Alternative.

### **Other Alternatives**

None of the other alternatives would affect parks or recreational facilities. Alternative 5 would require several feet of right-of-way from the site described above, identical to the Preferred Alternative.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## 4.11 Agricultural Lands

### Summary of Discussion in Draft EA

- Existing agriculture in the corridor was described in **Section 3.11: Agricultural Lands**.

### Preferred Alternative

**Table 4-15: Right-of-Way Impacts on Parcels with Agricultural Activity Bordering Corridor** provides an overview of the agricultural parcels that have agricultural activity in the immediate proximity of the corridor and could be impacted by the project. The table does not include parcels where agricultural fields, greenhouses, or shade houses are far removed from the roadway and will not be affected.

**Table 4-15: Right-of-Way Impacts on Parcels with Agricultural Activity Bordering Corridor**

Tax Map Key (TMK) Parcel	Total Acres	Acres ALISH	Total Acres Right-of-way Acquired (with Signalized Intersections)			
			TSM Alt. 2	Alt. 3	Preferred Alt.	Alt. 5
W.H. Shipman Ltd. Agricultural Properties Between Keaʻau and Shower Drive						
16001015	989.5	-	0	2.61	2.62	4.77
16003002	38.6	-	0	0.19	0.18	0.33
16004011	1154.1	-	0	1.20	1.78	3.46
16004048	366.3	266.2 Prime	0	0.04	0.02	0.08
16004049	0.7	-	0	0.08	0.08	0.14
16004050	25.2	-	0	0.01	0.01	0.03
16004055	21.3	-	0	0.02	0.14	0.35
16004056	2.1	-	0	0.06	0.06	0.14
Subtotal: Shipman	2597.8	266.2	0	4.21	4.89	9.30
Other Agricultural Properties near Pāhoa						
15007075	5.6	-	0	0.12	0.15	0.15
15116019	15.3	-	0	0	0	0
15006005	15.4	-	0.09	0	0.17	0.17
15006026	6.6	-	0.09	0	0.10	0.10
15005001	10.7	-	0	0	0.06	0.06
15006017	14.5	-	0	0	0	0
Subtotal: Other	68.1	0	0.18	0.12	0.48	0.48
TOTALS	2685.4	266.2	0.18	4.33	5.37	9.78

Note: Does not include non-agricultural properties leased to institutions by W. H. Shipman that border Kea'au-Pāhoa Road, including Kea'au Transfer Station.

Source: SSFM, Inc., County of Hawai'i, Real Property Tax Office, Hawai'i Department of Agriculture

The Preferred Alternative will have a minimal direct impact overall on agricultural land in the study area. Most of the right-of-way that would be necessary for improvements are narrow strips of land along the edge of the highway in the general range of 10 to 20 feet in width, which constitute a minimal percentage of the overall property. Out of a total acreage of 2,669

agricultural acres in parcels bordering Kea'au-Pāhoa Road, the Preferred Alternative is expected to acquire about 5.4 agricultural acres, most of which is vacant property owned by W.H. Shipman; 0.5 acres of other agricultural parcels would be acquired.

As the table demonstrates, there is one parcel, 366.3 acres in size that is owned by W.H. Shipman Ltd. that contains 266.2 acres of Prime Agricultural Land in two units (257.1 acres and 9.1 acres). The parcel is mauka of Kea'au-Pāhoa Road, north of Shower Drive/Pōhaku Drive. The Preferred Alternative would affect a miniscule portion of this parcel, 0.02 acres. It is not clear if the limits of the Prime Farmland extends fully to the edge of Kea'au Pāhoa Road

Because this project is a federal project, as part of the pre-assessment consultation for this project, the Natural Resources Conservation Service (NRCS) requested a Farmland Conversion Impact Rating form (form AD-1006) to be completed if farmlands would be converted to non-farmland uses. This form is required as part of the Farmland Protection Policy Act and was included as part of the Draft EA. Subsequent correspondence with NRCS requested a different form be submitted instead, form CPA-106. This form is included in **Appendix N: Farmland Conversion Impact Rating Form**. Consultation will continue with NRCS.

During the Cultural Impact Assessment process (see **Section 4.9.3: Cultural Practices**), the management of W.H. Shipman, the largest landowner in the project area, raised concerns that access changes and the roadway design could compromise the ability of agricultural machinery to access fields easily. They requested that access points to their agricultural areas remain open. There are two gated driveways to the Shipman properties on the mauka side of the highway between Shower Drive and the Kea'au Bypass, and one gated driveway on the makai side. HDOT will work with W. H. Shipman and other agricultural property owners to ensure that changes in roadway access do not compromise agricultural operations.

### **Other Alternatives**

The No-Build will not have any impact on agricultural property.

The TSM Alternative will have a negligible impact on agricultural operations in the corridor, limited to two parcels, in close proximity to Nanawale Homestead Road (Post Office Road), with acquisitions of less than 0.1 acre each for adding turn lanes in the area. The TSM Alternative does not affect any Agricultural Lands of Importance to the State of Hawai'i (ALISH).

Alternative 3 is expected to acquire 4.3 agricultural acres, and Alternative 5 is expected to acquire about 9.8 agricultural acres.

### **New Issues or Clarification of Issues for Final EA**

As noted above, a different NRCS form has been included in the Final EA from that provided in the Draft EA as NRCS revised their request for documentation. This form is included in **Appendix N: Farmland Conversion Impact Rating Form**.

The table in the Draft EA corresponding to **Table 4-15: Right-of-Way Impacts on Parcels with Agricultural Activity Bordering Corridor** and corresponding text above has been modified to

reflect the fact that a roundabout is not proposed at Post Office Road; this was evaluated as a possibility in the Draft EA.

## 4.12 Visual Environment

### Summary of Discussion in Draft EA

- The project corridor is already affected by the existing roadway and by the highly developed nature of much of the adjoining land use.
- The discussion in **Chapter 2: Alternatives** describes the widening in greater detail, and provides illustrations of the widened cross-sections. In general, the wider the highway will be, the more vegetation will be removed, and the more of the visual environment will be devoted to a highway use. The two-lane cross-sections will have vegetated grass swales in some areas to treat drainage, whereas drainage under the four-lane and six-lane sections will be more likely to be handled with underground collection, and the amount of vegetated area will generally be less.

### Preferred Alternative

The Preferred Alternative will widen the highway from the current two lanes to four lanes for the entire corridor between the Kea'au Bypass and Pāhoa-Kapoho Road. Drainage will be treated with underground collection, and the amount of vegetated area will generally be less than exists today.

The Preferred Alternative will not block scenic vistas or viewplanes. The project has followed a Context Sensitive Solutions (CSS) process in order to involve the community in the planning for the project to ensure a facility that is appropriate for the context of the lower Puna District. Landscaping and design decisions in final design will strive for a facility that is complementary to the adjoining properties and community at large.

Roundabouts at Ainaloa Boulevard, Old Pāhoa Road, and Kahakai Boulevard will provide landscaping and aesthetic opportunities in the middle of the roundabout.

A landscaping plan will be created as part of the final design effort for this project. Emphasis will be placed on the usage of native species wherever possible and avoiding invasive species.

Light pollution can be a concern with street lighting. Streetlights should be shielded to comply with the Hawaii County Code § 14 - 50 et seq. which requires the shielding of exterior lights so as to lower the ambient glare caused by unshielded lighting to astronomical observatories.

There will be some visual effects from widening and in some cases, paving, local subdivision roads to county standards for access management. New roads that do not exist today will be a more pronounced visual impact.

## **Other Alternatives**

The No-Build Alternative would not change the visual landscape, although increasing delay and congestion will have an effect on the appearance of the corridor.

The TSM Alternative would visually have a reduced effect within the Kea'au-Pāhoa corridor compared to the Preferred Alternative. Improvements would be very localized to intersection areas. The effects from roundabouts and access management roads would be comparable to that of the Preferred Alternative.

Alternative 3 would widen the highway from two lanes to four lanes between the Kea'au Bypass and Ainaloa Boulevard. The remainder would remain two lanes wide, a lesser visual impact compared to the Preferred Alternative. The two-lane cross-section would have vegetated grass swales in some areas to treat drainage; four lane sections would be identical to the Preferred Alternative. No scenic viewplanes would be blocked. The effects from roundabouts and access management roads would be comparable to that of the Preferred Alternative.

Alternative 5 would widen the highway from the current two lanes to six lanes from the Kea'au Bypass to Paradise Drive. It would be widened to four lanes between Paradise Drive and Kahakai Boulevard. The remainder would remain two lanes wide. The six-lane cross-section would be visually the most notable change and a more prominent visual impact than the Preferred Alternative. The four- and two-lane segments would be comparable to the other Build Alternatives. No scenic viewplanes would be blocked. The effects from roundabouts and access management roads would be comparable to that of the Preferred Alternative.

## **New Issues or Clarification of Issues for Final EA**

Text has been added to this discussion to take into account the effects of the access management roadways. The locations of proposed roundabouts are now identified in this discussion.

## **4.13 Utilities**

### **4.13.1 Electrical**

#### **Summary of Discussion in Draft EA**

- The project will require relocation of utility poles to accommodate the additional travel lanes, shoulder areas, and pedestrian accommodations. New poles will be relocated approximately 10 to 30 feet from their existing locations toward the property line, and placed approximately one to two feet from the property line and within the highway right-of-way. All conductors and fixtures such as insulators and cross-arms will be placed on the highway side of the pole. No conductors will cross over private property. Easements to install pole anchors on private property may be required at selected locations where the highway curves.

- The relocation of utility poles will require a utility agreement (UA) between the regulated utility companies (HELCO, Hawaiian Telcom, and Oceanic Time Warner Cable) and the HDOT. Typically all relocations will be one-for-one (replace one utility pole with a similar utility pole at the new location). The UA will provide for cost-sharing for these relocations. The Public Utilities Commission would have oversight of this process.
- The relocation of individual free-standing metal street light poles will be determined in final design.
- Relocating only the HELCO lines to an underground conduit would cost between an estimated \$65 million and \$80 million. Relocating Hawaiian Telcom and Oceanic Time Warner cables underground would add to these costs. Thus, the prospect of moving utilities underground was not pursued further.

### **Preferred Alternative**

The Preferred Alternative would require 245 utility poles to be relocated - 4.6 miles of poles on the mauka side and 4.2 miles on makai side. The cost is estimated between \$7 million and \$10 million in 2009 dollars depending on materials (wood versus metal). There may be some minor relocation of utilities within subdivisions where access management roads are constructed.

To mitigate the effects of relocation of utilities and inconvenience the fewest people, the construction process closes off one side of the highway at a time so that new infrastructure could be built. Traffic control measures could require temporary signals or flagmen. There could be periodic disruption of service as lines and services are switched to new utility poles.

### **Other Alternatives**

The No-Build Alternative would not require relocations of any utilities.

Utility relocations for the TSM Alternative would be very limited given the limited construction and primarily focus on intersection areas.

Alternative 3 would require 219 utility poles to be relocated - 4.2 miles of poles on both sides of the highway. The cost is estimated between \$6 million and \$9 million in 2009 dollars. Alternative 5 would relocate the same poles as the Preferred Alternative for the same cost.

The TSM Alternative, Alternative 3, and Alternative 5 all could entail some minor relocation of utilities within subdivisions where access management roads are constructed.

### **New Issues or Clarification of Issues for Final EA**

Text has been added to this discussion to take into account the effects of the access management roadways. Costs of relocating utilities in these areas will be determined in final design.

## 4.13.2 Telecommunication

### Summary of Discussion in Draft EA

- Hawaiian Telcom and Oceanic Time Warner Cable lines share poles with HELCO, and impacts of the five Alternatives on Hawaiian Telcom and Time Warner Cable are covered in the discussion of HELCO's poles for **Section 4.13.1: Electrical**.
- As noted above in **Section 3.13.2: Telecommunications**, Sandwich Isles Communications (SIC) is currently in its final design phase for construction of a 9.38-mile fiber-optic line in an underground conduit that will extend between Highway 11 in Kea'au and the Department of Hawaiian Home Lands (DHHL) property at the Maku'u Farmers Market.

### Preferred Alternative

It is unclear at this time if there would be any direct impact on this future fiber optic line. SIC will have a full agreement with HDOT regarding SIC's responsibility for relocating the line if HDOT needs the easement area.

### Other Alternatives

The No-Build Alternative would not impact this future infrastructure. The TSM Alternative would have no or negligible impact given its limited construction effects. Impacts under Alternatives 3 and 5 are unclear, as with the Preferred Alternative.

### New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

## 4.13.3 Water Service

### Summary of Discussion in Draft EA

- Existing water lines under the highway are not slated to be relocated, as the additional costs to abandon the existing waterlines and construct new waterlines outside of the roadway prism would not provide significant benefit to the project.
- The County Department of Water Supply (DWS) may require single-lane road closures during maintenance. During these periods, traffic would be diverted to the adjacent lane or shoulder to allow for safe and controlled access to the underground infrastructure.
- Construction above the existing water lines will require care to avoid damage to the lines. The precise depths of all waterlines are not known but will be confirmed during final design. The depth appears to be in the range of 2.5 feet to 3 feet below the road surface based on current information. Current HDOT standards require a minimum of 3 feet of cover above buried utilities, and a horizontal separation of 5 feet from the edge of pavement.

- The project will not create demand for potable water. HDOT will coordinate with DWS to ensure that the water infrastructure is not adversely impacted and the service is not interrupted. Thus, the project will not have an adverse effect on demand.
- The fire hydrant and water meter relocation work will require a Utility Agreement between the DWS and the HDOT. Under the Utility Agreement, HDOT will fund the costs related to the relocation work.

### **Preferred Alternative**

Under the Preferred Alternative, the 12-inch makai-side waterline along 4.4 miles of Kea'au-Pāhoa Road between Shower Drive and Ka Ohuwalu Drive will ultimately be situated largely within the Kea'au-bound driving lanes, as shown in the figures in **Appendix A: Roadway Design Plans**.

The existing 12-inch makai-side and mauka-side waterlines for the 1.2-mile distance from Kaluahine Street to Old Pāhoa Road are also located within the existing shoulder areas of Kea'au-Pāhoa Road. Under Preferred Alternative 4 as well as the other Build Alternatives 3 and 5, these waterlines will both ultimately be situated within the driving lanes of the new roadway.

Under the Preferred Alternative, proposed road elevations will closely match the existing roadway elevation, and as such the depth of the existing waterline will not change more than negligible amounts.

Existing fire hydrants and residential water meters along the corridor will require removal and relocation under the Preferred Alternative to increase the horizontal separation from the roadway. Service interruptions will be minimal and can generally be scheduled to minimize impacts on the existing users. The Hawai'i County Fire Department would also be notified when there are interruptions.

There is no DWS infrastructure along the access management roadway improvement routes.

### **Other Alternatives**

The No-Build Alternative would not create any impacts on DWS water lines.

The TSM Alternative may have minor localized effects on water utility infrastructure in the immediate location of TSM improvements at intersections as widening for turn lanes will result in short segments of the water lines ending up located under travel lanes of the roadway. The majority of the water lines over the entire project corridor will not be affected. Hydrants may need relocation in the immediate proximity of intersections.

Alternatives 3 and 5 would have identical effects on water lines as noted for the Preferred Alternative. Hydrants will need to be relocated in segments widened to four or six lanes or where turn lanes widen the overall width of the road.

#### **New Issues or Clarification of Issues for Final EA**

A comment was received from the public raising concerns about keeping water mains below the roadway areas. The mains are being maintained under the roadway because of the high cost of relocating them, and maintenance of mains under roadway facilities is standard engineering practice throughout the United States.

### **4.13.4 Wastewater Services**

#### **Summary of Discussion in Draft EA**

- There are no County of Hawai'i wastewater facilities within the project limits.
- The project will not require wastewater services from the County of Hawai'i. Therefore, the Kea'au-Pāhoa Road Improvement project will not have an adverse affect on the County's wastewater system.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## **4.14 Hazardous Materials**

#### **Summary of Discussion in Draft EA**

- There is a very low likelihood of contamination in the immediate vicinity of the corridor.

#### **Preferred Alternative**

Under the Preferred Alternative, there is minimal likelihood of hazardous materials being of concern. However, if hazardous materials are discovered during construction, standard procedures will be followed to prevent exposure to workers and to alert authorities for emergency response as needed.

#### **Other Alternatives**

The No-Build Alternative would be expected to have no effect on contaminated properties, and the TSM Alternative is expected to have a negligible effect.

Alternatives 3 and 5 would have a comparable likelihood of hazardous material concern to the Preferred Alternative.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## 4.15 Right-of-Way, Relocations, and Access Changes

### Overview

There are several types of land use impacts on adjoining properties that can result from highway improvement projects, discussed in the sections that follow. Projects could create a partial acquisition impact (strip of property needed near the edge of the highway) or in some cases require full acquisition of the property (which would entail relocating the residents or business on the property). There can also be effects on properties from changes in access, especially for those parcels that currently front onto the highway.

It is very important to note that design on this project is at a very preliminary level. All estimates of right-of-way acquisitions and relocations are subject to change with further refinement of the design during the final design process. Changes in access from closure of streets, modification of access management measures, etc. are also subject to change.

Impacts on utilities that will require relocation are discussed in **Section 4.13: Utilities**.

### 4.15.1 Right-of-Way Acquisitions for Kea'au-Pāhoa Road

#### Summary of Discussion in Draft EA

- The anticipated right-of-way impacts from widening Kea'au-Pāhoa Road are described in **Table 4-16: Estimated Right-of-Way Acquisitions on Kea'au-Pāhoa Road Under Project Alternatives**, and elaborated in the text that follows. Impacts from access management measures are discussed below in **Section 4.15.3: Right-of-Way Acquisitions From Access Management**

**Table 4-16: Estimated Right-of-Way Acquisitions on Kea'au-Pāhoa Road Under Project Alternatives**

Alternative	Parcels Affected	Acreage Acquired
No-Build	0	0
<b>Preferred Alternative: 4 Lanes Entire Corridor</b>	329	24.6
TSM Alternative	36	0.9
Alt. 3 : 4 Lanes Kea'au - Ainaloa, 2 Lanes S. of Ainaloa	287	18.1
Alt. 5: 6 Lanes Kea'au - Paradise, 4 Lanes Paradise - Kahakai, 2 Lanes S. of Kahakai	362	39.7

Source: SSFM International, Inc.

#### Preferred Alternative

The Preferred Alternative would widen the highway to contain a four-lane divided cross section for the entire distance between the Kea'au Bypass and Pāhoa-Kapoho Road and require the acquisition of 24.6 total acres of property from 329 parcels. The Preferred Alternative would not require the total acquisition of any properties or relocation of any residents for Kea'au-Pāhoa Road itself.

Most of the right-of-way needed for this project from adjoining properties will be partial acquisition of strips of property on the general order of 10 to 20 feet in width immediately abutting Kea'au-Pāhoa Road. Most of this acquisition will be permanently needed for highway right-of-way, though there is a possibility that property could be turned back to property owners or other interests if not needed after completion of the project. It is also possible that easements could be acquired for construction purposes from owners.

The permanent Best Management Practices (BMP) facilities have been designed as linear infiltration facilities intended to fit entirely within the highway right-of-way limits. No additional right-of-way is anticipated beyond the highway corridor extents, to accommodate the BMP facilities. Construction and maintenance activities can be completed from within the defined right-of-way limits. Temporary construction easements may be required in some locations to accommodate initial construction, depending upon the final depth and local topography.

### **Other Alternatives**

The No-Build Alternative will not require the acquisition of any property from any adjoining parcels.

The TSM alternative would primarily acquire right of way near intersections, where minor widening would accommodate new or lengthened turn lanes and bus pullouts. TSM would require the estimated acquisition of 0.9 acres from 36 parcels, none of which would be total acquisition or relocate residents.

Alternative 3 would widen the highway to a four-lane divided cross section from the Kea'au Bypass to Ainaloa Boulevard and would require the estimated acquisition of 18.1 acres of property from 287 parcels. Alternative 3 would not require the total acquisition of any properties or relocation of any residents.

Alternative 5 would widen the highway to six lanes from the Kea'au Bypass to Paradise Drive and contain four lanes from Paradise Drive to Kahakai Boulevard. Alternative 5 would require estimated acquisition of 39.7 total acres of property from 362 parcels. Alternative 5 would not require the total acquisition of any properties or relocation of any residents.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

## **4.15.2 Right-of-Way Acquisitions for Roundabouts**

### **Summary of Discussion in Draft EA**

- Roundabouts would generally require the acquisition of additional property not counted above. At the time the Draft EA was written, roundabouts were considered at six locations, and collectively would have required an estimated 1.78 acres from 55 parcels (some of

which has already been counted above in **Section 4.15.1: Right-of-Way Acquisitions for Kea'au-Pāhoa Road**).

### **Preferred Alternative**

The Preferred Alternative will construct roundabouts at Kahakai Boulevard, Old Pāhoa Road, and Ainaloa Boulevard. Approximately 0.07 acre of additional property in one parcel not counted above is estimated to be needed for the Kahakai Boulevard roundabout. Approximately 0.07 acre of additional property in three parcels not counted above is estimated to be needed for the Ainaloa Boulevard roundabout. The Old Pāhoa Roundabout's acquisitions have already been accounted in in **Section 4.15.1: Right-of-Way Acquisitions for Kea'au-Pāhoa Road**.

### **Other Alternatives**

The No-Build Alternative will not construct any roundabouts. The TSM Alternative and Alternatives 3 and 5 would require an identical acreage for roundabouts to the Preferred Alternative.

### **New Issues or Clarification of Issues for Final EA**

As noted above, it is now known that the Preferred Alternative includes three roundabouts.

## **4.15.3 Right-of-Way Acquisitions From Access Management**

### **Summary of Discussion in Draft EA**

- The Draft EA provided a preliminary estimate of right-of-way acquisition for access management measures in subdivisions that border on Kea'au-Pāhoa Road. At the time that the Draft EA was written, these measures could have been included in any alternative but most discussion focused on these measures as being part of the TSM Alternative. **Section 2.2.2: Access Control Under the Preferred Alternative** provides a detailed description.
- Provision of these new roads or improvements to existing roads would require right-of-way acquisition. All roads, either new or existing, would need to be upgraded to current Hawai'i County Standards.

### **New Issues or Clarification of Issues for Final EA**

At the time of the Draft EA, it was assumed that the access management measures would include an extension of Paradise Drive to 34<sup>th</sup> Avenue, mauka of Kea'au-Pāhoa Road. This measure is no longer included. Instead, Paradise Drive will be converted to a right-in access only. Traffic that now uses Paradise Drive will instead use an upgraded Uhaloa Avenue (32<sup>nd</sup> Avenue) and an extension of Orchidland Drive makai of Kea'au-Pāhoa Road.

With the elimination of an extension of Paradise Drive, a relocation of one house along that proposed roadway no longer is necessary.

The calculations that follow reflect the changes above.

### Preferred Alternative

**Table 4-17: Right of Way Acquisition and Relocations Associated With Access Management Concepts** provides an overview of the impacts of new or improved roadways. As the table demonstrates, there could be as many as 145 parcels affected by these access management concepts, and up to 5.48 acres of property needed for roadway use.

**Table 4-17: Right of Way Acquisition and Relocations Associated With Access Management Concepts**

Access Management Concept	Hawai'i County Standard		Number of Parcels Affected	Total Acres Acquired in New Road Right of Way	Number of Relocations
	Road Designation	Right of Way Width (ft.)			
Pōhaku Circle	Minor Street	50	38	0.58	-
Kaloli Drive Extension	Collector	60	2	0.83	-
Cul-de-sac on Uala Ave (31st Ave.) at Kaloli Drive	n/a	n/a	1	0.13	-
Uala Ave (31st Ave.) to Puakalo Ave (30th Ave.)	Minor Street	50	2	0.75	-
Orchidland Drive Extension	Collector	60	2	0.43	-
Uhaloa Avenue (between Orchidland Drive extension and Paradise Drive)	Minor Street	60	22	0.32	-
34th Ave improvements from Auli'i Street to Ilima Street	Minor Street	50	74	0.95	-
Maku'u Drive Extension	Collector	60	3	1.36	-
Cul-de-sac on Ilima St at Kea'au -Pāhoa Road	n/a	n/a	1	0.13	-
Totals			145	5.48	0

Source: SSFM International, Inc.

## 4.15.4 Relocations

### Summary of Discussion in Draft EA

- Relocations of properties required by project alternatives were considered in the Draft EA.

### New Issues or Clarification of Issues for Final EA

The access management concept at the time of the Draft EA assumed that a new roadway would be extended from Paradise Drive to 34<sup>th</sup> Avenue. This would have required the acquisition of a house. This roadway is no longer considered part of the access management concept.

### **Preferred Alternative**

At the current level of design, widening Kea'au-Pāhoa Road to four lanes and provision of access management roads is not expected to require any relocations of homes or businesses under the Preferred Alternative. Property to be acquired will generally be limited to partial acquisitions of narrow strips of property immediately next to the highway or local subdivision roads.

In the event that relocations of businesses or homes are necessary, mitigation will be made through relocation assistance as described below in **Section 4.15.5: Mitigation of Right-of-Way Acquisition Impacts**.

### **Other Alternatives**

None of the other alternatives would require any relocations.

## **4.15.5 Mitigation of Right-of-Way Acquisition Impacts**

### **Overview**

As part of the right-of-way acquisition process, HDOT will identify those properties under the Preferred Alternative that will require right-of-way acquisition of land or relocations of occupants with low incomes. The acquisition of dwellings and businesses or portions of property will need to be conducted according to the HDOT Right-of Way Procedure Manual to ensure equitable treatment of all businesses and persons.

Where property acquisition or relocations would occur, compensation will be provided to affected property owners, businesses, or residents in compliance with all applicable Federal and State laws and would follow the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (as amended by the Uniform Relocation Act of 1987), at 49 CFR 24.

HDOT will pay fair and just compensation for fee purchase or easement use of property required for transportation purposes. "Just compensation," as defined by the courts, is the payment of "fair market value" for the property rights acquired plus allowable damages to any remaining property. "Fair market value" is defined as the highest price estimated, in terms of money, the property would bring if offered for sale on the open market by a willing seller, with a reasonable time allowed to find a purchaser, buying with the knowledge of all the uses to which it is adapted and for which it is capable of being used.

Resources will be made available without discrimination to all property owners or tenants who are relocated. Under the requirements of the Uniform Act no relocations can occur until it is shown that comparable housing is available in the area for relocation purposes. Replacement housing and business locations must be similar both in type and price range.

Relocation advisory services and/or a relocation plan may be necessary in later phases of this project. Every effort will be made, through relocation assistance, to reduce the impact if and when it occurs. HDOT is required to determine the availability of comparable, decent, safe and sanitary housing for eligible displaced individuals and businesses. Appropriate measures will be

taken to ensure that all eligible displaced individuals and businesses are advised of the rights and benefits available and course of action open to them.

At the present time, the housing market in East Hawai'i has ample available replacement housing in the region.

#### **4.15.6 Private Use of Public Right-of-Way**

##### **Overview**

Over the years, some landowners may have established private uses within the State right-of-way such as plantings or other property improvements. Implementation of the Preferred Alternative would require termination of private uses. The level of this impact depends on the property location.

#### **4.15.7 Changes to Property Access**

##### **Summary of Discussion in Draft EA**

- The Draft EA calculated the numbers of properties that would be affected by access changes. The estimated numbers were identical under all Build Alternatives

##### **Preferred Alternative**

Under the Preferred Alternative 4, in addition to the direct impacts caused by property acquisition and relocation, a number of properties may be affected indirectly by changes to their property access. As described above in discussions on access control in **Chapter 2: Alternatives**, travelers along the project corridor may need to change their traveling patterns. In areas with raised median barriers, access to driveways or minor cross-roads will generally be limited to right-in, right-out access. This would require a U-turn at controlled points if one wanted to make a movement that now is handled by a left turn.

**Table 4-18: Estimated Changes to Driveway Access with Build Alternatives** estimates the numbers of driveways that will lose left-turn access with a change to right-in-right-out access based on the current design. The Preferred Alternative will affect 152 parcels in this fashion. The 152 parcels are served by 133 individual driveways.

Access changes may be modified further in final design. For affected properties that front onto both Kea'au-Pāhoa Road and a cross-street that has full access, it may be possible to mitigate these access-change impacts by reconfiguring the property so that access is provided off the cross-street.

Mitigation measures related to changes in travel patterns may require personal notifications and community education. Despite long term benefits, some motorists may be challenged to accept changes to personal routines. Some people indicated in the Social Impact Assessment that they already avoid left hand turns by traveling to a nearby street. Therefore, changing behaviors may not be a problem for some motorists.

**Table 4-18: Estimated Changes to Driveway Access with Build Alternatives**

Segment of Road	Preferred Alternative	
	Parcels Affected	Driveways Affected
Merge Area to Shower Dr./Pōhaku Dr.	13	6
Shower Dr./Pōhaku Dr. to Pōhaku Pl.	16	15
Pōhaku Pl. to Kaloli Dr.	11	7
Kaloli Dr. to Pōhaku Cir.	7	5
Pōhaku Cir. to Orchidland Dr.	23	23
Orchidland Dr. to Paradise Dr.	10	9
Paradise Dr. to Auli'i St.	15	15
Auli'i St. to Maku'u Dr.	21	19
Maku'u Dr. to Ainaloa Blvd.	5	5
Ainaloa Blvd. to Kaluahine/Niaulani St.	11	11
Kaluahine/Niaulani St. to Old Pāhoa Rd.	20	18
Old Pāhoa Rd. to Kahakai Boulevard	0	0
Kahakai Boulevard to Kapoho Rd.	0	0
<b>Total Affected Properties</b>	<b>152</b>	<b>133</b>

Source: SSFM International, Inc.

### Other Alternatives

The No-Build Alternative will not change any driveway accesses, though it will permit left turns to continue indefinitely, raising safety concerns. TSM will not have any access limitations with the exception of properties very close to intersections where channelization will limit turns.

As explained in detail in the Draft EA, Alternatives 3 and 5 will affect a identical number of properties to the Preferred Alternative.

### New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

## 4.16 Construction Impacts

### Summary of Discussion in Draft EA

In addition to the long-term impacts that will be created after improvements to Kea'au-Pāhoa Road are completed and the highway is opened for operation, there are also specific impacts that will result during the construction phase of the project. This section addresses these temporary short-term impacts, which are different in magnitude, intensity and timing than permanent post-construction impacts.

### **Preferred Alternative**

The discussions that follow focus on the construction impacts of the Preferred Alternative. In addition to compliance with State and County regulations, HDOT will implement a construction program that includes limited night work, adequate notification for properties adjacent to or impacted by construction activities, and a construction hotline and other contact information for easy access to HDOT and construction personnel.

### **Other Alternatives**

In general, the No-Build Alternative would not produce any construction impacts as no construction would be performed.

The TSM Alternative would result in minor construction impacts at localized areas along Kea'au-Pāhoa Road.

Preferred Alternative 4 as well as Alternatives 3 and 5 will result in higher levels of disturbance from construction. While the discussion below focuses on mitigating impacts of the Preferred Alternative, the discussions also would be applicable to Alternatives 3 and 5, and generally to the TSM Alternative as well.

## **4.16.1 Construction-Related Air Quality**

Temporary construction activities from the Preferred Alternative, would result in air quality impacts from several sources. Fugitive dust emissions may result from removal of vegetation in the project corridor. While high rainfall levels in the area would generally control construction dust, during prolonged dry periods, it is possible that dust emissions could become a problem without mitigative measures. A dust control plan would be developed and implemented to minimize fugitive dust as part of the Special Contract Requirements, to be approved by the State Department of Health. The plan would include some or all of the following measures:

- Watering of active work areas
- Screening piles of materials from wind if appropriate
- Cleaning nearby paved roads affected by construction
- Covering open trucks carrying construction materials
- Limiting areas to be disturbed at any given time
- Mulching or chemically stabilizing inactive areas that have been disturbed
- Paving and landscaping areas as soon as practical in the construction schedule

Heavy construction equipment will produce emissions. Contractors will be required to maintain equipment with required emissions controls.

Traffic delays could result from construction activity, and these delays could produce emissions from idling vehicles. Efforts will be made to control what activities happen during traffic peak hours to minimize disruption to traffic.

### 4.16.2 Construction Noise

Temporary construction activities from the Preferred Alternative will involve the use of equipment that results in high noise levels adjacent to construction sites. **Section 4.5.3: Construction Noise Impacts and Mitigation** provides an extensive discussion of the noise generated by construction equipment and specific mitigative measures that will be employed.

Special Contract Requirements will require contractors to obtain a community noise permit and/or variance from the State Department of Health in conformance with Chapter 11-46 of Hawai'i Administrative Rules (Community Noise Control). As part of the permitting process, the Department of Health will review the construction activities, and impose conditions and mitigative measures, which could include restrictions on the types of equipment used, maintenance requirements, hours of construction, and portable noise barriers.

### 4.16.3 Construction Impacts on Surface Waters

Temporary construction activities from Preferred Alternative, if not mitigated, would result in impacts to intermittent waterways. Removal of the abandoned bridge upstream of the Waipāhoehoe Bridge will pose addition potential for impact.

During construction, temporary degradation of water quality in intermittent waterways is possible due to sedimentation from disturbance to banks of waterways and increased sediment in storm water runoff. These disturbed areas may also cause an increase in suspended solids and nutrient loading from exposed areas. Construction activities may also introduce pollutants such as oil and grease from construction equipment.

Compliance with the Hawai'i County Code, Chapter 10 - Erosion and Sedimentation Control, and the Department of Public Works (DPW) Storm Drainage Standards will be required to control erosion and sedimentation. Furthermore, a National Pollutant Discharge Elimination System (NPDES) permit will be required from the state Department of Health because the project will disturb an area greater than an acre in size.

Special Contract Requirements will implement temporary and permanent Best Management Practices (BMPs) in a stormwater pollution prevention plan to mitigate any impacts to water quality from construction activities. BMPs would include such measures as:

- Timing construction activities such as grading or culvert installation to periods of lesser rainfall
- Limiting area of disturbance at any given time to reduce potential erosion
- Constructing temporary drainage features to divert runoff from areas susceptible to erosion
- Utilizing protective materials such as mulch or geotextiles to minimize erosion and revegetating areas as soon as possible to minimize the amount of time soils are exposed
- Using sedimentation basins and silt fencing to collect sediment before it runs off to drainage structures or streams

#### **4.16.4 Construction Impacts on Vegetation**

Temporary construction activities from the Preferred Alternative will result in the removal of vegetation. Vegetation affected will include both landscaping present within the existing highway right-of-way, landscaped areas within what are now private parcels, and areas of native and non-native vegetation of varying levels of disturbance.

To minimize the effects of fugitive dust and erosion, areas disturbed from removal of vegetation would be revegetated as soon as feasible. Furthermore, a landscaping plan for the project will propose the composition of vegetation to be planted. An emphasis will be made on using vegetation native to Hawai'i and minimizing the potential for invasive species to establish themselves in the corridor.

#### **4.16.5 Construction Impacts on Traffic and Property Access**

Temporary construction impacts from the Preferred Alternative will result in temporary effects on traffic and property access in the corridor. Impacts could be expected from several sources:

- Traffic delays from travel within a construction zone, which will result in reduced speeds, lane closures, potential safety concerns, and temporary realignment of travel lanes
- Potential detours
- Temporary access changes or periods of access closure to individual properties

HDOT will implement a construction information program that includes a public notification effort for both individual properties and the general community to disseminate information on construction activities. A construction hotline and other contact information will be provided for easy access to HDOT and construction personnel. These efforts will hopefully minimize the adverse effects described above by giving travelers options for avoiding delays in construction zones.

Detours will be avoided to the greatest degree possible, to minimize inconvenience to travelers, and to avoid off-site impacts to properties along a detour route. In the unlikely event that detours are warranted, they will be used for as short a period as possible, and preferably during non-peak hours to minimize the number of people inconvenienced. Dissemination of information in advance on detours will be important to minimize the adverse effects of the detour on the community.

Where needed, flagmen or other traffic-direction measures may be used to improve progression of traffic during construction zones.

Access closures will be addressed through consultation with affected properties. Where necessary, especially for businesses that are affected, signage may need to be provided to direct customers to their destinations.

#### **4.16.6 Construction Impacts on Bicycles, Pedestrians, and Transit**

Temporary construction impacts from the Preferred Alternative will result in effects on the corridor that could affect bicycles, pedestrians, and transit in the area. While Kea'au-Pāhoa Road poses safety concerns during regular conditions to these users of the corridor, safety for pedestrians, bicycles, and transit vehicles in construction zones will be of even greater importance.

For bicycles and pedestrians, HDOT will implement a construction information program that includes a public notification effort to disseminate information on construction activities and safety in construction zones. A construction hotline and other contact information will be provided for easy access to HDOT and construction personnel.

Information on detours will be disseminated to the greatest degree possible.

HDOT will coordinate closely with the County of Hawai'i's Mass Transit Agency to ensure that operators of the Hele-On system are aware of the status of construction. The two agencies will work together to ensure that impacts on transit operations and inconvenience to passengers are minimized to the greatest degree possible.

#### **4.16.7 Construction Impacts on Utilities**

Temporary construction activities from the Preferred Alternative could result in effects on utility service in the corridor. As discussed in greater detail in **Section 4.13: Utilities**, efforts will be made to relocate utilities in such a fashion that there is no break in service. Specifically, new lines to serve an area would be constructed before removal of existing lines.

Nonetheless, there may be the need for temporary breaks in utility service to specific properties as a result of construction activities. All affected utility companies would be contacted and proper coordination would ensure minimum disturbance to system users.

#### **4.16.8 Construction Impacts from Hazardous Materials**

Temporary construction activities from the Preferred Alternative could result in the possibility of encountering contamination from unknown sites.

If contamination were encountered during construction, mitigation and disposal of any hazardous material would take place according to state and federal guidelines.

#### **4.16.9 Construction Impacts on Cultural Resources**

Temporary construction activities from the Preferred Alternative could result in the possibility of encountering archaeological resources. A Memorandum of Agreement (MOA) regarding mitigation of impacts to cultural resources would be signed by HDOT and the State Historic Preservation Division (SHPD) prior to project construction. If any cultural resources are encountered during construction, construction would immediately cease, and materials would be evaluated in accordance with 36 CFR 800.13.

As described in greater detail in **Section 4.9.1: Archaeological Resources**, SHPD will review an archaeological monitoring plan that will facilitate the identification and proper treatment of any burials or other archaeological resources that might be discovered during project construction. Information will be gathered on non-burial archaeological deposits, should any be discovered. Archaeological monitoring will potentially prevent accidental damage to resources in lava tubes. Monitoring of construction activities will also prevent access or damage to the ancient trails system that abuts the corridor. Further, on-site monitors will be able to point out archaeological features and trails alongside the roadway from areas of low visibility during the archaeological survey, or in areas of increased visibility due to vegetation clearance during the construction phase.

Data recovery on the abandoned 1930s era bridge upstream of the Waipahoehoe Bridge will have taken place prior to construction as a result of the Shoulders Improvement Project.

While the site is outside of the Area of Potential Effect, the erection of continuous, orange-web "event fencing" or some similar barrier is recommended prior to any project related work within 50 feet of the Sacred Heart Catholic Church property. This interim protection could be carried out and documented under monitoring archaeologist supervision.

#### **4.16.10 Construction Impacts on Lava Tubes**

Lava tubes underlie much of the project corridor and while several prominent ones are documented such as Kazumura Cave and Pāhoa Cave, there is potential for construction resulting in the opening or discovery of lava tubes that have not been identified to date. The depth to these lava tubes below the existing terrain generally has not been established.

In the event of a lava tube being breached, construction would immediately stop to avoid further damage to the resource. Federal and state authorities would be contacted as appropriate, and geological investigations would be conducted to determine if the road could continue to be constructed as planned, or if structural modifications would be necessary. Archaeological monitoring described in **Section 4.16.9: Construction Impacts on Cultural Resources** will potentially prevent accidental damage to the Kazumura Cave system and its associated features and burials.

#### **4.16.11 Economic Effects of Construction**

Temporary construction activities from the Preferred Alternative will have economic effects.

The primary beneficial economic effect of construction will come from temporary income and employment from construction. These effects in turn would be magnified by additional revenues to the government in the form of sales and income taxes, permits, and other fees.

A temporary adverse effect of construction on the local economy could result if businesses are affected by persons avoiding the construction area. This is likely a minor impact given the lack of alternate routes to Kea'au-Pāhoa Road. Businesses that are a destination business such as a specialty store will likely be less adversely affected than businesses that serve impulse purchases such as a convenience store/gas station.

Changes in access to businesses could be mitigated by temporary signage or other measures to improve motorist recognition.

## **4.17 Laws, Permits, Orders and Approvals**

Compliance with a number of federal, state, and county laws, permits, approvals, and executive orders are anticipated for this project. In a number of cases, they have been described elsewhere in this document. They are summarized below. The Draft EA should be consulted for more detailed information.

### **4.17.1 Federal**

#### **4.17.1.1 National Environmental Policy Act (NEPA) of 1970**

This Environmental Assessment has been prepared under the requirements of the National Environmental Policy Act (NEPA) of 1970 (23 CFR 771 and 40 CFR 1500). Preparation of this EA has taken place in accordance with the USDOT Technical Advisory 6640.8A, Guidance for Preparing and Processing Environmental and Section 4(f) Documents, dated 30 October 1987 to ensure compliance with these pieces of legislation.

#### **4.17.1.2 US Department of Transportation Act of 1966**

Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966 (49 USC 303) protects publicly owned parks, recreation areas, wildlife and wildfowl refuges, and historic sites of local, state, or national significance from conversion to transportation uses. Refer to **Chapter 5: Section 4(f) Evaluation**.

#### **4.17.1.3 Section 6(f) of the Land and Water Conservation Fund Act of 1965**

Section 6(f) of the Land and Water Conservation Fund Act (16 USC 4601-4 et seq.) requires impacts on recreational facilities funded under the Land and Water Conservation Fund (LWCF) to be avoided and fully compensated in-kind if impacts are unavoidable (36 CFR 59). There are no properties regulated under Section 6(f) in the study area.

#### **4.17.1.4 Uniform Relocation Assistance & Real Property Acquisition Act of 1970**

The Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (42 U.S.C. 4601 et seq. and 49 CFR 24) as amended ensures property owners and tenants are compensated fairly for property acquisition and relocation costs. See **Section 4.15: Right-of-Way, Relocations, and Access Changes**.

#### **4.17.1.5 Title VI of the Civil Rights Act of 1964**

Title VI of the Civil Rights Act of 1964 (42 USC 2000d and 49 CFR 21), as amended, is the foundation for most federal rules, regulations, and mandates concerning nondiscrimination in

federal activities. Title VI protects individuals from discrimination on the basis of their race, color, national origin, sex, age, disability, or religion.

Refer to **Sections 3.3.2: Environmental Justice Communities in Immediate Study Area** and **4.3.3: Impacts on Environmental Justice Communities** for more information on how Title VI is being addressed by this project.

#### **4.17.1.6 Americans with Disabilities Act of 1990**

Building on Title VI, the Americans with Disabilities Act of 1990 (ADA) (42 USC 12101 and 23 CFR 200) extended non-discrimination in the implementation of federal programs to persons with disabilities. The ADA ensures that no qualified individual with a disability shall, by reason of such disability, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination under a federal project. On the Kea'au-Pāhoa Road Improvements project, all design elements will comply with the ADA.

#### **4.17.1.7 Executive Order 12898: Environmental Justice**

In response to growing public concern and mounting evidence of disparate treatment, President Bill Clinton signed Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, on February 11, 1994. (59 CFR 7629, 62 CFR 18377, and 60 CFR 33896). The purpose of E.O. 12898 was to focus federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities.

The project will not have a disproportionate adverse impact on environmental justice populations in the area, and will provide some benefits to these populations. Refer to **Sections 3.3.2: Environmental Justice Communities in Immediate Study Area** and **4.3.3: Impacts on Environmental Justice Communities** for more information.

#### **4.17.1.8 Section 106 of the National Historic Preservation Act of 1966**

The National Historic Preservation Act (NHPA) of 1966 (16 USC 470) established the National Register of Historic Places (NRHP). Section 106 of the NHPA requires federal agencies to consider the effects of federal actions upon historic and archaeological resources that may be eligible for the NRHP. The Hawai'i State Historic Preservation Division (SHPD) oversees this process on behalf of the federal Advisory Council on Historic Preservation. There are also state-level regulations protecting cultural resources under HRS Chapter 6E-8 that are similar.

As described in detail in **Section 4.9: Cultural Resources**, the Section 106 process has been considered as part of the Archaeological Impact Survey (AIS) and Cultural Impacts Assessment processes. The AIS is currently under review by SHPD, and coordination will continue to ensure their concurrence with the recommended findings of "no adverse effect." FHWA will make a determination of effects after consulting further with SHPD as needed under the Section 106 process.

#### **4.17.1.9 Historic Bridge Program**

As part of the Surface Transportation and Uniform Relocation Assistance Act of 1987 [23 USC 144(o)], State highway agencies were required to complete an inventory of bridges on and off the Federal-aid system to determine the historic significance of the bridges.

There is a 1930s-era bridge adjacent to Kea'au-Pāhoa Road that will be demolished as part of the Shoulder Lane Conversion project that will precede this project (see **Section 1.2.2.1: The Kea'au-Pāhoa Road Shoulder Lane Conversion Project** for more information). This bridge is not listed on the State of Hawai'i Historic Bridge inventory. Data recovery is recommended and has already taken place. Refer to **Sections 3.9.3: Historic Resources** and **4.9.2: Historic Resources** for more information.

#### **4.17.1.10 Coastal Zone Management Act of 1972**

The Coastal Zone Management Act (CZMA) of 1972 (16 USC 1451 et seq.) encourages coastal states to protect coastal resources consistent with the state's coastal zone management program. Within Hawai'i, the CZM program was authorized by HRS Chapter 205A, and is administered by the Office of Planning within the State of Hawai'i Department of Business, Economic Development, and Tourism (DBEDT). Actions anywhere within the State of Hawai'i must comply with the CZM program.

A consistency determination is required for federal actions that would have reasonably foreseeable direct or indirect effects on any use of or resource in the coastal zone. FHWA has evaluated the Proposed Action and has determined that it is consistent to the maximum extent practicable with the State of Hawai'i CZM program. The consistency determination will be submitted to the DBEDT Office of Planning.

#### **4.17.1.11 Endangered Species Act of 1973**

The Federal Endangered Species Act (ESA) of 1973 (16 USC 1531 et seq.) protects federally listed endangered and threatened plants and wildlife and designated critical habitats for such species. The ESA prohibits federal actions that would likely jeopardize the continued existence of those species or result in the destruction or adverse modification of designated critical habitat. HRS Chapter 195D is the state counterpart to the ESA.

The provision for interagency cooperation within Section 7 of the ESA requires consultations with federal wildlife management agencies on actions that may affect species or designated critical habitat. As noted in **Section 4.6.2: Fauna**, no federal- or state-listed threatened or endangered species or critical habitat were observed in the affected area. Section 7 consultation with USFWS has been initiated, and a Biological Opinion of "Not Likely to Adversely Affect" is expected.

#### **4.17.1.12 Migratory Bird Treaty Act of 1918**

The Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 USC 760), protects migratory wild birds found in the United States. The MBTA makes it unlawful to pursue, hunt, take,

capture, kill, possess, sell, purchase, barter, import, export, or transport any migratory bird, or any part, nest, or egg of any such bird, unless authorized under a permit issued by the Secretary of the U.S. Department of the Interior. One bird species listed as protected under the MBTA has been found in the general region of the study area, the Pacific Golden Plover, or kolea (*Pluvialis fulva*). As noted in **Section 4.6.2: Fauna**, no shorebirds like the Pacific Golden Plover were observed in the immediate vicinity of the study corridor, which does not offer typical shorebird habitat.

#### **4.17.1.13 Clean Water Act of 1972**

The Water Pollution Control Act, more commonly referred to as the Clean Water Act (CWA) provides federal protection for the quality of the nation's waterways. Federal protection of navigable and tidally-influenced waterways is also provided under Section 10 of the Rivers and Harbors Act of 1899 and Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972. There are no navigable waterways within the study area.

Section 404 of the CWA regulates discharge of dredge and fill material (as would be expected with road construction) into the "Waters of the United States," including wetlands, and requires a Department of the Army permit from the US Army Corps of Engineers. Section 401 of the Clean Water Act directs states to establish water quality certification (WQC) programs; in Hawai'i, the Section 401 WQC is administered by the Hawai'i Department of Health - Clean Water Branch (DOH-CWB). If there will be discharges regulated under Section 404, then Section 401 WQC is required as well.

Section 402 of the CWA requires a National Pollutant Discharge Elimination System (NPDES) permit for discharges from construction activities that disturb one acre or more. The NPDES program within Hawai'i is administered by the DOH-CWB as well, as covered in HRS Chapter 342D and HAR Chapter 11-55.

As described above in **Section 3.7.1: Surface and Groundwater**, coordination has taken place with the US Army Corps of Engineers regarding the jurisdictional status of the intermittent waterway affected by the project, and a Determination from the Corps is pending. All permits described in this section will be obtained if necessary.

#### **4.17.1.14 Executive Order 11990: Protection of Wetlands**

Executive Order 11990, given by President Carter in 1977 (23 CFR 777, DOT Order 5660.1A), requires the avoidance of direct or indirect support of new construction in wetlands wherever there is a practicable alternative. The executive order requires evaluation and mitigation of impacts on wetlands.

As noted in **Section 4.7.2: Wetlands**, there is one depression area mauka of the highway that exhibits some wetland characteristics, specifically positive vegetation and hydrology indicators, and a possible soil indicator requiring more in-depth study. However, this depression is not expected to be classified as a jurisdictional wetland. Efforts will be made to minimize impacts on this area to the greatest degree possible.

#### **4.17.1.15 Executive Orders 11988 and 12148: Floodplain Management**

Executive Order 11988 intended to avoid the long- and short-term adverse impacts associated with the occupancy and modification of floodplains, and to restore and preserve the natural and beneficial values served by floodplains. All construction of Federal or Federally aided roads that encroach upon or affect the base floodplain, requires: (1) assessment of floodplain hazards and (2) specific finding required in final environmental document for significant encroachments. This Executive Order was amended by Executive Order 12148, which established the Federal Emergency Management Agency (FEMA) as having oversight of floodplains. The Preferred Alternative will seek to minimize effects on floodplains to the greatest degree possible. Refer to **Section 4.7.3: Floodplains and Hydrology** discussion of anticipated impacts and mitigation.

#### **4.17.1.16 Executive Order 13112: Invasive Species**

Executive Order 13112 required federal agencies to implement policies to minimize the spread of invasive species. A landscaping plan will be created as part of the final design effort for this project. Emphasis will be placed on the usage of native species wherever possible, along with ensuring that sources for plantings do not contain invasive species. These efforts will help minimize the spread of invasives while improving aesthetics, reducing maintenance costs and promoting native Hawaiian values of stewardship for the land.

#### **4.17.1.17 Farmland Protection Policy Act of 1981**

This legislation (7 USC 4201-4209, 7 CFR 658) seeks to minimize impacts on farmland and maximize compatibility with state and local farmland programs and policies. Projects that impact farmland require coordination with the US Department of Agriculture's Natural Resources Conservation Service (NRCS) and a farmland conversion assessment form must be submitted to NRCS. A form CPA-106 will be submitted to NRCS and is found in **Appendix N: Farmland Conversion Impact Rating Form**.

#### **4.17.1.18 Clean Air Act and Amendments**

The Clean Air Act of 1972 and its 1990 Amendments and subsequent legislation regulate air emissions from area, stationary, and mobile sources. As described above in **Section 3.4: Climate and Air Quality**, the US Environmental Protection Agency has established National Ambient Air Quality Standards (NAAQS) for priority pollutants to protect public health and the environment. The State of Hawai'i is in conformity with the NAAQS. No exceedances of the NAAQS are anticipated from the project. The US EPA also oversees Mobile Source Air Toxics (MSAT), which are described in **Section 4.4.3: Mobile Source Air Toxics**.

#### **4.17.1.19 RCRA and CERCLA**

The Resource Conservation and Recovery Act (RCRA) of 1976, as amended (42 USC 6901 et seq.), is the nation's primary law governing the disposal of solid and hazardous waste. RCRA provides the US Environmental Protection Agency with oversight of generation, transportation, treatment, storage and disposal of hazardous and non-hazardous wastes. As discussed in

**Section 4.14: Hazardous Materials**, there is a low likelihood of encountering subsurface contamination in the corridor. There are no known Superfund sites in immediate proximity to the corridor, as regulated under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended (42 USC 9601 et seq.) Hazardous materials encountered during construction, will be handled in accordance with state/federal regulations.

## **4.17.2 State of Hawai'i**

### **4.17.2.1 Hawai'i Revised Statutes, Act 343**

This EA is being produced to ensure compliance with Act 343 as well as the National Environmental Policy Act. Act 343 (HAR Chapter 11-200) requires state and county governments to give systematic consideration to the environmental, social, cultural and economic consequences of proposed projects.

### **4.17.2.2 State Land Use Law, Chapter 205**

Along the Kea'au-Pāhoa Corridor, the entire area abutting the highway within the project study limits is designated as "Agricultural" with the exception of the area between Old Pāhoa Road and Kahakai Boulevard, which is "Urban" on the mauka side of the highway. Kea'au-Pāhoa Road is an existing permitted use in an Agricultural area. The County has oversight of Urban areas, and would permit a public roadway in an Urban area. Refer to **Section 3.1.2: State Land Use Designations** for more information.

### **4.17.2.3 Stream Channel Alteration Permit**

The State Water Code (HRS Chapter 174C) established the Water Commission, which regulates activities affecting stream channels, which are defined as any natural or artificial watercourse with a definite bed and banks, which periodically or continuously contains flowing water. A Stream Channel Alteration Permit (SCAP) is required (HAR Chapter 13-169) for any activity that would:

- Obstruct, diminish, destroy, modify, or relocate a stream channel
- Change the direction of flow of water in a stream channel
- Place material or structures in a stream channel, or
- Remove material or structures from a stream channel

Modification to the unnamed intermittent stream north of Shower Drive will potentially require a new bridge so a SCAP is anticipated to be needed.

### **4.17.2.4 Coastal Zone Management Act, Chapter 205A, Hawai'i Revised Statutes**

As described above in **Section 4.17.1.10: Coastal Zone Management Act of 1972**, the Coastal Zone Management Act (CZMA) of 1972 (16 USC 1451 et seq.) provides guidelines for development regulations within the coastal zone. The objectives of the Coastal Zone Management (CZM) Program are to provide the public with recreational opportunities, protect

historic resources, protect scenic and open space resources, protect coastal ecosystems, provide facilities for economic development, reduce hazards and manage development. All lands in the State of Hawaii are considered to be within the coastal zone.

Chapter 205A delegates authority to the counties to require additional permitting for uses close to the shoreline as Special Management Areas (SMAs). Kea'au-Pāhoa Road is outside the SMA and therefore will not require an SMA permit.

CZM program objectives and a determination of the applicability to the proposed improvements to Kea'au-Pāhoa Road are discussed in **Section 4.18: Coastal Zone Management Consistency Determination** below.

#### **4.17.2.5 Act 50, Cultural Practices**

Hawai'i's Act 50 (2000) sought to "promote and protect cultural beliefs, practices, and resources of native Hawaiians and other ethnic groups" and requires the project proposers under Chapter 343 to consider cultural practices in a cultural impact assessment (CIA). A CIA for this project is discussed in **Section 3.9.4: Cultural Practices** and **Section 4.9.3: Cultural Practices**. Based on issues raised during the telephone and talk story in-person interviews with local *kūpuna* (elders) and/or *kama'āina* (native born), the following measures are proposed:

- Archaeological monitoring
- Masking historic trails crossing Kea'au-Pāhoa Road that are obscured by vegetation
- Safety measures to avoid impacting lava tubes and Kazumura Cave
- Maintaining agricultural access for vehicles to W.H. Shipman properties
- Avoiding impact to the greatest degree possible at the Maku'u Farmers' Market to protect Native Hawaiian traditional practices

#### **4.17.2.6 Underground Injection Control Permit**

The State of Hawai'i regulates Underground Injection Control (UIC) to protect drinking water quality from underground pollution (HAR Chapter 11-23). The project is located above the UIC line and therefore is within the area regulated for UIC. Drywells will be among the measures used for conveying drainage as part of this project, and a State of Hawai'i Department of Health UIC permit will be required in final design.

#### **4.17.2.7 Noise Control Permit or Variance**

Chapter 11-46 of Hawai'i Administrative Rules (Community Noise Control) requires a community noise permit and/or variance from the State Department of Health if construction noise levels exceed certain levels, as typically is the case for highway projects. A permit is expected to be needed on this project, as discussed in greater detail in **Section 4.5.3: Construction Noise Impacts and Mitigation**. As part of the permitting process, the Department of Health will review the construction activities, and impose conditions and mitigative measures, which could include restrictions on the types of equipment used, maintenance requirements, hours of construction, and portable noise barriers.

### 4.17.3 County of Hawai'i

A Grubbing, Grading, Excavation and Stockpiling Permit is anticipated to be needed from the County of Hawai'i.

### 4.17.4 Summary of Permits and Approvals Needed

**Table 4-19: Summary of Permits and Approvals Needed** provides a list of permits and approvals anticipated to be needed for this project.

**Table 4-19: Summary of Permits and Approvals Needed**

Permit/Approval	Agency with Authority
Section 4(f) Approval	Federal Highway Administration
Section 106 /Chapter 6E Concurrence	Hawai'i State Historic Preservation Division
Endangered Species Act Section 7 Consultation	US Fish and Wildlife Service
Section 404 Department of Army Permit (if needed)	US Army Corps of Engineers
Floodplain Letter of Map Revision (if needed)	Federal Emergency Management Agency
Coastal Zone Management Consistency Determination	State of Hawai'i Office of Planning
National Pollution Discharge Elimination System (NPDES)	State of Hawai'i Department of Health Clean Water Branch
Section 401 Water Quality Certification (if needed)	State of Hawai'i Department of Health Clean Water Branch
Noise Permit/Variance	State of Hawai'i Department of Health
Underground Injection Control Permit	State of Hawai'i Department of Health
Grubbing, Grading, Excavation, and Stockpile Permits	County of Hawai'i

Source: SSFM International, Inc.

## 4.18 Coastal Zone Management Consistency Determination

As described above in **Section 4.17.1.10: Coastal Zone Management Act of 1972**, and **Section 4.17.2.4: Coastal Zone Management Act, Chapter 205A, Hawai'i Revised Statutes**, the Coastal Zone Management Act (CZMA) of 1972 (16 USC 1451 et seq.) provides guidelines for development regulations within the coastal zone to provide recreational opportunities, protect historic resources, protect scenic and open space resources, protect coastal ecosystems, provide facilities for economic development, reduce hazards and manage development. The

entire State of Hawaii is in the coastal zone. HRS Chapter 205A implements the Coastal Zone Management (CZM) program at the state level. Although located within the coastal zone, Kea'au-Pāhoa Road is outside the Special Management Area and therefore will not require an SMA permit from the County of Hawai'i.

A consistency determination is required for federal actions that would have reasonably foreseeable direct or indirect effects on any use of or resource in the coastal zone. CZM program objectives and applicability to the proposed improvements to Kea'au-Pāhoa Road are discussed below:

## **4.18.1 Recreational Resources**

### **4.18.1.1 CZM Objective for Recreational Resources**

The objective is to provide coastal recreational opportunities accessible to the public.

### **4.18.1.2 CZM Policies for Recreational Resources**

The following are the policies for the CZM program's oversight of recreational resources:

- A) Improve coordination and funding of coastal recreational planning and management; and
- B) Provide adequate, accessible and diverse recreational opportunities in the coastal zone management area by:
  - i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;
  - ii) Requiring replacement of coastal resources having significant recreational value, including but not limited to surfing sites, fishponds and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the state for recreation when replacement is not feasible or desirable;
  - iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;
  - iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;
  - v) Ensuring public recreational use of county, state and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;
  - vi) Adopting water quality standards and regulating point and non-point sources of pollution to protect and where feasible, restore the recreational value of coastal waters;
  - vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches and artificial reefs for surfing and fishing; and

- viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, county planning commissions; and crediting such dedication against the requirements of Section 46-6, HRS.

#### **4.18.1.3 Recreational Resources Discussion**

Kea'au-Pāhoa Road is located roughly three to five miles inland from the shoreline. There are no public recreation facilities in close proximity to the corridor. Therefore, there will be no effect on existing coastal or inland recreational resources.

### **4.18.2 Historic Resources**

#### **4.18.2.1 CZM Objective for Historic Resources**

The objective is to protect, preserve and where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

#### **4.18.2.2 CZM Policies for Historic Resources**

The following are the policies for the CZM program's oversight of historic resources:

- A) Identify and analyze significant archaeological resources;
- B) Maximize information retention through preservation of remains and artifacts or salvage operations; and
- C) Support state goals for protection, restoration, interpretation and display of historic resources.

#### **4.18.2.3 Historic Resources Discussion**

Improvements to Kea'au-Pāhoa Road will be constructed in keeping with the guidelines and objectives of the aforementioned objective and policies. Plans for the highway have been designed to improve public safety while minimizing impacts on cultural resources.

An Archaeological Impact Survey (AIS) and Cultural Impacts Assessment (CIA) have been undertaken, and two historic resources have been identified as part of the AIS:

**1930s-era Concrete Bridge:** Demolition of this bridge will occur as part of the Shoulders Conversion project that precedes this project (see Section **1.2.2.1: The Kea'au-Pāhoa Road Shoulder Lane Conversion Project**) and therefore the bridge will be gone before this project commences.

**Sacred Heart Church Cemetery:** The project will have no effect on this resource, which is outside the Area of Potential Effect (APE). Avoidance and protection of this facility, which is a component of the Pāhoa Historic and Commercial District is recommended.

The following mitigative measures are recommended to minimize the project's effects on cultural practices as recommended in the AIS and CIA:

- Archaeological monitoring
- Masking historic trails crossing Kea'au-Pāhoa Road that have been obscured by vegetation
- Safety measures to avoid impacting lava tubes and Kazumura Cave
- Maintaining agricultural access for vehicles to W.H. Shipman properties
- Avoiding impact to the greatest degree possible at the Maku'u Farmers' Market to protect Native Hawaiian traditional practices

Coordination will take place further with SHPD to ensure their concurrence with the recommended findings of "no adverse effect." FHWA will make a determination of effects after consulting further with SHPD as needed under the Section 106 process, and the findings from this process will be documented in the Final EA.

The expectation is that with appropriate mitigation that would include sensitivity to cultural histories, practices, materials, and remains, improvements to Kea'au-Pāhoa Road will have no significant impact on Hawaiian cultural resources, beliefs, and practices.

### **4.18.3 Scenic and Open Space Resources**

#### **4.18.3.1 CZM Objective for Scenic and Open Space Resources**

The objective is to protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.

#### **4.18.3.2 CZM Policies for Scenic and Open Space Resources**

The following are the policies for the CZM program's oversight of scenic and open space resources:

- A) Identify valued scenic resources in the coastal zone management area;
- B) Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;
- C) Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and
- D) Encourage those developments that are not coastal dependent to locate in inland areas.

#### **4.18.3.3 Scenic and Open Space Resources Discussion**

Improvements to Kea'au-Pāhoa Road will not impact shoreline views or open space resources. The roadway is located roughly three to five miles inland, at a distance from the coastline. Shoreline open space and scenic resources will be preserved, and the project will not block or mar scenic vistas, primarily those of Mauna Loa and Mauna Kea. The project corridor is

adjacent to a mixture of developed and undeveloped land both mauka and makai. The Puna Community Development Plan and County zoning will have control over the character of development around the corridor.

## **4.18.4 Coastal Ecosystems**

### **4.18.4.1 CZM Objective for Coastal Ecosystems**

The objective is to protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

### **4.18.4.2 CZM Policies for Coastal Ecosystems**

The following are the policies for the CZM program's oversight of coastal ecosystems:

- A) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources
- B) Improve the technical basis for natural resource management;
- C) Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance
- D) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and
- E) Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine water ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

### **4.18.4.3 Coastal Ecosystems Discussion**

Improvements to Kea'au-Pāhoa Road will not have any direct impact on coastal ecosystems. The roadway is located roughly three to five miles inland, at a distance from the coastline. The one intermittent stream located within the corridor has no direct hydrological connection to marine resources. The aquatics study found very little aquatics resources within the corridor. Drainage will be designed to maintain acceptable drainage patterns.

The contractor will be required to conform to NPDES permit requirements to protect aquatic resources during the construction phase of the project. An Underground Injection Control (UIC) permit will also be required for this project. Appropriate Best Management Practices (BMPs) will be followed in order to protect the aquatic resources during construction of the project.

## **4.18.5 Economic Uses**

### **4.18.5.1 CZM Objective for Economic Uses**

The objective is to provide public or private facilities and improvements important to the State's economy in suitable locations.

### **4.18.5.2 CZM Policies for Economic Uses**

The following are the policies for the CZM program's oversight of economic uses:

- A) Concentrate in appropriate areas the location of coastal dependent development necessary to the State's economy;
- B) Insure that coastal dependent development such as harbors and ports, visitor industry facilities, and energy generating facilities are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and
- C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such development and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:
  - i) Utilization of presently designated locations is not feasible;
  - ii) Adverse environmental effects are minimized; and
  - iii) Important to the State's economy.

### **4.18.5.3 Economic Uses Discussion**

Improvements to Kea'au-Pāhoa Road will not have any direct influence on coastal-dependent development, as the corridor is located between three and five miles inland, and is an existing roadway that already serves the greater community. The project is an important long-term investment in an area with lower than average income that has been underserved by public infrastructure in past decades. Improvements to Kea'au-Pāhoa Road will also have a short term beneficial impact on the economy during construction by providing construction-related employment.

The project is intended to support the economic development initiatives planned in the PCDP, which will encourage planned development through a series of village and town centers rather than the uncontrolled sprawl that has taken place in Puna over the past five decades.

## **4.18.6 Coastal Hazards**

### **4.18.6.1 CZM Objective for Coastal Hazards**

The objective is to reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, and subsidence.

### **4.18.6.2 CZM Policies for Coastal Hazards**

The following are the policies for the CZM program's oversight of coastal hazards:

- A) Develop and communicate adequate information on storm wave, tsunami, flood erosion, and subsidence hazard;
- B) Control development in areas subject to storm wave, tsunami, flood, erosion, and subsidence hazard;
- C) Ensure that developments comply with requirements of the Federal Flood Insurance Program; and
- D) Prevent coastal flooding from inland projects.

### **4.18.6.3 Coastal Hazards Discussion**

Kea'au-Pāhoa Road runs generally parallel to the coastline at a distance of approximately three to five miles inland, and is outside of all potential tsunami and coastal flooding inundation areas. The design of the proposed project will conform to all regulatory requirements to ensure adequate and proper storm drainage and erosion control to the surrounding properties. While it is not listed in the policies above, lava flow is a concern in lower Puna, and the project corridor is located in Lava Zones 2 and 3.

As the only route into and out of lower Puna, Kea'au-Pāhoa Road is of critical importance in serving as both a route for first responders and an evacuation route. A Puna Makai Alternate Route (PMAR) has been proposed but will not be constructed for the foreseeable future, and Kea'au-Pāhoa Road will not preclude any alignment of PMAR if it is built.

## **4.18.7 Managing Development**

### **4.18.7.1 CZM Objective for Managing Development**

The objective is to improve the development review process, communication, and public participation in the management of coastal resources and hazards.

### **4.18.7.2 CZM Policies for Managing Development**

The following are the policies for the CZM program's oversight of managing development:

- A) Effectively utilize and implement existing law to the maximum extent possible in managing present and future coastal zone development;

- B) Facilitate timely processing of application for development permits and resolve overlapping or conflicting permit requirements; and
- C) Communicate the potential short- and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the general public to facilitate public participation in the planning and review process

#### **4.18.7.3 Managing Development Discussion**

Improving Kea'au-Pāhoa Road is an integral part of and consistent with a number of State and County land use plans, including the Puna Community Development Plan (PCDP) which was adopted by the County of Hawai'i in 2008, and the Puna Regional Circulation Plan (PRCP), which was issued in 2005 but never formally adopted. Both plans had extensive public involvement. The PCDP will have the most influence in steering the development in the Puna District along the lines of the policies above.

Regarding permits, improvements to Kea'au-Pāhoa Road will require a National Pollution Discharge Elimination System (NPDES) permit for storm water discharges related to construction as well as a County of Hawai'i Department of Public Works (DPW) Grubbing, Grading, Excavation and Stockpiling Permit. These permits will require review of plans and documents from State and County agencies, which may include the solicitation for public comment.

The Kea'au-Pāhoa Road Improvements Project has followed a Context Sensitive Solutions (CSS) process that has included a robust public involvement process to ensure that the community's voice has been heard and their needs are addressed as part of this project. Meetings of the Kea'au-Pāhoa Advisory Group have brought together a wide cross-section of the community and enabled consensus on the Purpose and Need for this project, as well as the range of Reasonable Alternatives that have been studied in this EA.

A Social Impact Assessment (SIA) for this project has strived to gauge public sentiment to accurately assess the social effects of this project on the community. This included interviews with 39 members of the community.

The project outreach has included an evolving web site, newsletters, and opportunities for public inquiry and comment throughout the history of the project. Three Public Information Meetings have been held to date.

The Environmental Assessment process, which is currently underway, requires public notification and two periods for public comment, one for the Draft EA and one for the Final EA.

### **4.18.8 Public Participation**

#### **4.18.8.1 CZM Objective for Public Participation**

The objective is to stimulate public awareness, education, and participation in coastal management.

#### **4.18.8.2 CZM Policies for Public Participation**

The following are the policies for the CZM program's oversight of public participation:

- A) Maintain a public advisory body to identify coastal management problems and to provide policy advice and assistance to the coastal zone management program;
- B) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal-related issues, developments, and government activities; and
- C) Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

#### **4.18.8.3 Public Participation Discussion**

As previously noted, while the project will have little influence over coastal management issues, a Context Sensitive Solutions process has included extensive public input to ensure the public has had a hand in steering this project. Copies of the Draft EA will be sent to applicable agencies and organizations to solicit and encourage comments regarding the project.

Public outreach will continue with the conclusion of the Environmental Assessment phase. It will be of great importance to keep the public engaged as the project moves into final design and construction.

### **4.18.9 Beach Protection**

#### **4.18.9.1 CZM Objective for Beach Protection**

The objective is to protect beaches for public use and recreation.

#### **4.18.9.2 CZM Policies on Beach Protection**

The following are the policies for the CZM program's oversight of beach protection:

- A) Locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion;
- B) Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and
- C) Minimize the construction of public erosion-protection structures seaward of the shoreline.

#### **4.18.9.3 Beach Protection Discussion**

Kea'au-Pāhoa Road runs generally parallel to the coastline at a distance of approximately three to five miles inland, and therefore will have no direct effect on beaches or shoreline areas. The design of the proposed project will conform to all regulatory requirements to ensure adequate and proper storm drainage and erosion control to the surrounding properties.

## **4.18.10 Marine Resources**

### **4.18.10.1 CZM Objective for Marine Resources**

The objective is to implement the State's ocean resources management plan.

### **4.18.10.2 CZM Policies on Marine Resources**

The following are the policies for the CZM program's oversight of marine resources

- A) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;
- B) Assure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;
- C) Coordinate the management of marine and coastal resources and activities management to improve effectiveness and efficiency;
- D) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;
- E) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and
- F) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

### **4.18.10.3 Discussion on Marine Resources**

Kea'au-Pāhoa Road runs generally parallel to the coastline at a distance of approximately three to five miles inland, and therefore will have no direct effect on coastal marine resources. The design of the proposed project will avoid, minimize, and mitigate environmental impacts as much as possible to ensure stewardship of resources within the coastal zone.

## **4.19 Indirect and Cumulative Impacts**

### **Overview**

Most of the impacts that have been discussed for project alternatives in this Environmental Assessment are "direct impacts," which would result in a direct effect on a resource or the environment. In addition to the direct impacts that have been described so far, there are also indirect and cumulative impacts that are required to be evaluated under the National Environmental Policy Act and Chapter 343.

## **4.19.1 Indirect Impacts**

### **Overview**

Indirect impacts are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems. (40 CFR 1508.8).

The No-Build and TSM Alternatives are expected to have minimal or no indirect impacts. Indirect impacts from the No-Build Alternative will result from increased congestion and safety concerns that will worsen over time.

### **4.19.1.1 Induced Growth**

#### **Summary of Discussion in Draft EA**

- The cause and effect from population growth and highway construction are often intertwined. Much of the purpose and need for the project has come from congestion coming from several decades of strong population growth in lower Puna's subdivisions. The Puna Community Development Plan (CDP) attempts to steer growth in a controlled manner, and assumes this project as part of the overall long-term plans for the area.

#### **Preferred Alternative**

It is likely that improving Kea'au-Pāhoa Road for the benefit of existing residents and businesses will encourage or "induce" some incremental amount of additional growth in residential or commercial development that would not have otherwise occurred. Since the latent potential for growth is already extremely high from the thousands of vacant developable parcels in the subdivisions along Kea'au-Pāhoa Road, it is difficult if not impossible to quantify the growth that would only happen from widening Kea'au-Pāhoa Road.

#### **Other Alternatives**

The No-Build Alternative will not improve Kea'au-Pāhoa Road and as a result, would not induce additional development. Congestion could make the area less attractive to development. The TSM Alternative will not appreciably increase the capacity of the highway overall, which will remain two lanes wide, and little induced development would be likely.

Alternatives 3 and 5 would offer greater capacity and would have comparable effects on induced growth to the Preferred Alternative.

#### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

#### **4.19.1.2 Land Use Changes**

##### **Summary of Discussion in Draft EA**

- It is possible that a wider Kea'au-Pāhoa Road and access modifications may make abutting properties less attractive for residential use and more attractive for commercial, institutional, or industrial use. Such changes in land use would be under the control of the County's zoning and state land use designations. The PCDP has also dictated the district's aspirations for future development.

##### **Preferred Alternative**

The Preferred Alternative could influence development as noted above.

##### **Other Alternatives**

The No-Build Alternative will not change the highway or access to the highway and should not influence future land use. The TSM Alternative would make minimal changes outside of intersection areas and should not have a pronounced effect on land use.

Alternatives 3 and 5 would influence land use changes comparably to the Preferred Alternative.

##### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

#### **4.19.1.3 Induced Traffic**

##### **Summary of Discussion in Draft EA**

- Many travelers on Kea'au-Pāhoa Road make conscious decisions based upon the congestion they experience. It is likely that some commuters make their trips later or earlier than they would ideally prefer in the interest of avoiding the worst peak-hour congestion. Similarly, there may be travelers that deliberately avoid the peak hours altogether for travel if they have the discretionary choice to do so. There may also be very discretionary trips that travelers simply do not make at all (but would make otherwise) because of congestion.
- There are generally no viable parallel alternative routes for most trips that use Kea'au-Pāhoa Road. However, there will likely be some reduction in "cut through" traffic in Hawaiian Paradise Park that currently avoids some congestion on Kea'au-Pāhoa Road.

##### **Preferred Alternative**

For the reasons mentioned above, it is likely that an indirect effect of the Preferred Alternative will be to alter the travel behavior of motorists. Relief from congestion will increase the flexibility for motorists to make trips at the time they would prefer to travel, and in some cases, encourage or "induce" travel that would otherwise not happen without the improvements.

## Other Alternatives

The No-Build Alternative generally will not change travel patterns, but it may encourage additional cut through traffic as delay and congestion increase. The TSM Alternative would improve intersections, reducing cut-through traffic, but it is not likely to induce much additional traffic as delay and congestion will still persist.

Alternatives 3 and 5 will likely alter travel behavior and may encourage additional trips not made today. This effect would likely be more pronounced than the Preferred Alternative in the case of Alternative 5, which will offers greater capacity, and somewhat less in Alternative 3.

## New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

### 4.19.1.4 Fiscal Effects

#### Summary of Discussion in Draft EA

- While the project is anticipated to create temporary construction employment, it is not expected to have a perceptible effect on the area's population or housing needs, as most workers would be expected to come from the local area. The comparative construction costs of the Preferred Alternative and other alternatives are outlined in **Section 2.4: Project Cost Estimates**.
- The project will require minor amounts of right-of-way to be acquired from a number of abutting property owners. This will remove small amounts of taxable land area from the county's tax rolls. **Refer to Section 4.15: Right-of-Way, Relocations, and Access Changes** for a comparison between right of way needed for the Preferred Alternative and other Alternatives.
- By improving accessibility to lower Puna, the project could encourage economic development (new businesses, institutions, etc.) in the region.

## New Issues or Clarification of Issues for Final EA

There are no new issues or issues that need to be clarified for the Final EA.

### 4.19.2 Cumulative Impacts

#### Summary of Discussion in Draft EA

- Cumulative impacts result from the incremental impact of the Proposed Action when added to other past, present, and "reasonably foreseeable" future actions, regardless of what entity undertakes such actions. Cumulative impacts result from individually minor but collectively significant actions over a period of time (40 CFR 1508.7).
- A particular action or group of actions would create cumulative impacts with the Kea'au-Pāhoa Road Improvements project if they occur in a common area, are similar in nature,

and are long-term in their duration. The following list contains contributing actions that could result in a cumulative impact when combined with the Preferred Alternative to reconstruct Kea'au-Pāhoa Road. Refer to Section 4.19.2: Cumulative Impacts in the Draft EA for elaboration on these actions:

- Past and Future Residential Development
- Former and Present Agricultural Practices
- Commercial Development, Past, Present and Planned
- Community Facilities, Past, Present, and Future
- Other Roads
- Past Construction and Improvements to Kea'au-Pāhoa Road

### **Preferred Alternative**

Together with the Preferred Alternative, some or all of the actions mentioned above will have cumulative effects on resources in **Section 4.19.2.1** through **Section 4.19.2.8**.

### **Other Alternatives**

The No-Build Alternative by its nature will not result in any wider facility that would have a cumulative effect with the other actions listed above, with the exception of Environmental Justice (described below in **Section 4.19.2.6: Environmental Justice Communities**.)

Alternatives 3 and 5, and to a lesser extent, the TSM Alternative, will have cumulative effects on resources in **Section 4.19.2.1** through **Section 4.19.2.8**, comparable to those of the Preferred Alternative.

### **New Issues or Clarification of Issues for Final EA**

There are no new issues or issues that need to be clarified for the Final EA.

#### **4.19.2.1 Vegetation and Wildlife Habitat**

The amount of undisturbed native vegetation and wildlife habitat in lower Puna is declining as property is converted to developed land, agriculture, or roadway use. Ongoing conversion of land will limit the habitat needed for endangered and threatened plants and animals. While mitigation is proposed in this Final EA to address the Preferred Alternative's effects on these resources, most small-scale development on previously-subdivided property does not require this assessment. These cumulative effects would be anticipated for all the actions cited above.

#### **4.19.2.2 Water Resources**

As the actions cited above modify drainage patterns and add impervious surfaces to the landscape, there are potential impacts to aquatic features. The Preferred Alternative will mitigate these impacts directly, but the ongoing development of the area in all the actions cited above has created a cumulative effect on water resources.

#### **4.19.2.3 Archaeological/Historic Resources and Cultural Practices**

Ongoing development has likely had a destructive effect on archaeological and historic resources throughout the area. While the Preferred Alternative is being designed to avoid direct effects on cultural resources, there have been numerous incremental effects on these resources from development from all the actions cited above. The current landscape is also less conducive to traditional cultural practices than pre-development.

#### **4.19.2.4 Geological Resources**

Lava tubes and caves have importance as both geological features and as locations of archaeological/cultural relics. Past construction activities for the types of development cited above have resulted in the discovery of skylights or unintentional breaching of walls. Furthermore, there have been human uses of lava tube caves from prehistoric times to the present, and some vandalism and destructive impacts have resulted. Allred and Allred (1997) identified sewer pipes, graywater pollution, garbage dumps, and fills from road construction, as well as signs of trash and shoe fragments from recreational use of the cave. Unintentional breaching of lava tube caves from the project would have a cumulative effect along with these other past impacts, which is why the Preferred Alternative includes mitigative measures.

#### **4.19.2.5 Visual Quality**

The appearance of the area has incrementally changed over time from a more naturalistic environment to a more developed landscape as development has progressed. This will change further as development continues in the foreseeable future. The original construction of Kea'au-Pāhoa Road and subsequent improvements over time created the visual environment that exists today. Developments beyond the road right-of-way have contributed to the current viewshed. The design of the Preferred Alternative will mitigate adverse visual effects of highway widening with a design that includes opportunities for landscaping, particularly with native species if possible.

#### **4.19.2.6 Environmental Justice Communities**

Lower Puna has low incomes and higher-than-average poverty compared to countywide averages. There are pockets of native Hawaiian population, persons of Filipino descent and other Environmental Justice groups. These communities have in part ended up in lower Puna because of the area's relative affordability, which stems from high availability of developable land that would be marginal for other uses. A relative lack of services and longer commute distance to Hilo also has kept housing costs lower. The actions mentioned above, particularly historic development patterns, contributed to this outcome. Under the Preferred Alternative, an improved Kea'au-Pāhoa Road could have varied demographic effects of its own; benefits could come from improved access to the area for underserved communities. There could also be negative social effects from living close to a wider highway.

As noted above in **Section 4.3.3: Impacts on Environmental Justice Communities**, while it will have minimal direct effects, the No-Build Alternative will have an adverse impact on the larger

Puna community, including Environmental Justice populations. Residents of Lower Puna have indicated a perception that their district and area has been consistently underserved by community services and infrastructure. The No-Build Alternative, and to a lesser degree, the TSM Alternative will not achieve the purpose and need for the project, and further perpetuate this cumulative effect.

#### **4.19.2.7 Community Cohesion**

Past improvements to Kea'au-Pāhoa Road created a physical and social separation between the properties and subdivisions on the two sides of the highway. Many properties on Kea'au-Pāhoa Road, particularly residential properties, “back” onto the highway rather than “front” onto the highway. Further widening of Kea'au-Pāhoa Road under the Preferred Alternative would generally increase this lack of cohesion between neighbors on both sides. This effect will be somewhat mitigated by access management improvements described in **Section 2.2.2: Access Control Under the Preferred Alternative**, as new connections across Kea'au-Pāhoa Road will increase cohesion between subdivisions on both sides of the highway.

#### **4.19.2.8 Right-of-Way Impacts**

Properties along Kea'au-Pāhoa Road experienced past partial property acquisitions during roadway construction in past decades. Some of those properties will be impacted further by right-of-way needs in the Shoulder Improvements project (described in **Section 1.2.2: Interim Improvements** above) and/or the Preferred Alternative. Thus, past incremental roadway improvements and the Preferred Alternative will cumulatively affect abutting properties.

### **4.20 Relationship Between Short Term Uses and Long Term Productivity**

#### **Summary of Discussion in Draft EA**

- The project will involve short-term and long-term tradeoffs. Money, labor, and construction materials used to construct the Preferred Alternative will be substantial. The ultimate benefits should justify the initial costs. Costs and benefits are not limited to spending public dollars, but also include hard-to-quantify items such as safety, people's time, economic development benefits, opportunities to facilitate regional planning efforts, etc.
- For this discussion, “short-term” refers to the immediate direct consequences of the project while “long-term” refers to its direct or indirect effects on future generations.
- Short-term consequences to the environment resulting from the Build Alternatives have been discussed throughout **Chapter 4: Environmental Impacts and Mitigation Measures**.

#### **Preferred Alternative**

Under the Preferred Alternative, short term uses of the environment would include:

- Temporary air, noise, and visual effects caused by reconstruction of roadways

- Increased cost to motorists in time and fuel efficiency because of construction delays
- Disturbances to businesses, homes, and institutions because of construction
- Conversion of residential area, open space, and agricultural land to transportation use
- Reduction in property tax revenues resulting from conversion of private land to public highway rights of way
- Use of public funds to build the highway

Most of the long-term benefits from the Preferred Alternative are addressed in **Chapter 1: Purpose and Need for Project**, and include:

- A safer roadway and the attendant benefits that come from reduced accidents
- Improved, safer travel options for alternative modes such as bicyclists, pedestrians, and transit users
- The economic and social benefits that come with improved mobility
- Improvements in driver convenience, safety, travel time, and energy use

As noted above in **Section 4.1.1: Consistency with Government Plans, Policies and Controls**, the improvements to Kea'au-Pāhoa Road are consistent with the other long range transportation and community development plans for Puna.

### **Other Alternatives**

Under the No-Build Alternative, there will be few short-term uses of the human environment above and beyond existing use of the roadway by traffic. No property would be converted to highway right-of-way. Over the long term, congestion and delay will likely increase.

The TSM Alternative will have much lower costs of the nature listed above, but also much lower benefits than the Preferred Alternative.

Alternatives 3 and 5 will have similar costs, and generally comparable benefits to the Preferred Alternative

## **4.21 Irreversible & Irretrievable Commitments of Resources**

### **Summary of Discussion in Draft EA**

- Permanent commitments of resources occur when land or other resources are acquired or modified for a transportation project. HDOT could attempt to convert the resources back later or replace them, but they will never quite be the same.
- Irreversible and irretrievable commitments of resources are the funds, materials, and labor for a project. Some resources, like materials, could possibly be recycled. Others would be gone forever.

### **Preferred Alternative**

Construction of the Preferred Alternative involves the commitment of a range of natural, physical, social resources and public tax dollars. Land used for the Preferred Alternative is

considered a permanent commitment during the time period that the land is used for a highway. For right-of-way, land resources would be converted from natural, agricultural, residential, and commercial areas. However, if a greater need arises for the use of the land or highway facilities, the land can conceivably be converted to another use. There is no reason to believe such a conversion would ever occur.

Construction of the Preferred Alternative will utilize fossil fuels, labor, and construction materials such as cement, stone, and asphalt materials. Such uses are generally irreversible, although it would be possible to retrieve and reuse these resources to a limited extent. Construction will require a substantial onetime expenditure of state and federal funds which are irretrievable.

Commitment of the resources presumes lower Puna will benefit from the improvements.

### **Other Alternatives**

Irretrievable commitments of the NoBuild Alternative include the money, time, and personal hardship related to increasing congestion and safety concerns. As roadway operations deteriorate over time, there would be increasing costs for energy and the time required for business travel and personal driving. As traffic delay and operational inefficiencies increase, safety concerns would affect the local community to a greater extent than exists today.

Alternatives 3 and 5, and to a lesser degree, the TSM Alternative, would entail use of resources similar to those needed for the Preferred Alternative.

## **4.22 Summary of Impacts and Mitigation Commitments**

**Table 4-20: Summary of Impacts and Mitigation Commitments** summarizes the impacts of the Preferred Alternative and compares them with the No-Build and TSM Alternatives. It also lists mitigation commitments outlined in the preceding sections of this chapter.

**Table 4-20: Summary of Impacts and Mitigation Commitments**

Section	Issue	Impacts of:			Mitigation Commitments
		No-Build	TSM Alt.	Preferred Alternative	
4.1	Land Use	<ul style="list-style-type: none"> <li>• Status quo maintained for future</li> <li>• <b>Not consistent</b> with Puna Community Development Plan (Puna CDP)</li> <li>• <b>Not consistent</b> with Puna Regional Circulation Plan (PRCP)</li> <li>• <b>Not consistent</b> with County General Plan and other plans</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Not consistent</b> overall with these elements of Puna CDP: <ul style="list-style-type: none"> <li>• No increased capacity</li> <li>• Limited improvement for bikes/pedestrians</li> <li>• Will not improve emergency evacuations</li> <li>• Doesn't meet PCDP plan to reduce speed to 45 mph between Kea'au &amp; Ainaloa</li> </ul> </li> <li>• <b>Consistent</b> with these elements of Puna CDP: <ul style="list-style-type: none"> <li>• Supports Mass Transit</li> <li>• Improved access to Village Centers</li> <li>• Does not preclude PMAR</li> </ul> </li> <li>• <b>Not consistent</b> with PRCP: <ul style="list-style-type: none"> <li>• Doesn't provide four lanes from Kea'au to Pāhoa</li> </ul> </li> <li>• <b>Consistent</b> with PRCP: <ul style="list-style-type: none"> <li>• Supports Mass Transit</li> <li>• Limited improvement for bikes/pedestrians</li> <li>• Increased connectivity between subdivisions</li> <li>• Does not preclude PMAR</li> </ul> </li> <li>• Not generally consistent with County General Plan and other plans</li> <li>• Outside of intersection areas, will not change access to properties along highway (no medians) and therefore will not reduce accidents from turning movements in these places. Some changes to access points for subdivisions.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Consistent/supportive</b> towards Puna CDP goals: <ul style="list-style-type: none"> <li>• Increased capacity</li> <li>• Improved access to Village Centers</li> <li>• Supports Mass Transit</li> <li>• Supports bikes/pedestrians</li> <li>• Improved emergency evacuations</li> <li>• Does not preclude PMAR</li> </ul> </li> <li>• <b>Fully consistent with and supportive</b> of PRCP: <ul style="list-style-type: none"> <li>• Meets plan for at least four lanes from Kea'au to Pāhoa</li> <li>• Supports Mass Transit</li> <li>• Supports bikes/pedestrians</li> <li>• Can provide increased connectivity between subdivisions</li> <li>• Does not preclude PMAR</li> </ul> </li> <li>• <b>Generally consistent with and supportive</b> of County General Plan and other plans</li> <li>• Will change access to properties along highway and will reduce accidents from turning movements. Some changes to access points for subdivisions.</li> </ul>	<ul style="list-style-type: none"> <li>• Will continue to involve community with CSS Process to ensure planning goals are considered</li> </ul>

**Table 4-20: Summary of Impacts and Mitigation Commitments**

Section	Issue	Impacts of:			Mitigation Commitments
		No-Build	TSM Alt.	Preferred Alternative	
4.2	Traffic and Transportation	<ul style="list-style-type: none"> <li>• Congestion and delay in corridor will continue to decline</li> <li>• Safety deficiencies will not be addressed</li> <li>• No changes in access</li> <li>• No improvements for bikes/peds</li> <li>• No improvements for transit</li> <li>• <b>Purpose and Need of Project will not be met</b></li> </ul>	<ul style="list-style-type: none"> <li>• Level of Service (LOS) will still be poor along roadway segments between intersections because no capacity increases</li> <li>• Level of Service at intersections will be marginally improved, though capacity still limited and LOS still poor generally between Pōhaku Place and Ainaloa Boulevard</li> <li>• TSM Measures implemented in 2018 timeframe, but TSM would not have acceptable operations by 2038</li> <li>• Safety deficiencies will be addressed somewhat at intersections but not between intersections</li> <li>• No new passing zones or capacity improvements will be provided.</li> <li>• Access changes would reduce problems at stop-sign-controlled points only; no medians or access changes beyond intersections</li> <li>• The only location a roundabout would function in 2038 is at Kahakai Boulevard and would modify Old Pāhoa Road access as well. Ainaloa Boulevard and Orchidland Drive could be considered for shorter-term implementation of a roundabout.</li> <li>• Localized improvement for transit at bus pullout sites</li> <li>• Improvements for pedestrians and bicyclists limited to crossings of road, no new bike/ped facilities along road itself</li> <li>• Does not preclude and can connect with Puna Makai Alternate Route (PMAR)</li> <li>• <b>Purpose and Need of Project will not be met</b></li> </ul>	<ul style="list-style-type: none"> <li>• Mostly satisfactory Level of Service (LOS) along roadway except for north of Shower Drive</li> <li>• Signalized intersections generally have acceptable LOS though some have poor individual traffic movements that may be improved with signal optimization</li> <li>• Some stop-sign-controlled intersections will have poor LOS for cross-street traffic</li> <li>• Access changes will reduce problems at stop-sign-controlled points</li> <li>• 25% fewer crashes estimated</li> <li>• Transit benefits from new bus pullouts, reduced delay, more consistent schedules</li> <li>• Pedestrians and bicyclists benefit from walkways and/or improved shoulders</li> <li>• Does not preclude and can connect with PMAR</li> <li>• <b>Addresses Purpose and Need of Project</b></li> </ul>	<ul style="list-style-type: none"> <li>• No significant impacts with mitigation</li> <li>• Implementation of additional travel lanes, turn lanes, access changes, and signals/roundabouts will enable corridor to handle future traffic volumes adequately and safely</li> </ul>

**Table 4-20: Summary of Impacts and Mitigation Commitments**

Section	Issue	Impacts of:			Mitigation Commitments
		No-Build	TSM Alt.	Preferred Alternative	
4.3	Social/ Community Impacts	<ul style="list-style-type: none"> <li>No direct impact on community</li> <li>Increased delay over time will compromise community mobility and quality of life</li> <li>Increased difficulty for residents to access jobs, healthcare, education</li> <li>Continues perceived underinvestment in Puna, particularly for minority/low-income communities</li> <li>No way to tie subdivisions together</li> </ul>	<ul style="list-style-type: none"> <li>Little direct impact on community resources other than near intersections</li> <li>Modest investment in Puna</li> <li>Modest reduction in delay and modest improvement in mobility and access</li> <li>Would improve access between subdivisions</li> <li>Benefits to minority/low-income communities, particularly transit-dependent and pedestrians/bikes</li> <li>Modest improvement for emergency access</li> </ul>	<ul style="list-style-type: none"> <li>Substantial investment in Puna</li> <li>Impacts on neighborhood cohesion of wider four-lane facility in entire corridor</li> <li>Will improve access between subdivisions</li> <li>Substantial reduction in delay and improved mobility and access</li> <li>Benefits to minority/low-income communities, particularly transit-dependent and pedestrians/bikes</li> <li>Substantial improvement for emergency access</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>Context Sensitive Solutions process seeks to reduce impacts on community from facility</li> <li>Process has worked to make project process open and equitable for minority/low-income communities</li> </ul>
4.4	Air Quality	<ul style="list-style-type: none"> <li>Increasing volumes and delay by 2038 will be offset by improved vehicle emission controls, lower intersection-level carbon monoxide (CO) emissions compared to 2006</li> <li>Compared to 2006, regional emissions in 2038 of CO will increase 17% with greater traffic; Regional Nitrogen Oxides (NOx) and Volatile Organic Compounds (VOC) will respectively decrease 19% and 61% with emission controls.</li> <li>No exceedances of state or federal air standards are anticipated</li> <li>Mobile Source Air Toxics expected to increase over time, proportional to increase in traffic; this may be offset by future emission controls.</li> <li>No Short-term construction air quality impacts</li> </ul>	<ul style="list-style-type: none"> <li>No appreciable differences among alternatives in intersection-level emissions; all within state/federal standards in 2038 and lower than today's levels.</li> <li>If pursued, roundabouts could reduce emissions even further than signals</li> <li>While regional emission levels will increase/ decrease from 2006 to 2038 comparable to No-Build changes, no appreciable differences in regional emissions between alternatives in 2038.</li> <li>While levels will increase from 2006 to 2038 comparable to No-Build changes, no appreciable difference in Mobile Source Air Toxics expected among alternatives in 2038.</li> <li>Short-term construction phase air quality impacts will be mitigated</li> </ul>	<ul style="list-style-type: none"> <li>No appreciable differences among alternatives in intersection-level emissions; all within state/federal standards in 2038 and lower than today's levels.</li> <li>While regional emission levels will increase/ decrease from 2006 to 2038 comparable to No-Build changes, no appreciable differences in regional emissions between alternatives in 2038.</li> <li>While levels will increase from 2006 to 2038 comparable to No-Build changes, no appreciable difference in Mobile Source Air Toxics expected among alternatives in 2038.</li> <li>Short-term construction phase air quality impacts will be mitigated</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>No mitigation of long term effects warranted as no significant impacts anticipated</li> <li>Temporary construction-phase air quality impacts will be mitigated to minimize fugitive dust and emissions from equipment</li> </ul>

**Table 4-20: Summary of Impacts and Mitigation Commitments**

Section	Issue	Impacts of:			Mitigation Commitments
		No-Build	TSM Alt.	Preferred Alternative	
4.5	Noise	<ul style="list-style-type: none"> <li>No direct effect on noise in the corridor, though noise levels will increase from existing levels because of traffic increase in intervening time</li> <li>117 existing properties exceed HDOT/FHWA Criteria out of 182 in corridor</li> <li>150 future properties will exceed HDOT/FHWA Criteria in 2038 out of 182 in corridor</li> </ul>	<ul style="list-style-type: none"> <li>Minimal direct effect on noise in the corridor compared to No-Build</li> <li>Noise levels will increase from existing levels because of traffic increase in intervening time</li> <li>Affected numbers of properties along Kea'au-Pāhoa Road estimated similar to No-Build</li> <li>Some new traffic noise in subdivisions from changes in access</li> </ul>	<ul style="list-style-type: none"> <li>Noise levels will increase from existing levels because of traffic increase in intervening time</li> <li>Imperceptible (less than 3 dBA) increase in noise compared to a No-Build scenario in 2038 at 23 properties</li> <li>Up to 166 future properties will exceed HDOT/FHWA Criteria in 2038 out of 182 in corridor, an increase of 16 over No-Build</li> <li>Some new traffic noise in subdivisions from changes in access</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>Mitigation cannot include noise walls as driveway openings preclude walls</li> <li>Construction Noise will be mitigated with a permit</li> </ul>
4.6.1	Flora	<ul style="list-style-type: none"> <li>No direct effect on vegetation because no construction</li> </ul>	<ul style="list-style-type: none"> <li>Minimal effect on vegetation because of limited area of construction</li> <li>Some minor conversion of strips of vegetation along access management roadways in subdivisions</li> </ul>	<ul style="list-style-type: none"> <li>Conversion of a narrow strip of highly disturbed vegetation to highway use</li> <li>Some minor conversion of strips of vegetation along access management roadways in subdivisions</li> <li>No adverse impact on sensitive botanical resources</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>Landscaping of facility will seek to provide native, non-invasive species that could benefit biological resources in area.</li> </ul>
4.6.2	Fauna	<ul style="list-style-type: none"> <li>No direct effect on wildlife because of limited habitat in study area and no construction</li> </ul>	<ul style="list-style-type: none"> <li>Minimal effect on wildlife because of limited habitat in study area and limited area of construction</li> </ul>	<ul style="list-style-type: none"> <li>Limited habitat in affected area</li> <li>Limited potential for adverse impacts on wildlife.</li> <li>Recommended mitigation ensures no significant impacts.</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>Mitigation measures will include consultation in accordance with Section 7 of the Endangered Species Act to ensure that impacts on Hawaiian Hawk, Hawaiian Petrel, Newell's Shearwater, Hawaiian Hoary Bat are minimized.</li> </ul>
4.6.3	Aquatic Biota	<ul style="list-style-type: none"> <li>No direct effect on aquatic species because limited habitat and no construction</li> </ul>	<ul style="list-style-type: none"> <li>No direct effect on aquatic species because limited habitat in study area and no construction in areas near aquatic resources</li> </ul>	<ul style="list-style-type: none"> <li>Limited potential for adverse impacts on aquatic resources because of limited habitat and resources</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>Runoff treatment through swales, drywells, infiltration trenches, etc.</li> <li>Best Management Practices (BMPs) and National Pollution Discharge Elimination System (NPDES) permit will minimize potential for impacts on aquatic resources in corridor</li> </ul>

**Table 4-20: Summary of Impacts and Mitigation Commitments**

Section	Issue	Impacts of:			Mitigation Commitments
		No-Build	TSM Alt.	Preferred Alternative	
4.7.1	Surface/ Groundwater	<ul style="list-style-type: none"> <li>No direct effect on surface/groundwater because no construction</li> </ul>	<ul style="list-style-type: none"> <li>Minimal direct effect on surface/groundwater because very limited construction</li> </ul>	<ul style="list-style-type: none"> <li>Limited potential for adverse impacts on surface waters because of limited resources and proposed mitigation</li> <li>Treatment of runoff will prevent impacts on groundwater.</li> <li>No underground injection.</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>Runoff treatment through swales, drywells, infiltration trenches, etc.</li> <li>Best Management Practices (BMPs) and National Pollution Discharge Elimination System (NPDES) permit will mitigate impacts on surface water resources in corridor</li> <li>Treatment of runoff will mitigate impacts on groundwater</li> </ul>
4.7.2	Wetlands	<ul style="list-style-type: none"> <li>No direct effect on wetlands because no construction</li> </ul>	<ul style="list-style-type: none"> <li>No direct effect on wetlands because no construction in area of wetlands</li> </ul>	<ul style="list-style-type: none"> <li>Small area with some wetland characteristics near Waipahoehoe Bridge, but no jurisdictional wetland affected</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>One area near Waipahoehoe Bridge exhibits some characteristics of wetland but is not a defined jurisdictional wetland. Design will avoid and minimize impacts in this area.</li> <li>Treatment of runoff will benefit area</li> </ul>
4.7.3	Floodplains & Hydrology	<ul style="list-style-type: none"> <li>No direct effect on floodplains, as none are mapped in area</li> <li>Existing areas of flooding problems will not be improved</li> </ul>	<ul style="list-style-type: none"> <li>No direct effect on floodplains, as none are mapped in area</li> <li>Drainage on project will ensure roadway is drained adequately and water is transported across highway adequately</li> </ul>	<ul style="list-style-type: none"> <li>No direct effect on floodplains, as none are mapped in area</li> <li>Drainage on project will ensure roadway is drained adequately and water is transported across highway adequately</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>Drainage treatments will include such measures as vegetated swales, drywells, infiltration trenches, etc. to detain and dispose of runoff</li> <li>Culverts and bridges will be improved as needed and designed to current standards</li> <li>An existing abandoned concrete bridge will be removed as part of Shoulder Lane Conversion Project to improve drainage</li> </ul>
4.8	Natural Hazards	<ul style="list-style-type: none"> <li>No direct effect on sensitive lava tubes</li> <li>The existing facility would have limited capacity in the event of a regional evacuation</li> </ul>	<ul style="list-style-type: none"> <li>Limited potential for affecting sensitive lava tubes</li> <li>While intersections would be improved, the facility would have limited capacity in the event of a regional evacuation</li> </ul>	<ul style="list-style-type: none"> <li>Unknown potential for affecting sensitive lava tubes</li> <li>Improved capacity for evacuation.</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>Archaeological monitoring during construction will help avoid or minimize effects on breaching lava tubes.</li> </ul>

**Table 4-20: Summary of Impacts and Mitigation Commitments**

Section	Issue	Impacts of:			Mitigation Commitments
		No-Build	TSM Alt.	Preferred Alternative	
4.9.1	Archaeological Resources	<ul style="list-style-type: none"> <li>No direct effect on archaeological resources because no construction</li> </ul>	<ul style="list-style-type: none"> <li>No effect on known archaeological resources</li> <li>Limited potential for affecting unknown resources</li> </ul>	<ul style="list-style-type: none"> <li>No effect on known archaeological resources</li> <li>Limited potential for affecting unknown resources</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>FHWA will consult with the State Historic Preservation Officer as necessary under Section 106 of the National Historic Preservation Act</li> <li>Archaeological monitoring will help avoid or minimize effects on encountering unknown archaeological resources or the breaching of lava tubes.</li> </ul>
4.9.2	Historic Resources	<ul style="list-style-type: none"> <li>No effect on historic resources</li> </ul>	<ul style="list-style-type: none"> <li>No effect on historic resources</li> </ul>	<ul style="list-style-type: none"> <li>No effect on historic resources because a historic bridge will have been demolished during the Shoulder Lane Conversion project before this project starts</li> <li>No effect on historic cemetery adjacent to project</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>FHWA will consult with the State Historic Preservation Officer as necessary under Section 106 of the National Historic Preservation Act</li> <li>Mitigative data collection and coordination with State Historic Preservation Division on historic bridge has taken place on Shoulder Lane Conversion project</li> <li>A barrier will protect cemetery from construction in adjacent highway right-of-way</li> </ul>
4.9.3	Cultural Practices	<ul style="list-style-type: none"> <li>No effect on cultural practices</li> </ul>	<ul style="list-style-type: none"> <li>Bus stop and bus pullout near Maku'u Farmer's Market will improve access to this cultural site.</li> </ul>	<ul style="list-style-type: none"> <li>Bus stop and bus pullout near Maku'u Farmer's Market will improve access to this cultural site.</li> <li>Road widened to four lanes in this area, but impacts on the Maku'u Farmer's Market will be minimized as much as possible within the narrow strip of property between highway and parking areas</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>Archaeological monitoring will help avoid or minimize effects on encountering unknown archaeological resources or the breaching of lava tubes.</li> <li>If ancient trails are made visible because of vegetation clearing, they will be masked and buffered to protect them</li> <li>Impacts on Maku'u Farmer's Market property will be minimized as much as possible</li> </ul>

**Table 4-20: Summary of Impacts and Mitigation Commitments**

Section	Issue	Impacts of:			Mitigation Commitments
		No-Build	TSM Alt.	Preferred Alternative	
4.10	Parks and Recreation	<ul style="list-style-type: none"> <li>No effects on any parks or recreational facilities</li> </ul>	<ul style="list-style-type: none"> <li>No effects on any parks or recreational facilities</li> </ul>	<ul style="list-style-type: none"> <li>No effects on any parks or recreational facilities</li> </ul>	<ul style="list-style-type: none"> <li>No mitigation needed because no effects</li> </ul>
4.11	Agricultural Lands	<ul style="list-style-type: none"> <li>No effects on any agricultural lands</li> </ul>	<ul style="list-style-type: none"> <li>Approximately 0.18 acres of agricultural property acquired in narrow strips next to highway</li> </ul>	<ul style="list-style-type: none"> <li>Approximately 5.37 acres of agricultural property acquired, mostly vacant W.H. Shipman property</li> <li>Approximately 0.02 acres of Prime Agricultural Land acquired</li> <li>Highway widening near three Shipman access driveways</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>Fair and just compensation for property acquired as per Uniform Relocation Assistance and Real Property Acquisition Act of 1970</li> <li>Coordination will take place with the Natural Resources Conservation Service and form AD-1006 completed</li> <li>HDOT will work with agricultural property owners regarding accesses to ensure agricultural operations are not compromised</li> </ul>
4.12	Visual Environment	<ul style="list-style-type: none"> <li>No direct visual effects</li> </ul>	<ul style="list-style-type: none"> <li>Areas of alteration of visual environment limited to intersection areas.</li> <li>Roundabouts would provide landscaping and aesthetic opportunities</li> <li>Some effects from widening and in some cases, paving, local subdivision roads to county standards for access management</li> </ul>	<ul style="list-style-type: none"> <li>Visual effects where highway widened from two lanes to four lanes for entire corridor from Kea'au to Pāhoa-Kapoho Road</li> <li>Some effects from widening and in some cases, paving, local subdivision roads to county standards for access management</li> <li>Roundabouts will provide landscaping and aesthetic opportunities</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>Context Sensitive Solutions (CSS) process involved the community in the planning for the project to ensure a facility that is appropriate for area's context</li> <li>A landscaping plan in final design will emphasize native species wherever possible to minimize the spread of invasives, improve aesthetics, reduce maintenance costs and promoting native Hawaiian values of stewardship for the land.</li> <li>Roundabouts, will provide landscaping and aesthetic opportunities</li> <li>Streetlights will be shielded to avoid light pollution as per County of Hawai'i code</li> </ul>

**Table 4-20: Summary of Impacts and Mitigation Commitments**

Section	Issue	Impacts of:			Mitigation Commitments
		No-Build	TSM Alt.	Preferred Alternative	
4.13	Utilities	<ul style="list-style-type: none"> <li>No impacts on utilities</li> </ul>	<ul style="list-style-type: none"> <li>Limited impacts on utilities, if at all, near intersections</li> </ul>	<ul style="list-style-type: none"> <li>Relocation of 4.6 miles of electric/ telecommunications utility line on mauka side highway</li> <li>Relocation of 4.2 miles of electric/ telecommunications utility line on makai side highway</li> <li>Relocation of 245 poles on both sides highway</li> <li>Potential relocation of not-as-yet-installed fiber optic line between Kea'au and Maku'u Farmer's Market</li> <li>Three waterlines (approximately 6.8 miles total) may end up being situated under driving lanes after road is widened</li> <li>40 fire hydrants will need to be relocated, along with water meters</li> <li>Some minor relocation of utilities may be needed within subdivisions where access management roads are constructed</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>HDOT will coordinate with utilities and customers to minimize and mitigate disruption</li> </ul>
4.14	Hazardous Materials	<ul style="list-style-type: none"> <li>No impacts from hazardous materials</li> </ul>	<ul style="list-style-type: none"> <li>Very limited potential for impacts from hazardous materials</li> </ul>	<ul style="list-style-type: none"> <li>Very limited potential for impacts from hazardous materials</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>If hazardous materials are discovered during construction, standard procedures will be followed to prevent exposure to workers and to alert authorities for emergency response as needed.</li> </ul>
4.15	Right of Way, Relocations, Access	<ul style="list-style-type: none"> <li>No direct acquisition of property or relocations of residents or businesses</li> </ul>	<ul style="list-style-type: none"> <li>0.9 acres acquired in 36 parcels for Kea'au-Pāhoa Road itself.</li> <li>No relocations of residents or businesses from improvements to Kea'au-Pāhoa Road itself</li> <li>Access management measures would require acquisition of up to 5.48 acres in 145 parcels</li> <li>Minimal effect on driveways in corridor</li> </ul>	<ul style="list-style-type: none"> <li>24.6 acres acquired in 329 parcels for Kea'au-Pāhoa Road itself.</li> <li>No relocations of residents or businesses from improvements to Kea'au-Pāhoa Road itself</li> <li>Access management measures would require acquisition of up to 5.48 acres in 145 parcels</li> <li>Up to 133 driveways have access limited to right-in-right-out</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>Fair and just compensation for property acquired or relocations of residents/businesses as per Uniform Relocation Assistance and Real Property Acquisition Act of 1970.</li> </ul>

**Table 4-20: Summary of Impacts and Mitigation Commitments**

Section	Issue	Impacts of:			Mitigation Commitments
		No-Build	TSM Alt.	Preferred Alternative	
4.16	Construction Impact	<ul style="list-style-type: none"> <li>No construction impacts</li> </ul>	<ul style="list-style-type: none"> <li>Very minor localized construction impacts</li> </ul>	<ul style="list-style-type: none"> <li>Construction impacts on air, noise, surface waters, vegetation, erosion, traffic, property access, utilities, cultural resources, etc.</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> <li>Construction program will limit night work, provide adequate for nearby/impacted properties ,and entail outreach with public</li> </ul>
4.18	Coastal Zone Consistency	<ul style="list-style-type: none"> <li>No action in coastal zone.</li> </ul>	<ul style="list-style-type: none"> <li>Generally consistent with Coastal Zone Management program goals.</li> </ul>	<ul style="list-style-type: none"> <li>Generally consistent with Coastal Zone Management program goals.</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation</li> </ul>
4.19	Indirect/ Cumulative Impact	<ul style="list-style-type: none"> <li>Little direct contribution to indirect or cumulative effects, though adverse effects of increasing congestion and delay on the community may have some contribution.</li> </ul>	<ul style="list-style-type: none"> <li>Minimal direct contribution to indirect or cumulative effects though adverse effects of increasing congestion and delay on the community may have some contribution</li> </ul>	<ul style="list-style-type: none"> <li>Indirect effects from induced growth, though growth is occurring independently of project.</li> <li>Indirect effects from induced traffic from congestion reduction</li> <li>Cumulative effects on vegetation, wildlife, aesthetics, natural/cultural resources, community cohesion, past right-of-way impacts</li> </ul>	<ul style="list-style-type: none"> <li>No significant impacts with mitigation. Mitigation for these varied effects discussed elsewhere in this table</li> </ul>

***THIS PAGE INTENTIONALLY LEFT BLANK.***

## CHAPTER 5: SECTION 4(F) EVALUATION

Section 4(f) of the Department of Transportation Act of 1966, 49 USC 303(c), requires that, prior to the use of any of the land types listed below, it must be determined that there are no prudent and feasible alternatives which avoid such use and that the project includes all possible planning to minimize harm to such resources:

- A publicly owned park
- A publicly owned recreation area
- A publicly owned wildlife or waterfowl refuge
- Land from an historic property that is on or eligible for inclusion in the National Register of Historic Places (NRHP or "National Register")
- Archaeological sites that will be preserved in place

According to FHWA regulations, a "use" can be either (1) direct, (2) constructive, or (3) temporary. [See 23 CFR 771.135(p)]

- A direct use occurs when land from a Section 4(f) resource is permanently incorporated into a transportation project
- A constructive use occurs when the proximity impacts of the project are so severe that they substantially impair the protected activities, feature, or attributes that qualify the resource for Section 4(f) protection
- A temporary use occurs when there is a temporary occupancy of the Section 4(f) property that is adverse in terms of the statute's preservation purposes

In order for a park, recreation area, or wildlife/waterfowl refuge to qualify for protection under Section 4(f) it must be publicly owned and officially designated as a park, recreational area, or wildlife or waterfowl refuge. Historic resources that are listed in, or eligible for listing in, the NRHP are not required to be publicly owned in order to be protected under Section 4(f). Archaeological sites must also be on or eligible for the National Register and important for 'preservation in place' in order to be considered a Section 4(f) resource.

As noted in **Section 4.10: Parks and Recreational Resources**, there are no recreational facilities affected in any way by the project. The Hawai'i County Department of Parks and Recreation has investigated the concept of a park along Kea'au-Pāhoa Road adjacent to the new Pāhoa Fire Station. However, at the present time, the county has not programmed or produced any long-term plans for a park on this site, and no conceptual design plans have been produced to date. (Personal Communication, Robert Fitzgerald, County of Hawai'i Director of Parks and Recreation, 11/12/09). Therefore, Section 4(f) would not apply to impacts upon this property.

There are two historic resources that were identified in the Archaeological Inventory Survey for this project that would be covered by Section 4(f), a historic 1930s-era concrete bridge and the Sacred Heart Church Cemetery. The bridge and cemetery have been discussed in detail in **Section 3.9.3: Historic Resources** and **Section 4.9.2: Historic Resources** and the reader is

suggested to refer to those sections for more information. The discussion that follows focuses on the Section 4(f) implications of these properties and project impacts.

## 5.1 Proposed Action

### 5.1.1 Project Description

HDOT proposes to improve 9.5 miles of Kea'au-Pāhoa Road (State Route 130), from the terminus of the existing four-lane Kea'au Bypass to its intersection with Pāhoa-Kapoho Road as shown in **Figure 1-1: Project Study Area**. State Route 130 is the only roadway that connects the study area with the Hilo area and is the primary conduit for emergency services to access local properties.

The project's purpose is to improve safety, increase capacity, and modernize State Route 130 between Kea'au and Pāhoa. Currently, Kea'au-Pāhoa Road is heavily congested during peak hours. The study area is only a quarter built-out, but it is expected that over the next 20-30 years, population will double, exacerbating an already-congested situation if improvements are not made. Safety for both motorists and non-motorists is a paramount concern, as the roadway serves motor vehicles, the county's Hele-On bus routes, bicyclists, and pedestrians. Vehicle conflict points, at the intersections and numerous driveways, contribute to an accident rate much higher than the statewide average.

### 5.1.2 Project Purpose and Need

**Chapter 1: Purpose and Need for Project** provides a detailed discussion of the need for this project. The Purpose and Need can be summarized as follows:

- Improve Safety. The foremost purpose of the proposed action is to increase safety for all travelers between Kea'au and Pāhoa. The design of the project from a geometric and traffic safety standpoint should address vehicle conflict points along the highway, including intersections and turning points.
- Provide Mobility and Relieve Congestion. Another primary purpose of this project involves improving regional mobility, local mobility and access, and reducing traffic congestion within the Puna District.
- Improve Travel for Alternative Modes. An important purpose of this project is to accommodate the transit system, bicyclists and pedestrians, to provide a more balanced transportation system.
- Address Future Traffic Increases. Improvements that increase accessibility, mobility and safety for local and regional traffic, including vehicular and non-vehicular modes of travel should be adequate for the next 20 to 30 years.

- Support Future Land Use Objectives. The Puna Community Development Plan (PCDP), adopted in 2008, and the Puna Regional Circulation Plan (PRCP), completed in 2005 (but never formally adopted), both envision a future land use concept concentrating future development into village and town centers to serve the local Puna community and address past sprawl and Hilo-centric patterns of travel.
- Enable Civil Defense, Emergency Travel, and Evacuations. Until an alternate parallel route to Kea'au-Pāhoa Road can be constructed, for now, it provides the only route into and out of Lower Puna. This means that it would serve as the primary evacuation route for Civil Defense needs and it also is the primary route first responders use to reach local subdivisions and transport people to Hilo Medical Center, the region's only hospital.

### 5.1.3 Project Alternatives

**Chapter 2: Alternatives** provides a detailed discussion of the alternatives under consideration, including alternatives that were eliminated from analysis in the Environmental Assessment. The Preferred Alternative incorporates the four lane alternative (called Alternative 4 in the Draft EA) along with access management improvements. To summarize, alternatives under consideration include:

- A "No-Build" Alternative, which only includes currently programmed actions
- A Transportation Systems Management (TSM) Alternative, which would make lower-cost improvements along the corridor, including signalizing intersections, access management, and transit improvements but not entail major construction
- **The Preferred Alternative**, which will incorporate all of the TSM improvements above, plus widen Kea'au-Pāhoa Road to four lanes between Kea'au Bypass and Pāhoa-Kapoho Road. This alternative includes improved shoulders/bikeway areas, bus pull-outs, and median treatments, as well as access management measures in adjoining subdivisions.
- Alternative 3, which would incorporate all of the TSM improvements above, plus widen Kea'au-Pāhoa Road to four lanes between Kea'au Bypass and Ainaloa Boulevard, and retain the two lane cross-section between Ainaloa Boulevard and Pāhoa-Kapoho Road. This alternative includes improved shoulders/bikeway areas, bus pull-outs, and median treatments, as well as access management measures in adjoining subdivisions.
- Alternative 5, which would incorporate all of the TSM improvements above, plus widen Kea'au-Pāhoa Road to six lanes between Kea'au Bypass and Paradise Drive, four lanes between Paradise Drive and Kahakai Boulevard, and retain the two lane cross-section between Kahakai Boulevard and Pāhoa-Kapoho Road. This alternative includes improved shoulders/bikeway areas, bus pull-outs, and median treatments, as well as access management measures in adjoining subdivisions.

## 5.2 1930s Era Concrete Bridge

### 5.2.1 Section 4(f) Property

An abandoned concrete bridge and associated asphalt-paved roadway are located adjacent and parallel to the southwestern edge of the existing Kea'au-Pāhoa Road. The SIHP# 50-10-44-26874 bridge is located approximately 630 meters (2,067 feet) northwest of the intersection of Pōhaku/Shower Drives and Kea'au-Pāhoa Road. The bridge is constructed across an intermittent unnamed stream (also called Waipāhoehoe Stream, see **Section 3.7.1: Surface and Groundwater**) which was dry during the current survey. The bridge measures 28.2 meters (92.5 feet) long by 5.8 meters (19.0 feet) wide with an approximate height of 2.8 m (9.1 feet) from the surface of the dry streambed. The bridge is constructed of four angled concrete supports bearing a solid concrete slab measuring approximately 40 cm (16 inches) thick. The bridge is constructed on solid bedrock with pipe and rail posts inset into both the southwestern and northeastern sides of the bridge. Thick vegetation has obscured the northwest end of the bridge as well as the northwestern extension of the associated asphalt-paved roadway. No date or inscriptions were observed on any surface of the bridge. The associated roadway was observed to extend from the southeastern end of the bridge and continue southeast to become an unnamed paved subdivision road that is currently in use. This subdivision road continues southeast to nearly reconnect with Kea'au-Pāhoa Road but has been blockaded at its southeastern end.

The bridge and associated roadway likely functioned as an older alignment of the highway. The stretch of former roadway would have extended approximately 487 meters (1,598 feet) connecting to the present Kea'au-Pāhoa Road at both ends.

A quick review of maps including the 1928 Hawai'i Territory map, the 1944 Hawai'i Island map and the Tax Map Key Zone map does not show the paved roadway adjacent to Kea'au-Pāhoa Road. However, TMK 1-6-04, dated "March 1935, Revised January 27, 1959 and August 6, 1964" shows a bypass identified as State PAR. 30A [4.853 Ac.] in the location of SIHP # 50-10-44-26874. A Geographic Information Systems (GIS) review of the portion of Kea'au-Pāhoa Road containing SIHP # 50-10-44-26874, indicates that the bypass containing the bridge and Kea'au-Pāhoa Road itself are within the same parcel. The associated asphalt-paved roadway and unnamed paved subdivision road that it becomes is visible on an aerial photograph of the project area. The bridge is not listed in the Historic Bridge Inventory and Evaluation (Alvarez 1987) for the island of Hawai'i, nor is it in the State of Hawaii Historic Bridge Inventory and Evaluation (Spencer Mason Architects 1996), but the bridge is constructed in a style that is similar to 1930s concrete slab bridges.

The 1930s era concrete bridge is recommended eligible for the Hawai'i and National Registers under Criterion D.

### 5.2.2 Impacts on 1930s Era Concrete Bridge

This bridge will be demolished as part of the separate Shoulder Lane Conversion project described in **Section 1.2.2.1: The Kea'au-Pāhoa Road Shoulder Lane Conversion Project**, and therefore the bridge will no longer be present at the time that the project covered in this EA is constructed. Thus, the Preferred Alternative will not have any direct impact on this bridge. The bridge has been recommended for demolition as it impedes stream flow and would cause drainage problems during heavy rain events.

The recommendation being made to the SHPD specific effect recommendation is “no effect” as the bridge will have been demolished at the time this project is constructed.

Therefore, while this resource is present in the corridor at the present time, since it will have been demolished prior to construction of the Kea'au-Pāhoa Road Improvements Project, the project will not result in:

- A direct use of this Section 4(f) resource,
- A constructive use of this Section 4(f) resource, or
- A temporary use of this Section 4(f) resource.

### 5.2.3 Avoidance Alternatives

None of the alternatives for this project have any effect on this bridge.

### 5.2.4 Measures to Minimize Harm

To mitigate the impact of demolishing this bridge, data recovery in the form of Historic American Building Survey and Historic American Engineering Record (HABS/HAER) documentation of the bridge has been recommended as part of the Shoulder Lane Conversion project and by the project team on this project as well. Consultation with and the approval of the SHPD with the mitigation proposed above is recommended prior to any proposed alteration to SIHP # 50-10-44-26874.

### 5.2.5 Coordination

Coordination with SHPD has occurred on this project and will continue throughout the EA process and into the final design and construction process as is needed.

## 5.3 Sacred Heart Church Cemetery

### 5.3.1 Section 4(f) Property

A cemetery associated with the Sacred Heart Catholic Church in Pāhoa abuts the current right-of-way limits, at the intersection of the Pāhoa Bypass and Pāhoa-Kapoho Road (Old Pāhoa Road). The Sacred Heart Catholic Church and its cemetery are components of the Pāhoa Historic and Commercial District, SIHP # 50-10-55-7388 (Department of Transportation

1979:F1). Original documentation describes the church building that was constructed in 1898. Other buildings are briefly described as, "an outhouse and the rectory". The only description of the cemetery is, "A small graveyard is located in the rear" [of the lot] (Department of Transportation 1979:F-3).

A "path of meditation" was noted within 16 meters (52.5 feet) from the edge of the asphalt of the existing Kea'au-Pāhoa Road at the intersection with Old Pāhoa Road. This path of meditation includes landscaped areas containing basalt stone alignments, basalt pebble pavement, cement and basalt constructions, wooden crosses, and at least one wooden placard inscribed with family names. No burials are believed to be associated with this path of meditation. A miniature replica of Sacred Heart Catholic Church is found on the eastern edge of the church property. The church property improvements and amenities do not extend into the existing or future anticipated highway right-of-way limits but the path of meditation landscaping extends to the edge of the existing highway right-of-way.

The Sacred Heart Catholic Church cemetery is a component of the Pāhoa Historic and Commercial District, and is recommended eligible for the Hawai'i and National Registers under Criterion D.

### **5.3.2 Impacts on Sacred Heart Church Cemetery**

As noted in **Section 4.9.2: Historic Resources**, the Sacred Heart Church Cemetery is outside of the Area of Potential Effect of the project. It borders on both the existing and future project right-of-way.

There will be no direct impacts upon the Sacred Heart Church Cemetery property by any alternative, including the Preferred Alternative, which would construct a four-lane cross-section in the vicinity of the cemetery but not encroach any closer to the cemetery than the current highway. The No-Build Alternative and TSM Alternative will not involve any reconstruction in the vicinity of Sacred Heart Church Cemetery. Alternatives 3 and 5 would retain the existing two-lane cross-section in the vicinity of the cemetery. All project alternatives will remain within the existing right-of-way limits.

There will be no constructive use of this property. It is currently in close proximity to the existing highway, and will remain so in the future. Usage of the cemetery will not be altered or affected by the project.

No temporary use of the cemetery property is anticipated.

### **5.3.3 Avoidance Alternatives**

The No-Build and TSM Alternatives would not require any construction in this area, but neither meets the Purpose and Need for this project.

All Build Alternatives, including the Preferred Alternative would reconstruct Kea'au-Pāhoa Road in this area. There is no alternative alignment under consideration that would enable the area to be totally avoided by the project. The project terminates at the existing Pāhoa-Kapoho Road

intersection, and therefore, it would not be possible to shift the alignment to the makai side of the roadway away from the cemetery as it would then not line up with this intersection.

### **5.3.4 Measures to Minimize Harm**

The design of the facility in this area will ensure that no direct impacts on the cemetery are anticipated.

The institution of interim protection measures just prior to and during any project related work in the immediate vicinity is recommended. Specifically, the erection of continuous, orange-web "event fencing" or some similar barrier is recommended prior to any project related work within 50 feet of the Sacred Heart Catholic Church property. This interim protection could be carried out and documented under monitoring archaeologist supervision.

### **5.3.5 Coordination**

Coordination has taken place with the State Historic Preservation Division as part of the Archaeological Impact Survey and Cultural Impact Assessment for this project. This coordination will continue through the rest of the Environmental Assessment process

***THIS PAGE INTENTIONALLY LEFT BLANK.***

## CHAPTER 6: DETERMINATION OF SIGNIFICANCE

The purpose of the Environmental Assessment under the National Environmental Policy Act (NEPA) process at the Federal level and the Chapter 343 process at the state level is to assess the anticipated impacts of the project and determine if there would be any “significant” impacts. If no significant impacts are anticipated with the inclusion of mitigative measures that reduce all impacts to below the level of significant, a Finding of No Significant Impact (FONSI) is prepared under both state and federal processes, and the project can proceed into final design, right-of-way acquisition, and construction. If the Environmental Assessment determines there will be significant impacts, an Environmental Impact Statement (EIS) must be prepared.

“Significance” differs for NEPA and Chapter 343. At the federal level, significance is determined specific to the project’s context and issues. At the state level in Hawai’i, there are 13 formal criteria used for determining significance.

At the state level, a transmittal letter has been submitted by HDOT, as both “Proposing Agency” and “Approving Agency” to the Office of Environmental Quality Control (OEQC) that recommends a Negative Declaration and that a FONSI is warranted. A 30-day review period must be completed before FHWA can issue a FONSI at the federal level.

This determination of significance is for the Proposed Action, which is the Preferred Alternative described in detail in **Section 2.2: Proposed Action – Four Lane Highway With Associated Access Management Improvements**. It should be noted that all Build Alternatives were found to have no significant impacts.

### 6.1 Findings Under Hawai’i Chapter 343

#### 6.1.1 Significance Criteria

To determine whether a proposed action may have a significant effect on the environment under Hawai’i Administrative Rules (HAR) Title 11, Chapter 200, the Approving Agency (HDOT) needs to consider every phase of the action, the expected primary and secondary consequences, cumulative effect, and the short- and long-term effects. The Approving Agency’s review and evaluation of the proposed action’s effect on the environment can result in a determination that: 1) the action would have a significant effect on the environment, and an Environmental Impact Statement Preparation Notice should be issued, or 2) the action would not have a significant effect, and a FONSI is warranted.

This section provides an assessment of the Preferred Alternative’s impacts in relation to the 13 Significance Criteria prescribed under the State Department of Health’s Administrative Rules Title 11, Chapter 200. The purpose of this assessment is to consider the “significance” of potential environmental effects which includes the sum of effects on the quality of the environment along with the overall and cumulative effects.

1. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;

The Preferred Alternative will not have impacts on natural or cultural resources of any significance after mitigation. As noted above in **Chapter 4: Environmental Impacts and Mitigation Measures**, the corridor is generally highly disturbed from both the existing roadway environment and from the high level of development that has taken place in the properties adjoining the corridor. Vegetation consists mostly of alien species. Even in those portions of the corridor where natural vegetation is found, the natural setting has been degraded from its original state. There were minimal impacts anticipated on wildlife in the corridor for similar reasons. No threatened or endangered species were found in the corridor.

There were no archaeological resources identified in the project corridor during the field survey. One affected historic property, a 1930s-era concrete bridge, will be demolished as a result of an earlier project in the corridor. The specific effect recommendation being made to the SHPD is "effect, with proposed mitigation measures." The recommended mitigation measures, data collection (which has already taken place) will reduce any impacts on this property and bring them down below the level of a significant impact.

As noted above in **Section 3.9.4: Cultural Practices**, the Cultural Impact Assessment (CIA) found that the Preferred Alternative would create no impact to traditional cultural practices along the corridor, with the potential exception of the activities that are ongoing at the Maku'u Farmers Market Association site. As described above in **Section 4.9.3: Cultural Practices**, the design of the roadway in the vicinity of this site has been focused on avoiding impacts on the site to the greatest degree possible. Under the Preferred Alternative, a bus stop and bus pullout area will help improve accessibility of the site to transit-dependent persons but will affect a narrow strip of the property immediately next to Kea'au-Pāhoa Road. Impacts will be limited to the need to relocate power poles in the area and to provide the bus stop and pullout area.

**Section 4.9.3: Cultural Practices** also recommends other general measures for mitigating cultural effects of the project below a level of significance. These include archaeological monitoring during construction (ground disturbance), masking and buffering ancient trails, taking special care in the vicinity of the Kazumura Cave lava tube, and coordinating with W. H. Shipman, Inc. regarding provision of agricultural accesses.

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

The Preferred Alternative will not curtail the range of beneficial uses of the environment after mitigation. As the project intends to improve an existing roadway, the areas of impact are generally highly disturbed. The project is consistent with plans for the area and will enhance beneficial uses of the environment by providing improved opportunities for increased multi-modal travel in the corridor, specifically transit, bicycling, and pedestrian use.

3. Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;

HRS Chapter 344 establishes a state policy which encourages productive and enjoyable harmony between people and their environment, promotes efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, and enriches the understanding of the ecological systems and natural resources important to the people of Hawaii.

The Preferred Alternative contains mitigation for impacts on land, water, mineral, visual, air and other natural resources to ensure that there are no significant adverse impacts consistent with Chapter 344. Some of these mitigative measures include Best Management Practices (BMPs) and permits that will minimize emissions of fugitive dust/air emissions, prevent erosion/sedimentation and protect water quality. Other representative mitigative measures include permit requirements to limit hours of noise impacts, measures to minimize impacts on endangered/threatened species, landscaping with native species for ecological/visual benefits, and improving drainage in the corridor to address current problems.

Section 3(2)(C) of Chapter 344 calls for establishing communities which provide a sense of identity, wise use of land, efficient transportation, and aesthetic and social satisfaction in harmony with the natural environment which is uniquely Hawaiian. The Context Sensitive Solutions (CSS) process followed for this project resulted in the Preferred Alternative meeting the overall goal of aspiring to meet the ideals espoused in Section 3(2)(C).

4. *Substantially affects the economic welfare, social welfare, and cultural practices of the community or State;*

The Preferred Alternative will beneficially affect the economic and social welfare of the community and state. Lower Puna has been underserved by community services historically, including transportation and emergency services. Deficiencies along existing Kea'au-Pāhoa Road have resulted in a facility with a high accident rate, and high levels of congestion that result in long commute times, all of which have adverse social effects on the community. The project will increase mobility of the residents of lower Puna, and improve accessibility to school, jobs, and other life activities by adding bike lanes, pedestrian areas, crosswalks, and transit pull-outs. The project will also create construction jobs.

5. *Substantially affects public health;*

The Preferred Alternative is anticipated to have a net positive effect on public health, particularly in improving access to the region's hospital in Hilo. Effects on air quality, water quality, and noise levels, are expected to be only minimal in magnitude. Improved safety for pedestrians, bicyclists and motorists and a lower accident rate are expected. The mitigative measures proposed in this EA will abide by all applicable state and county standards and rules. Improved opportunities for transit, pedestrians, and bicycles in the corridor will support modes of transportation that encourage physical activity and benefit public health.

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

The lower Puna area has been confronting challenges that originated when the large non-conforming subdivisions flanking Kea'au-Pāhoa Road were created in the 1950s through early

1970s. The rapid growth that has taken place in these subdivisions and the large number of available lots for additional development spread over a vast area will create an unsustainable future condition unless action is taken to direct growth in Puna in a more concentrated, strategic manner. Furthermore, the area is dependent on longer-distance trips to Hilo as a center of employment, education, and other services. The Puna Community Development Plan (PCDP) attempts to address these problems through a directed land-use strategy of village and town centers.

In many ways, the Kea'au-Pāhoa Road improvements are a response to rapid growth. They are consistent with the PCDP's vision for the corridor. While there is potential for additional growth to be induced by the increased mobility offered by improvements to Kea'au-Pāhoa Road, the implementation of the PCDP will direct the growth in a concentrated, planned manner by way of the village and town centers. Improved regional access to the village and town centers from an improved Kea'au-Pāhoa Road will strengthen the viability of those areas to serve the greater Puna community by encouraging employment and services that are not present today.

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

The Preferred Alternative would not result in a substantial degradation of environmental quality. While there would be temporary construction effects and long-term effects from conversion of non-highway property to a transportation use, impacts will be mitigated in accordance with federal, state, and county regulations and permit conditions to avoid substantial degradation of environmental quality.

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

As discussed in **Section 4.19.2: Cumulative Impacts**, there will be some cumulative effects from the Preferred Alternative, but these are not significant effects. The effects of the project will generally be mitigated in accordance with federal, state, and county regulations and permit conditions to avoid a cumulative effect resulting from this project in conjunction with other past, present, and reasonable foreseeable future actions.

The No-Build Alternative, in contrast, will create impacts, not mitigated, that will contribute to a cumulative effect on the social environment as traffic congestion, accidents, and reduced mobility compromise Puna's quality of life.

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

Botanical and faunal studies were conducted for this EA. Overall, the Kea'au-Pāhoa corridor is highly disturbed and as described in **Section 4.6.2: Fauna**, there are minimal resources of importance. No significant impacts are anticipated to rare, threatened/endangered species or critical habitat with the mitigative measures proposed for this project.

*10. Detrimentially affects air or water quality or ambient noise levels:*

The Preferred Alternative will not result in an exceedance of federal or state air quality standards, and the overall regional benefit to air quality will be positive with a reduction in

congestion and idling vehicles in the corridor. The project will encourage alternative modes of travel, specifically transit, bicycling, and pedestrian activity, and increasing these modes in the corridor will have a beneficial effect on air quality as well. There will be some short-term impacts to air quality associated with construction activities, but these impacts will be mitigated through Best Management Practices.

Water quality in and around the corridor will not deteriorate as compliance with federal, state, and county regulations will prevent adverse impacts, both during and after construction.

Traffic noise levels are already generally high and will increase substantially by 2038 even under the No-Build Alternative. Future increases in noise specifically associated with the project compared to the No-Build Alternative would generally be imperceptible along the main corridor of Kea'au-Pāhoa Road; there will be some localized impacts within subdivision areas where roads are improved. Nonetheless, the project will result in exceedances of the FHWA/HDOT Noise Abatement Criteria. As noted in **Section 4.5.2: Mitigation of Project-Related Noise**, noise mitigation was evaluated, but the potential for noise barriers is limited because of the large number of driveways in the corridor. Noise mitigation for individual properties will be implemented if reasonable and feasible, to reduce impacts to affected properties. Potential short-term construction noise impacts are possible during the project construction period. However, noise impacts would be minimized with the use of standard curfew periods, properly muffled equipment, administrative controls, and construction barriers as required.

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

The project site is not within a tsunami zone, erosion prone area, or near coastal waters.

An unnamed intermittent stream (referred by some as Waipāhoehoe Stream) is crossed by the current Kea'au-Pāhoa Road. The bridge over this stream may need to be widened depending upon the alternative selected and design. Demolition of a nearby unused bridge structure will take place as part of the Shoulder Lane Conversion project that precedes this project as described in **Section 1.2.2.1: The Kea'au-Pāhoa Road Shoulder Lane Conversion Project**. That demolition is anticipated to improve the drainage of this stream. The stream is not directly connected hydrologically to the ocean and is not anticipated to be a Water of the United States. Impacts on this stream will be mitigated through compliance with federal, state, and county regulations. Best Management Practices during construction will prevent erosion and sedimentation.

The project corridor, and for that matter, all of the Puna District is threatened by volcanic hazards from Kīlauea volcano as well as earthquakes, but the corridor is not unusually sensitive to these hazards compared to other areas in the vicinity. There are numerous lava tubes that underlie this part of Puna, including the Kazumura Lava Tube Cave and Pāhoa Cave. **Sections 4.9.1: Archaeological Resources** and **4.9.2: Historic Resources** discuss measures for archaeological monitoring of the corridor to avoid or minimize effects on lava tubes.

12. Substantially affects scenic vistas and viewplanes identified in county or state plans or studies;

The project corridor is already affected by the existing roadway and by the highly developed nature of much of the adjoining land use. The Preferred Alternative will not block scenic vistas or viewplanes identified in county or state plans or studies. The project has followed a Context Sensitive Solutions (CSS) process in order to involve the community in the planning for the project to ensure a facility that is appropriate for the context of the lower Puna District. Landscaping and design decisions in final design will strive for a facility that is complementary to the adjoining properties and community at large.

Implementation of roundabouts will provide landscaping and aesthetic opportunities in the middle of the roundabout.

13. Requires substantial energy consumption.

The Preferred Alternative will require an expenditure of energy during construction of the project, and street lights and traffic signals will consume energy after construction is completed. However, these minor outlays of energy will be greatly compensated for many times over by the great improvement in traffic operations, which will reduce congestion and wasted fuel.

### **6.1.2 Determination of Significance Under Chapter 343**

Based upon the information and results of the assessments conducted for the project site a Finding of No Significant Impact (FONSI) determination is warranted for the Kea'au-Pāhoa Road Improvements Project under the Proposed Action, the Preferred Alternative. No Environmental Impact Statement would be required. The findings supporting this determination are based upon the previous discussion of the project's effect on the environment in relation to the 13 Significance Criteria.

## **6.2 Finding of No Significant Impact Under NEPA Process**

No significant impacts are anticipated under the NEPA process and a FONSI is expected from FHWA after a 30-day review period of this Final EA has been completed. **Table 6-1: Summary of Impacts and Mitigation Commitments Resulting in FONSI** briefly describes the impacts expected under this project and the measures that will be taken to reduce the level of severity to below "significant," thereby justifying a FONSI. For more details on these impacts and mitigation measures, refer to either **Table 4-20: Summary of Impacts and Mitigation Commitments** or the respective sections of the document listed in the table.

**Table 6-1: Summary of Impacts and Mitigation Commitments Resulting in FONSI**

<b>EA Sec.</b>	<b>Resource/ Issue</b>	<b>Preferred Alternative's Impact</b>	<b>Mitigation Commitments Resulting in No Significant Impact</b>
4.1	Land Use	Consistent with all plans including Puna CDP	None needed
4.2	Traffic and Transportation	Greatly improved traffic operations; addresses Purpose and Need of Project	BMPs during construction to minimize delay
4.3	Social/ Community Impacts	Positive benefits to community	None needed
4.4	Air Quality	Short-term construction phase air quality impacts	BMPs to minimize fugitive dust and emissions from equipment
4.5	Noise	Imperceptible increase in noise on main highway compared to No-Build; Some new traffic noise in subdivisions from access changes	Construction noise mitigated with permit to control equipment and hours of construction
4.6.1	Flora	Minor strip acquisition of mostly disturbed vegetation; no sensitive botanical resources present	Landscaping to provide native, non-invasive species, benefitting biological resources in area
4.6.2	Fauna	Limited habitat; limited potential for adverse impacts on wildlife from vegetation removal at certain times of year or lighting that disorients birds.	Shielding of lights and limitations on times of year for vegetation removal to minimize impacts
4.6.3	Aquatic Biota	Minimal impact as habitat and resources are very limited	Best Management Practices (BMPs) and National Pollution Discharge Elimination System (NPDES) permit minimize impacts
4.7.1	Surface/ Groundwater	Surface waters very limited in area due to geology. No underground injection.	Runoff treatment through BMPs. National Pollution Discharge Elimination System (NPDES) permit
4.7.2	Wetlands	No jurisdictional wetland affected, one small non-jurisdictional area with some wetland characteristics potentially affected	Impact minimized as much as possible. Treatment of runoff.
4.7.3	Floodplains & Hydrology	No floodplains mapped in area; drainage will be improved.	Drainage treatments to detain and dispose of runoff. Culverts and bridges improved as needed
4.8	Natural Hazards	Unknown potential for affecting lava tubes. Improved capacity for evacuation.	Archaeological monitoring during construction to avoid or minimize effects on breaching lava tubes.
4.9	Archaeological Resources, Historic Resources and Cultural Practices	No effect on known archaeological or historic resources. Limited potential for affecting unknown resources. Impacts on cultural practices at Maku'u Farmers market minimized	Resources avoided. Archaeological monitoring during construction. A barrier will protect cemetery from construction in adjacent highway right-of-way. Ancient trails will be masked and buffered.
4.10	Parks and Recreation	None	None
4.11	Agricultural Lands	Minimal impacts on small strips of land	Coordination will take place with the Natural Resources Conservation Service. Work with agricultural property owners to ensure no problems with access changes

**Table 6-1: Summary of Impacts and Mitigation Commitments Resulting in FONSI**

<b>EA Sec.</b>	<b>Resource/ Issue</b>	<b>Preferred Alternative's Impact</b>	<b>Mitigation Commitments Resulting in No Significant Impact</b>
4.12	Visual Environment	Changes to visual character of area. Roundabouts will provide landscaping and aesthetic opportunities	Context Sensitive Solutions (CSS) process involved the community to ensure facility appropriate for area. Landscaping with native species. Streetlights shielded to avoid light pollution per County code
4.13	Utilities	Relocations of utility poles; water lines end up under roadway; relocation of hydrants	Coordination with utilities and customers to pay for relocations and minimize disruption
4.14	Hazardous Materials	Very limited potential impacts from hazardous materials	Standard procedures followed if contamination is encountered.
4.15	Right of Way, Relocations, and Access Changes	24.6 acres acquired in 329 parcels for Kea'au-Pāhoa Road itself. Access management measures require acquisition of 5.48 acres in 145 parcels. No relocations. Up to 133 driveways have access limited to right-in-right-out.	Fair and just compensation for property acquisition per Uniform Relocation Assistance and Real Property Acquisition Act of 1970.
4.16	Construction Impacts	Construction impacts on air, noise, surface waters, vegetation, erosion, traffic, property access, utilities, cultural resources, etc.	Best Management Practices. Construction program will limit night work, provide adequate for nearby/impacted properties, and entail outreach with public
4.18	Coastal Zone Management Consistency	Consistent with Coastal Zone Management program goals.	Mitigative measures cited throughout Final EA
4.19	Indirect/ Cumulative Impacts	Minimal induced growth and traffic. Cumulative effects on vegetation, wildlife, aesthetics, natural/cultural resources, community cohesion, past right-of-way impacts	Mitigative measures cited throughout Final EA

## **CHAPTER 7: PUBLIC INVOLVEMENT AND AGENCY CONSULTATION**

### **7.1 Community Participation and CSS Process**

HDOT and the consultant team have been conducting a rigorous community participation program for the proposed project.

The use of the Context Sensitive Solutions, or CSS, approach was fundamental in designing and implementing the community participation program. The core principles of CSS apply to transportation processes, outcomes and decision making, and include:

- Strive towards a shared stakeholder vision to provide a basis for decisions,
- Demonstrate a comprehensive understanding of contexts,
- Foster continuing communication and collaboration to achieve consensus, and
- Exercise flexibility and creativity to shape effective transportation solutions, while preserving and enhancing community and natural environments.

Project team efforts to engage minority and low income groups in the planning and alternatives development for the proposed project are discussed in **Section 3.3.2.3: Incorporation of Title VI and Environmental Justice Requirements into the Proposed Project**.

Highlights of the community participation program are described below.

#### **7.1.1 Kea'au-Pāhoa Road Advisory Group (KPAG)**

Development of the proposed project included a representative group of community leaders in the KPAG. Further, it also means that a portion of the community was aware of the project processes due to the networks of members of the KPAG.

Between August 2008 and October 2010, KPAG and the project team held ten meetings, one of which occurred over a two-day period

The following issues were discussed at the KPAG meetings. Meeting summaries, comments received, and accompanying materials are available upon request from HDOT. All meetings offered the public opportunity for questions and comments.

- Meeting 1, held on August 26, 2008, introduced the new KPAG and discussed the Context Sensitive Solutions concept. KPAG members were given workbooks and disposable cameras to establish the context of the region and a sense of place.
- Meeting 2, held on September 22, 2008, provided an overview of the environmental review process, and further discussed the CSS process. It also included a work session for formulating the project's Purpose and Need.

- Meeting 3, held on October 27, 2008, provided a status report on the County's Transit System and Puna Community Development Plan, had breakout groups develop a "Universe of Alternatives" for the project, and presented traffic forecasts.
- Meeting 4 was held on two days, December 8 and December 9, 2008. Day one completed the KPAG's Purpose and Need statement with a voting effort, refined and confirmed the "Universe of Alternatives", and provided technical discussion on intersection treatments and roundabouts. Day two confirmed the results of the Purpose and Need voting, discussed traffic forecasts and Level of Service, discussed accident data, provided an overview of highway design guidelines, and three breakout groups screened a reasonable set of alternatives from the "Universe of Alternatives."
- Meeting 5, held on January 26, 2009, reviewed the reasonable set of alternatives from Meeting 4. KPAG members voted on the types of evaluation criteria identified for the reasonable set of alternatives. A brief discussion of intersections and roundabouts took place. KPAG members helped plan future Public Informational Meetings.
- Meeting 6, held on March 30, 2009, went into detail on existing and anticipated traffic conditions and Level of Service, along with corridor access management strategies. The KPAG approved the prioritization of evaluation criteria from the preceding meeting. A review of the Environmental Assessment process was provided. Further planning for two Public Informational Meetings on April 29 and 30, 2009 was discussed.
- Meeting 7, held on September 28, 2009, provided an overview of the Environmental Process and its timeline. The designs of the five alternatives discussed in the Draft EA were discussed. A discussion of some of the soon-to-be-completed environmental studies (botany, fauna, aquatic resources, hydrology, archaeology, and cultural impacts) were provided to the group.
- Meeting 8, held on October 21, 2009, included a group field trip out to the corridor to consider the issues affecting the improvements to the main intersections. The issues of connectivity, village centers, and the potential to create access-management improvements were discussed. A special presentation by a national expert on roundabouts comprised a substantial amount of the meeting.
- Meeting 9, held on April 5, 2010, included an overall summary of the Draft Environmental Assessment and explained the process for releasing the Draft Environmental Assessment to the public. The public comment period and public hearing were discussed.
- Meeting 10, held on October 18, 2010, included a review of the comments received on the Draft EA, the proposed selection of Preferred Alternative 4, and a discussion about additional analysis needed to complete the Final EA.

### **7.1.2 Public Information Meetings and Public Review**

A public meeting was held at the onset of the project in April, 2008 at the Kea'au Community Center. The project approach was presented, including the process for developing alternatives, the use of the Context Sensitive Solutions approach in project development, and the overall public involvement program that included the KPAG.

Two public meetings were held in April 2009 at the Pāhoa Intermediate/High School and Kea'au Elementary School to present the findings of the KPAG process to date.

A public review and comment period was offered with the release of the Draft EA, and ran from May 23, 2010 through July 23, 2010

A public hearing was held during the public review period for the Draft EA on June 29, 2010. The evening's proceedings started with an open house portion, with 12 stations illustrating the issues associated with the project. Following the open house, a formal presentation included a discussion about the environmental process and the Draft EA document. Public testimony was taken in verbal form during a testimony period. Written testimony was also accepted during the evening.

### **7.1.3 Project Website**

A project website, <http://www.keaau-pahoa.com/> provides:

- An overview of the project,
- Notices about KPAG meetings
- Notices about Public Information Meetings and Public Hearings, and
- An opportunity for the public to comment or make inquiries about issues related to the project.

## **7.2 Comments and Responses on the Draft EA**

Notification on the availability of the Draft EA was provided in the May 23<sup>rd</sup> *Environmental Notice* published by the Office of Environmental Quality Control (OEQC). Information about the Draft EA's availability, how to comment, and the public hearing were made in the Hawai'i Tribune Herald, West Hawai'i Today, and Big Island Weekly.

The Draft EA was made available for public review in a number of forms, including hard copies, electronic copies (on CD) and public download accessible from the project website and the OEQC website. Hard copies were made available at all area libraries and were also provided upon request. A total of 32 hard copies and 140 CD copies were distributed. Emails were also distributed to 24 interested parties.

A 60-day public review and comment period was offered with the release of the Draft EA, and ran from May 23, 2010 through July 23, 2010. During the comment period, a public hearing on June 29, 2010 explained the findings of the Draft EA to the public and allowed direct verbal and

written testimony on the project. Therefore, interested members of the public were afforded a range of opportunities to comment directly: via the project website, email, mailed letters, verbal testimony at the hearing, and written testimony at the hearing.

Written comments received in the comment period and direct responses are found in **Appendix B-2: Citizen Comments and Responses on the Draft EA**. In total, 11 comment letters and emails were received from eight citizens. At the public hearing, two individuals provided written testimony and 17 people gave oral testimony. Testimony offered during the public hearing on June 29, 2010 and responses to the issues raised in the testimony is shown in **Appendix B-3: Public Hearing Testimony**. All comments received from the community were addressed in the Final EA.

The community offered a wide range of comments. In particular:

- Commenters universally noted the urgency of the project and the need to expedite its construction to address pressing safety and congestion concerns. A number of commenters focused on rapid growth in lower Puna, and the expectation that this growth would continue and that the future facility needed to not only address current needs, but be built for the future traffic demands.
- A number of commenters cited dangerous conditions that are present at a number of intersections in the corridor, and in many cases described specific crash incidents at problem locations. Commenters focused on poor sight distances, lack of gaps in traffic during peak conditions, the need for safe turn lanes, and other challenges to safe travel. Many noted high accident rates.
- Congestion and delay, especially for commuters, were common concerns raised by many commenters. Several commenters noted problems with motorists cutting through residential subdivisions to bypass congestion along the main highway. The bottleneck at the end of the Kea'au bypass was also cited as a problem.
- The majority of commenters expressing an opinion on a roadway cross section supported a divided four-lane-wide highway as proposed in the Preferred Alternative, as they noted that four lanes would provide needed capacity, passing opportunities, and better travel times. However, a few commenters wanted the highway to remain two lanes wide with only Transportation Systems Management (TSM) improvements instituted (see **Chapter 2: Alternatives and Proposed Action**). Part of that support for TSM was a perception that it could be built much faster and for much less cost. In response to these concerns, the Preferred Alternative will implement all of the the TSM measures, and its phasing will be implemented such that these improvements will come first.
- Little support was received for the six-lane cross-section that would be associated with Alternative 5, as it was viewed by a number of commenters as out of scale with the rural and residential nature of the corridor.
- Widespread support was shown for improving the corridor for bus travel, pedestrians, and bicycling. Crosswalks were another repeated need, as many commenters feel it is difficult

or impossible for pedestrians to cross the highway safely, and further widening of the highway would make crossings even more challenging. Commenters noted that poor lighting and a lack of separation from traffic with pedestrians, bus riders, and bicycles endanger users of these alternative modes.

- Commenters showed mostly support but some opposition to traffic signals at major intersections. Some commenters expressed the need for traffic signals to accommodate safe traffic movements at intersections, and even noted that lower Puna has been neglected in the provision of traffic signals compared to other regions. Other commenters, however, were concerned that traffic signals along the corridor would serve as impediments to travel, and would make traffic stop frequently, thereby increasing travel times.
- There was also a diversity of opinion on providing roundabouts in the corridor. A substantial number of commenters expressed support for roundabouts, citing their benefits for safety by reducing conflict points, slowing traffic, aesthetics, efficient traffic operations, and cost savings. They also noted the success of roundabouts in other places. On the other hand, some commenters expressed skepticism about roundabouts, stating that they could be confusing for drivers and could be challenging for bicycles to navigate them. Several opponents to roundabouts equated them with much larger multi-lane traffic circles in places such as Washington, DC.
- A substantial number of commenters expressed universal support for the need to provide a second parallel facility to serve lower Puna along Railroad Avenue, an initiative of the County of Hawai'i known as the Puna Makai Alternate Route (PMAR).
- Several commenters cited concerns about traffic operations and access to businesses near Old Pāhoa Road, in both the existing Pāhoa Marketplace (Malāma Market) and the new Woodlands Center shopping center, which was still under construction at the time the comments were made. A right-in-right-out opening of the mauka side of the Kahakai Boulevard intersection has been subsequently built to address these needs.
- Those commenters that mentioned the Puna Community Development Plan (PCDP) universally noted the need for the project to be compatible with PCDP's vision for the region.

## 7.3 Agency Consultation

Stakeholders from county, state, federal agencies were consulted throughout the Draft EA and Final EA processes. Pre-assessment comments were solicited from agencies to help provide input and guidance on issues that should be considered in the Draft EA. A total of 15 agencies responded as shown in **Appendix B-1: Agency Consultation on the Draft EA**.

Copies of the Draft EA were sent to stakeholder agencies and comments were requested. A total of 17 agencies (one federal, 11 state, and five county) provided input on the project. No agencies cited opposition to the project. Consultation processes that are required by state and federal law have been followed on this project. They include consultation with:

- The State Historic Preservation Division (SHPD), required under Section 106 of the National Historic Preservation Act and Hawai'i Revised Statutes Chapter 6E-48. The project will have no effect on a historic bridge, and a cemetery.
- The US Army Corps of Engineers (USACOE), required under Sections 401 and 404 of the Clean Water Act. USACOE determined that there are no Waters of the US under the Corps' jurisdiction in the corridor.
- The US Fish and Wildlife Service, under Section 7 of the Endangered Species Act. No threatened or endangered species were found in the study area. Species known to exist on Hawai'i Island that are of concern will be provided standard mitigation measures to protect them.

Agency consultation with these and other stakeholder agencies will continue as needed through the design and construction processes.

## **7.4 Pre-Assessment Consultation**

Consultation with various Federal, State and County government agencies was conducted to obtain their comments and concerns associated with the project as part of the environmental assessment process.

Letters providing project information along with a preliminary site plan were sent to 57 consulted parties dated May 1, 2009 to solicit their initial comments and concerns associated with the project as part of the preparation of the Draft EA. Two letters, one to a house of worship in the corridor and one to a community organization, were returned as undeliverable.

A listing of agencies and organizations for which consultation letters were sent is provided in the Draft EA.

## CHAPTER 8: LIST OF PREPARERS

This Final Environmental Assessment Report has been prepared by SSFM International, Inc. 99 Aupuni Street, Suite 202, Hilo HI 96720.

The following tables list the preparers of this report.

Name/Credentials	Representing	Role
Abraham Wong, PE, Division Administrator	Federal Highway Administration	Approving Official
Glenn Okimoto, Director of Transportation	Hawai'i Department of Transportation	Approving Individual
John Nickelson, PE	Federal Highway Administration	Reviewer
Clifford Chew, PE	Federal Highway Administration	Reviewer
Jodi Chew, PE	Federal Highway Administration	Reviewer
Jiro Sumada, PE, Deputy Director, Highways Division	Hawai'i Department of Transportation	Reviewer
Ed Sniffen, PE, Highways Administrator	Hawai'i Department of Transportation	Reviewer
Ken Tatsuguchi, PE, Head Planning Engineer	Hawai'i Department of Transportation	Reviewer
Nelson Sagum, PE	Hawai'i Department of Transportation	Reviewer
Lance Manabe, PE	Hawai'i Department of Transportation	Reviewer
<b>Consultant Team</b>		
Name/Credentials	Representing	Role
Cheryl Soon, FAICP, Ph.D	SSFM International, Inc.	Project Management, QA/QC, Document Review
Douglas Zang, AICP	SSFM International, Inc.	Primary Document Author
Robin Barnes, PE	SSFM International, Inc.	Civil Engineer
Michael Packard, PE, PTOE	SSFM International, Inc.	QA/QC, Traffic Engineering Data
Heather Forester	SSFM International, Inc.	Document Assistance and Public Involvement

<b>Sub-Consultant Team</b>		
<b>Name/Credentials</b>	<b>Representing</b>	<b>Role</b>
Eric Guinther, Ecologist and Biologist	AECOS	Aquatics Resources and Water Quality
Barry Neal, Certified Consulting Meteorologist (CCM)	B.D. Neal & Associates	Air Quality
Geoff Casburn, PE	CMF Engineers	Hydrologic and Hydraulic Engineering
Hallett H. Hammett, Ph.D	Cultural Surveys Hawai'i	Archaeology Inventory Survey
Auli'i Mitchell, Cultural Anthropologist	Cultural Surveys Hawai'i	Archaeology Inventory Survey/Cultural Impact Assessment
Dana Dorsch	D.L. Adams & Associates	Noise Assessment
Roger Dyar, PE	Roger Dyar	Traffic Impact Study
Berna Cabacungan Senelly, Community Planner	Earthplan	Social Impact Assessment
Ron Terry, Ph.D	Geometrician Associates	Botanical Resources
Francis Hirakimi, PE	MK Engineers	Electrical Design and Utility Relocations
Reggie David, Terrestrial Vertebrate Biologist	Rana Biological Consulting, Inc.	Fauna / Avifauna

## CHAPTER 9: REFERENCES

- AECOS, Inc. 2004. Biological and water quality reconnaissance survey of an unnamed stream along Kea'au-Pāhoa Road, Puna District, Island of Hawai'i. Prep. for Wilson Okamoto and Associates. AECOS No. 1054A: 7 pp.
- AECOS, Inc. 2009. Supplemental surveys for the Kea'au Pāhoa Road, Shoulder Lane Conversion Project, Puna District, Island of Hawai'i. Prep. for Wilson Okamoto and Associates. AECOS No. 1054B: 15 pp.
- Allred, Kevin and Carlene Allred. 1997. "Development and Morphology of Kazumura Cave", *Hawaii Journal of Cave and Carst Studies* 59 (2): 67-80. April 1997
- Alvarez, Patricia M. 1987. *Historic Bridge Inventory and Evaluation Island of Hawai'i*. Prepared for the State of Hawaii Department of Transportation Highways Division, in cooperation with the U.S. Department of Transportation Federal Highway Administration, Honolulu.
- American Association of State Highway and Transportation Officials (AASHTO), 2004. Policy on Geometric Design of Highways and Streets. ("AASHTO Green Book").
- American Society of Civil Engineers, 1996. *Hydrology Handbook*, Second Edition
- Asquith, A. 1995. Hawaiian Damselfly Survey: Population Checklist of Category 1 Candidate 12 Species. Unpublished Document, U.S. Fish & Wildlife Service, Pacific Islands Office, Honolulu, HI.
- Bonaccorso, F. J., C. M. Todd and, A. C. Miles. 2005. Interim Report on Research to Hawaiian Bat Research Consortium for The Hawaiian Hoary Bat, Ope'ape'a, *Lasiurus cinereus semotus*. 1 September 2004 to 31 August 2005.
- Burdge, Rabel and Frank Vanclay. *Social Impact Assessment*. Environmental and Social Impact Assessment. Ed. Frank Vanclay and Daniel A. Bronstein. Wiley and Sons Ltd, 1996.
- Christiansen, Kathleen. *Social Impacts of Land Development: An Initial Approach to Estimating Impacts on Neighborhood Usages and Perceptions*. The Urban Institute, 1976.
- Colliers Monroe Friedlander Consulting, September, 2010. *Advisory Consulting Memorandum Regarding Village Center Developments (as outlined in the Puna Community Development Plan.)*
- Cooper, C. David, 1989. "Persistence Factors for Mobile Source (Roadway) Carbon Monoxide Modeling", *Journal of the Air & Waste Management Association*, Volume 39, Number 5, May 1989.
- County of Hawai'i, 2005. *County of Hawai'i General Plan*. February 2005.
- County of Hawai'i, 2005 Land Use Pattern Allocation Guide Map, part of County of Hawai'i General Plan.
- County of Hawai'i, 2008. *County of Hawaii Annual Report: Fiscal 2007-2008*.
- County of Hawai'i, 2008. *Hawaii Police Department Annual Report: Fiscal Year 2007 - 2008*.

County of Hawai'i, 2008. *Puna Community Development Plan*. Adopted in Ordinance 08-116 on August 13, 2008.

County of Hawai'i, Hawai'i County Research Center. *Puna Community Development Plan, Table 9F: Inventory of Puna Subdivisions*. Available online <http://www.hcrc.info/community-planning/community-development-plans/puna/planning-resources/Subdiv-Inventory-and-LOS-Data.pdf>

County of Hawaii, Department of Public Works, October 1970. Storm Drainage Standard.

County of Hawai'i Department of Water Supply, *Hawai'i County Water Use and Development Plan Update, Draft Report*, December 2006

County of Hawai'i, Mass Transit Agency, 2009. Bus Ridership statistics, July 2009, accessed October 27, 2009 from <http://www.heleonbus.org/transit-info-and-statistics/bus-ridership/>

Day, R. H., B. Cooper, and R. J. Blaha. 2003a. Movement Patterns of Hawaiian Petrels and Newell's Shearwaters on the Island of Hawai'i. *Pacific Science*, 57, 2:147-159.

Day, R. H., and B. Cooper 2003. Petrel and Shearwater Surveys Near a USCG Tower at Pāhoa, Hawaii, June 2003. Prepared for U.S. Coast Guard, Civil Engineering Unit.

Day, R. H., B. Cooper, and T. C. Telfer. 2003b. Decline of Townsend's (Newell's Shearwaters (*Puffinus auricularis newelli*) on Kauai, Hawaii. *The Auk* 120: 669-679.

Dyar, Roger, 2009. A Study of Predicted Traffic Operations for Kea'au-Pāhoa Road, March 2009.

Englund, R. A. 1998. New records and range extensions of native Odonata (Coenagrionidae) and introduced aquatic species in the Hawaiian Islands. *Bishop Museum Occ. Pap.*, 59: 15-16.

Federal Highway Administration, 1982. Procedures for Abatement of Highway Traffic Noise, Title 23, CFR, Chapter 1, Subchapter J, Part 772, 38 FR 15953, June 19, 1973; Revised at 47 FR 29654, July 8, 1982.

Federal Highway Administration, 2007. Desktop Reference for Crash Reduction Factors, Report No. FHWA-SA-07-015, published September 2007.

Federal Highway Administration, 2009. Manual on Uniform Traffic Control Devices (MUTCD)

Federal Register. 2005. Department of the Interior, Fish and Wildlife Service, 50 CFR 17. Endangered and Threatened Wildlife and Plants. Review of Species That Are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petition; Annual Description of Progress on Listing Actions. Federal Register, 70 No. 90 (Wednesday, May 11, 2005): 24870-24934.

Federal Register. 2008. Endangered and Threatened Wildlife and Plants; Withdrawal of Proposed Reclassification of the Hawaiian Hawk or Io (*Buteo solitarius*) From Endangered to Threatened; Proposed Rule To Remove the Hawaiian Hawk From the Federal List of Endangered and Threatened Wildlife. Federal Register, 73, No. 152 (August 6, 2008): 45680-45689.

Federal Register. 2009. Department of the Interior, Fish and Wildlife Service, 50 CFR Part 17. Endangered and Threatened Wildlife and Plants; Proposed Endangered Status for Flying Earwig

- Hawaiian Damselfly (*Megalagrion nesiotes*) and Pacific Hawaiian Damselfly (*M. pacificum*) Throughout Their Ranges. Federal Register, 74(129): 32490-32519 (July 8, 2009).
- Florida Department of Transportation, 2009. Quality/Level of Service Handbook
- Gagne, W., and L. Cuddihy. 1990. "Vegetation," pp. 45-114 in W.L. Wagner, D.R. Herbst, and S.H. Sohmer, eds. *Manual of the Flowering Plants of Hawai'i*. 2 vols. Honolulu: University of Hawai'i Press.
- Griffin, C. R., P. W. C. Paton, and T. S. Baskett. 1998. Breeding Ecology and Behavior of the Hawaiian Hawk. *Condor*, 100:654-662.
- Haun, A. and D. Henry. 2008. Archaeological Inventory Survey, Portions of TMK: (3) 1-6-04:11, 47-83, 55, 56 and 1-6-64:266-269, 283-286. Land of Kea'au, Puna District, Island of Hawai'i. Haun and Associates for Wilson Okamoto Corporation, July 2009.
- Hawai'i Agriculture Research Center. *HSPA Plantation Archives, "Register of the PUNA SUGAR COMPANY / OLAA SUGAR COMPANY, Olaa, Hawaii 1897 - 1991*. Available online at [http://www2.hawaii.edu/~speccoll/p\\_puna.html](http://www2.hawaii.edu/~speccoll/p_puna.html)
- Institute of Transportation Engineers (ITE), 2009. ITE Traffic Engineering Handbook.
- Johnson, Oscar W. and Peter G. Connors. 1996. Pacific Golden-Plover (*Pluvialis fulva*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online:  
<http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/202>
- Hawaiian Paradise Park Owners Association Master Plan Revision Committee. *Hawaiian Paradise Park Community Master Plan: A Future Vision for Our Community, Revision 1*. September 2005
- Kahikikolo, Leslie. 2008. *Hawai'i Environmental Justice Initiative Report*. Prepared for State of Hawai'i Environmental Council. January 9, 2008. Accessed at [http://oeqc.doh.hawaii.gov/Shared%20Documents/Misc\\_Documents/2008\\_Hawaii\\_Environmental\\_Justice\\_Report.pdf](http://oeqc.doh.hawaii.gov/Shared%20Documents/Misc_Documents/2008_Hawaii_Environmental_Justice_Report.pdf)
- Kennedy, C. H. 1934. *Kilauagrion dinesiotes*, a new species of dragonfly (Odonata) from Hawaii. *Annals. Ent. Soc. Amer.*, 27: 343-345.
- Klavitter, J. L. 2000. Survey methodology, abundance, and demography of the endangered Hawaiian Hawk: Is de-listing Warranted? Unpublished Master of Science Thesis. University of Washington.
- MacDonald, G. A., and A. T. Abbott. 1970. *Volcanoes in the Sea: The Geology of Hawaii*. University of Hawai'i Press, Honolulu. 441 pp.
- Moore, N. W., and W. C. Gagne. 1982. *Megalagrion pacificum* (McLachlan) - A preliminary study of the conservation requirements of an endangered species. Reports of the Odonata Specialist Group Species Survival Commission, International Union for Conservation of Nature and Natural Resources 3: 1-5.

- National Oceanic and Atmospheric Administration, 1993. Local Climatological Data, Annual Summary With Comparative Data, Hilo, Hawaii, 1993
- Office of the United States President. 1994. *Executive Order 12898 of February 11, 1994*. Federal Register Volume 59, No. 32. February 16, 1994.
- PBR Hawaii. 2002. *Hawai'i Island Plan*. Prepared for the State Department of Hawaiian Home Lands. May 2002.
- PlanPacific, Inc. 2008 *Working Paper No. 1: Elements of a Growth Management Strategy*. Prepared during the development of the Puna Community Development Plan adopted in 2008.
- Polhemus, D. A. 1995. New Heteroptera and Odonata (Insecta) records and range extensions in the Hawaiian Islands. *Bishop Mus. Occas. Pap.*, 42: 42-43.
- Polhemus, D.A. 2004. A revision of the Hawaiian damselflies in the genus *Megalagrion* (Odonata: Coenagrionidae). Unpublished report to U.S. Fish and Wildlife Service, Pacific Islands Office. pp. 1-2, 36-40, 43-48, 52-54, and 58-68.
- Polhemus, D.A. and A. Asquith. 1996. *Hawaiian Damselflies. A Field Identification Guide*. Bishop Museum Press. 122 pp.
- Rechtman, Robert B. 2004. *Request for SHPO Concurrence with a Determination of No Historic Properties Affect Pursuant to the National Environmental Policy Act and in Compliance with Section 106 of the National Historic Preservation Act (TMK: 3-1-5-07:17), Keonepolo Nui and Keonepoko Iki ahupua'a, Puna District, Island of Hawai'i*. Rechtman Consulting, LLC, Kea'au, HI.
- Reed, J. R., J. L. Sincock, and J. P. Hailman 1985. Light Attraction in Endangered Procellariiform Birds: Reduction by Shielding Upward Radiation. *Auk* 102: 377-383.
- Robinson, D.W and R.S. Dadson, 1956. *A Re-Determination of the Equal-Loudness Relations for Pure Tones*, British Journal of Applied Physics, vol. 7, pp. 166 - 181. (Adopted by the International Standards Organization as Recommendation R-226).
- Sato, H. Warren Ikeda, Robert Paeth, Richard Smythe, and Minoru Takehiro, Jr. 1973. *Soil Survey of the Island of Hawaii*. U.S. Department of Agriculture and Univ. of Hawaii Agricultural Experiment Station.
- Spencer Mason Architects. 1996. *State of Hawaii Historic Bridge Inventory and Evaluation*. Spencer Mason Architects, Honolulu.
- State of Hawai'i, Department of Hawaiian Homelands, 2002. *Hawai'i Island Plan*.
- State of Hawai'i, Department of Hawaiian Homelands, 2008. *Maku'u Regional Plan*.
- State of Hawai'i Department of Health. 2008. 2006 State of Hawaii Water Quality Monitoring and Assessment Report: Integrated Report to the U.S. Environmental Protection Agency and the U.S. Congress Pursuant To Sections §303(D) and §305(B), Clean Water Act (P.L. 97-117). 279 pp.

State of Hawai'i, Department of Health, Office of Hazard Evaluation and Emergency Response (HEER), 2008. April 2008 database. Accessed October, 2009 at <http://hawaii.gov/health/environmental/hazard/records.html>

State of Hawai'i Department of Land and Natural Resources (DLNR). 1998. Indigenous Wildlife, Endangered and Threatened Wildlife and Plants, and Introduced Wild Birds. Department of Land and Natural Resources. State of Hawai'i. Administrative Rule §13-134-1 through §13-134-10, dated March 02, 1998.

State of Hawai'i, Department of Transportation, 1997. Noise Analysis and Abatement Policy, Department of Transportation, Highways Division, State of Hawaii, June 1997.

State of Hawai'i, Department of Transportation, and County of Hawai'i. 1998. Hawai'i Long-Range Land Transportation Plan (HLRTP).

State of Hawai'i, Department of Transportation, 2002. Hawai'i Statewide Transportation Plan

State of Hawai'i, Department of Transportation, 2003. *Bike Plan Hawai'i*.

State of Hawai'i, Department of Transportation, 2006. Title VI Plan. January 18, 2009

State of Hawai'i, Department of Transportation, 2007. *Storm Water Permanent Best Management Practices Manual*.

State of Hawai'i, Department of Transportation, 2008. Hawai'i Statewide Transportation Improvement Program (STIP).

State of Hawai'i, Department of Transportation, 2009 *Draft Environmental Assessment, Kea'au-Pāhoa Road, Shoulder Lane Conversion, Kea'au Bypass to Shower Drive, Federal Aid Project No. STP-0130(28)*. November, 2009.

State of Hawai'i, Department of Transportation, 2010. *Design Criteria for Highway Drainage*.

State of Hawai'i, Hawai'i 2050 Sustainability Task Force, 2008. *Hawai'i 2050 Sustainability Plan: Charting a Course for Hawai'i's Sustainable Future*, January 2008

State of Hawai'i, 2000. *State of Hawaii Data Book 2000*.

Telfer, T. C. , J. L. Sincock, G. V. Byrd, and J. R. Reed. 1987. Attraction of Hawaiian seabirds to lights: Conservation efforts and effects of moon phase. *Wildlife Society Bulletin* 15:406-413.

Townscape, Inc. 2005. *Puna Regional Circulation Plan*. Prepared for the County of Hawaii Planning Department. November 2005.

Transportation Research Board (TRB), 2000. Highway Capacity Manual (HCM)

Transportation Research Board (TRB), National Academy of Sciences (NAS), 2001. Transportation Research Record 1751, "Safety Effect of Roundabout Conversions in the United States: Empirical Bayes Observational Before-After Study."

Transportation Research Board (TRB), National Academy of Sciences (NAS), 2007. NCHRP Report 572: Roundabouts in the United States. National Cooperative Highway Research Program.

University of Hawai'i, 1983. *Atlas of Hawaii*, Second Edition, Department of Geography, University of Hawaii, University of Hawaii Press, Honolulu,

US Department of Agriculture, Soil Conservation Service, June 1986. TR55 Urban Hydrology for Small Watersheds

U.S. Census Bureau. *American Fact Finder. 1990 and 2000 Census statistics*. Available online at <http://factfinder.census.gov/home/saff/main.html?lang=en>.

U.S Department of Commerce, Bureau of the Census. *1970 Census of Population and Housing: Summary Tape File 3A*.

U.S Department of Commerce, Bureau of the Census. *1980 Summary Tape File 1-A, Hawaii*.

U.S. Department of Commerce, U.S. Weather Bureau, 1962. *Technical Paper No. 43, Rainfall-Frequency Atlas of the Hawaiian Islands for Areas to 200 Square Miles, Durations to 24 Hours, and Return Periods From 1 to 100 Years*.

U.S. Department of Interior, Fish & Wildlife Service (USFWS) 1983. Hawaiian Dark-Rumped Petrel & Newell's Manx Shearwater Recovery Plan. USFWS, Portland, Oregon. February 1983.

U.S. Department of Interior, Fish & Wildlife Service (USFWS) 2005. Endangered and Threatened Wildlife and Plants. 50CFR 17:11 and 17:12 (Tuesday, November 1, 2005).

U.S. Department of Interior, Fish & Wildlife Service (USFWS) 2009. USFWS Threatened and Endangered Species System (TESS), online at [http://ecos.fws.gov/tess\\_public/](http://ecos.fws.gov/tess_public/)

U.S. Department of Interior, Fish & Wildlife Service (USFWS). 2009a. Endangered and Threatened Wildlife and Plants. 50CFR 17:11 and 17:12. Available online at URL: [http://ecos.fws.gov/tess\\_public/pub/stateListingIndividual.jsp?state=HI&status=listed](http://ecos.fws.gov/tess_public/pub/stateListingIndividual.jsp?state=HI&status=listed); last accessed on May 12, 2009.

U.S. Department of Interior, Fish & Wildlife Service (USFWS). 2009b. National Wetlands Inventory. Wetlands Mapper. At URL: <http://www.fws.gov/wetlands/Data/Mapper.html>; last visited June 11, 2009.

U.S. Environmental Protection Agency, 1977. *Toward a National Strategy for Noise Control*, April 1977.

U.S. Environmental Protection Agency, 1978. *Guidelines for Air Quality Maintenance Planning and Analysis; Indirect Sources*, Volume 9 Revised, September 1978.

U.S. Environmental Protection Agency, 1986. *Guideline on Air Quality Models (Revised), Including Supplements A and B, EPA-450/2-78-027R*, Research Triangle Park, NC, July 1986.

U.S. Environmental Protection Agency, 1992. *User's Guide to CAL3QHC Version 2.0: A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections*, November 1992.

U.S. Environmental Protection Agency, 1995. *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fifth Edition*, AP-42, Research Triangle Park, NC, January 1995.

- 
- U.S. Environmental Protection Agency, 2002. *User's Guide to MOBILE6.2, Mobile Source Emission Factor Model*, Office of Transportation and Air Quality, Assessment and Standards Division, Ann Arbor, Michigan, January 2002.
- U.S. Department of Transportation, Federal Highway Administration 1977. *Highway Construction Noise: Measurement, Prediction and Mitigation, Special Report HEV-21*
- U.S. Department of Transportation, Federal Highway Administration 1987. Technical Advisory 6640.8A, Guidance for Preparing and Processing Environmental and Section 4(f) Documents.
- U.S. Department of Transportation, Federal Highway Administration 2001. *Urban Drainage Design Manual (HEC-22), Second Edition*. FHWA Publication NHI-01-021.
- U.S. Department of Transportation, Federal Highways Administration. 2008 Five Percent Report for Hawai'i, accessed at <http://safety.fhwa.dot.gov/hsip/fivepercent/2008/08hi.htm>.
- U.S. Weather Bureau, 1965. "Climatic Summary of the United States, Supplement for 1951 through 1960, Hawaii and Pacific"
- Wilbur Smith Associates. 2008. Kea'au-Pāhoa Road Corridor Traffic Forecasting Report, October 13, 2008
- Wolfe, E.W., and J. Morris. 1996. Geologic Map of the Island of Hawai'i. USGS Misc Investigations Series Map i-2524-A. Washington, D.C.: U.S. Geological Survey.

***THIS PAGE INTENTIONALLY LEFT BLANK.***