DRAFT
ENVIRONMENTAL ASSESSMENT

Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive

Keaau, District of Puna, Island of Hawaii
Federal-Aid Project No. STP-0130(28)

Prepared for:

State of Hawaii
Department of Transportation
Highway Division
1151 Punchbowl Street
Honolulu, Hawaii 96813
Contract No. 51259

Prepared by:

Wilson Okamoto Corporation
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826
WOC: 6615-01

November 2009

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This Environmental Assessment (EA) has been prepared to meet the requirements of Chapter 343, Hawaii Revised Statutes, as amended, and Hawaii Administrative Rules Title 11, State of Hawaii Department of Health, Chapter 200, Environmental Impact Statement Rules, and the National Environmental Policy Act (NEPA) of 1969, as amended, (Pub. L. 91-190, 42 US Code 4321-4347, Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA, (40 Code of Federal Regulations 1500-1508) and 23 Code of Federal Regulations 771, Environmental Impact and Related Procedures.

Brennon Morioka, PhD, PE, Director State of Hawaii Department of Transportation	Abraham Wong, Administrator Federal Highway Administration Hawaii Division
Date	Date

Prepared for:
State of Hawaii
Department of Transportation
Highways Division

Prepared by:
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November 2009

SUMMARY

Proposing Agency:	State of Hawaii Department of Transportation 869 Punchbowl Street Honolulu, Hawaii 96813
Accepting Agency:	State of Hawaii Department of Transportation 869 Punchbowl Street Honolulu, Hawaii 96813
EA Preparer:	Wilson Okamoto Corporation 1907 South Beretania Street, Suite 400 Honolulu, Hawaii 96826 Contact: John L. Sakaguchi, AICP, Senior Planner Tel: 808.946.2277; Fax: 808.946.2253
Project Location:	Keaau, Puna District, Hawaii
Recorded Fee Owner:	State of Hawaii, County of Hawaii, and private landowners
Tax Map Key:	Within State of Hawaii right-of-way; TMK 1-6-003: 065, TMK 1-6-001: portion of 015; and TMK 1-5-036: portions of 116, 117, 119, 120, and 121; TMK: 1-5-033:261 and TMK: 1-6-064:204
Area:	12,210 linear feet (2.31 miles approx); 4.476 acres right-of-way taking/acquisition
State Land Use Classification:	N/A; surrounding Agriculture
County Zoning:	N/A; surrounding Agriculture (A-20a)
Proposed Action:	The project limits extend along both sides of Keaau-Pahoa Road, State Route 130, from Keaau Bypass Road on the north to Shower Drive on the south, a total length of approximately 12,210 linear feet, 2.31 miles. On the east or makai side of the road, the improvements will convert the existing temporary 10-foot wide shoulder lane to a permanent 12-foot-wide northbound lane and add an 8-foot-wide paved shoulder between the project limits. On the west or mauka side, the improvements would convert the existing 10-foot wide shoulder to a temporary 10-foot-wide shoulder lane and add a 2-foot-wide paved

shoulder. Construction will require the acquisition/ taking by the State of Hawaii Department of Transportation (HDOT) of approximately 4.476 acres of public (County) and private property adjacent to the east (makai) side of Keaau-Pahoa Road. No acquisition/taking would occur on the west (mauka) side. The improvements would include: on the east or makai side, demolition of the existing northbound 10-foot wide shoulder lane; construction of a new northbound 12-foot wide travel lane and 8-foot wide shoulder for pedestrians and bicyclists; installation of 7,432 linear feet (1.40 miles) guardrails along the project limits; extension of 9 existing culverts and construction of new headwalls; relocation of an existing 12-inch water line; and relocation of utility poles and overhead electrical lines; on the west or mauka side conversion of the existing 10-foot wide shoulder to a 10-foot-wide shoulder lane and addition of a 2-foot wide paved shoulder; construction of one new multiple concrete pipe culvert beneath the road within the right-of-way to alleviate overtopping of the road during heavy rainfall events; widening of Waipahoehoe Bridge from 40 feet to 70 feet wide; and installation of a new traffic signal at the intersection of Keaau-Pahoa Road, Shower Drive /Pohaku Drive.

Impacts:

Widening of the shoulder lane will result in the acquisition/taking of approximately 4.476 acres of County of Hawaii and private land within the 2.31-mile long project limits. Short-term construction related impacts will be created by generation of dust and noise. Vegetation will be removed on the sides of the highway for road widening and construction access. During construction, the travel lanes will be shifted to one side to allow travel on two lanes. Traffic delays are anticipated during the construction period while the work area is closed to vehicle traffic. Once completed, no significant impacts are anticipated from the project.

Parties Consulted During Pre-Assessment:

US Department of the Army, Honolulu District Engineer
US Fish and Wildlife Service
State of Hawaii Dept. of Land and Natural Resources
State of Hawaii DLNR–Historic Preservation Division
State of Hawaii DLNR–Water Resources Mgmt.
State of Hawaii Department of Health

State of Hawaii Department of Health Environmental Management Division
County of Hawaii Department of Environmental Management
County of Hawaii Department of Parks and Recreation
County of Hawaii Planning Department
County of Hawaii Department of Research and Development
County of Hawaii Department of Public Works
Hawaiian Electric Light Company

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PREFACE

Chapter 343, Hawaii Revised Statues (HRS), as amended, Environmental Impact Statements, requires that a government agency or a private developer proposing to undertake a project consider the potential environmental impacts of the proposed project by preparing an assessment. Use of public funds for a project is among the criteria set forth in Chapter 343, HRS which requires preparation of an environmental assessment. The Keaau-Pahoa Road, Shoulder Lane Conversion will be constructed with funds provided by the State of Hawaii Department of Transportation and the US Department of Transportation Federal Highway Administration (FHWA).

This Environmental Assessment (EA) has been prepared to meet the requirements of Chapter 343, HRS, as amended, and Hawaii Administrative Rules Title 11, State of Hawaii Department of Health, Chapter 200, Environmental Impact Statement Rules, and the National Environmental Policy Act (NEPA) of 1969, as amended, (Pub. L. 91-190, 42 US Code 4321-4347, Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA, (40 Code of Federal Regulations 1500-1508) and 23 Code of Federal Regulations 771, Environmental Impact and Related Procedures. A Finding of No Significant Impact (FONSI) is anticipated for the project as shown in Chapter 5.

Compliance with various Federal environmental clearances are also included in this document meet Federal environmental documentation requirements.

1. INTRODUCTION

1.1 Project Background

The State of Hawaii Department of Transportation (HDOT) through its Highways Division is responsible for providing a safe, efficient and accessible highway system through the utilization of available resources in the maintenance, enhancement and support of land transportation facilities. The Highways Division is one of three divisions within the HDOT.

Keaau-Pahoa Road (State Route 130) is a two-lane undivided road generally oriented north-south which connects Keaau and Pahoa and serves the residential subdivisions of Hawaiian Paradise Park, Orchid Land, Hawaiian Acres, and Ainaloa, all located on either side of the road. Keaau-Pahoa Road has a functional classification of minor arterial on the State highway system and is not listed on the National Highway System (NHS). From Keaau Bypass to Shower Drive, Keaau-Pahoa Road is access controlled roadway with no parking permitted.

Historical research indicates that by the 1890s, most of the coastal lands of the Keaau area were abandoned as the more productive inland areas were put into agricultural production. Further, in the 1890s, large tracts of homestead land were opened throughout Puna. These agricultural parcels were located three or more miles inland and could be better accessed by a more direct inland route between Puna and Hilo. As a result, in the early 1890s, the basic alignment of Keaau-Pahoa Road was established and initial construction of the road began sometime around 1895.

1.2 Purpose and Need

According to HDOT 24-hour traffic count data (Station C-2-F), during an 11-year period, traffic volumes on Keaau-Pahoa Road near the County of Hawaii refuse convenience center increased from about 19,700 vehicles in 1996 to about 25,200 per day in 2007, a growth of about 5,500 vehicles or 28.0 percent, approximately 2.26 percent per year. This steady growth in traffic on Keaau-Pahoa Road over the years has been such that, in July 1996, HDOT constructed a 10-foot wide northbound (makai) shoulder lane and extended the shoulder between the Keaau Bypass Road and Shower Drive for use by motorists between 6:00am to 8:00am to improve traffic flow in the morning peak period.

This northbound shoulder lane is posted for use only between 6:00am to 8:00am. However, current traffic volumes are such that, despite the posted sign for use between 6:00am to 8:00am, motorists use the shoulder lane throughout the day as a travel lane. Use of the shoulder lane as a travel lane by motorists prevents its use by pedestrians and bicyclists.

In addition, southbound traffic volumes in the afternoon period create backup conditions and congestion south of Keaau, where two lanes on the Keaau Bypass must merge into a one lane on Keaau-Pahoa Road.

There are a number of purposes for the Keaau-Pahoa Road Shoulder Lane Conversion project. First, there is a need to improve traffic conditions on Keaau-Pahoa Road between Keaau Bypass Road (milepost 1.9) on the north to Shower Drive (milepost 4.2) on the south, a distance of about 2.31 miles, or approximately 12,210 feet. Within these project limits, additional travel lanes are needed to improve traffic conditions for both northbound and southbound traffic. The additional travel lanes are intended to accommodate traffic from the residential areas along Keaau-Pahoa Road in the vicinity of Shower Drive and Pohaku Drive. These residential areas have experienced population growth in the past years and have been subdivided into lots which can accommodate additional residential development in the future. County of Hawaii Planning Department studies anticipate on-going and future development of lands along Keaau-Pahoa Road.

Second, the purpose of the Keaau-Pahoa Road, Shoulder Lane Conversion project is to improve the hydraulic conditions along the project limits by constructing a new multiple cell concrete pipe culvert system at a low point in the road north of the Waipahoehoe Bridge. The culvert will reduce the need to close the Road due to storm water runoff overtopping the road during heavy rainfall events.

Thirdly, the purpose of the Keaau-Pahoa Road, Shoulder Lane Conversion project is to improve traffic conditions by installing a traffic signal at the intersection of Keaau-Pahoa Road/Shower Drive. In June and July 2004 and in April 2005, traffic counts were conducted on Keaau-Pahoa Road and at the Keaau-Pahoa Road/Shower Drive intersection as part of a traffic warrant analysis to determine the need for construction of a traffic signal. The traffic warrant analysis recommended installation of a traffic signal at the intersection, based on the warrants and field observations of the delays

experienced by vehicles on the minor street approaches (Shower Drive and Pohaku Drive). The analysis showed both of these minor approaches at the intersection operated at Level of Service "F" during both morning and afternoon peak hours of traffic with constant queues present at the approaches.

Lastly, the purpose of the Shoulder Lane Conversion project is to design the improvement to be compatible with the HDOT project (Project No. STP 0130 (27)) to increase roadway capacity between Keaau and Pahoa by constructing a roadway with 4 or 6 travel lanes to service the Puna region.

1.3 Project Location and Conditions

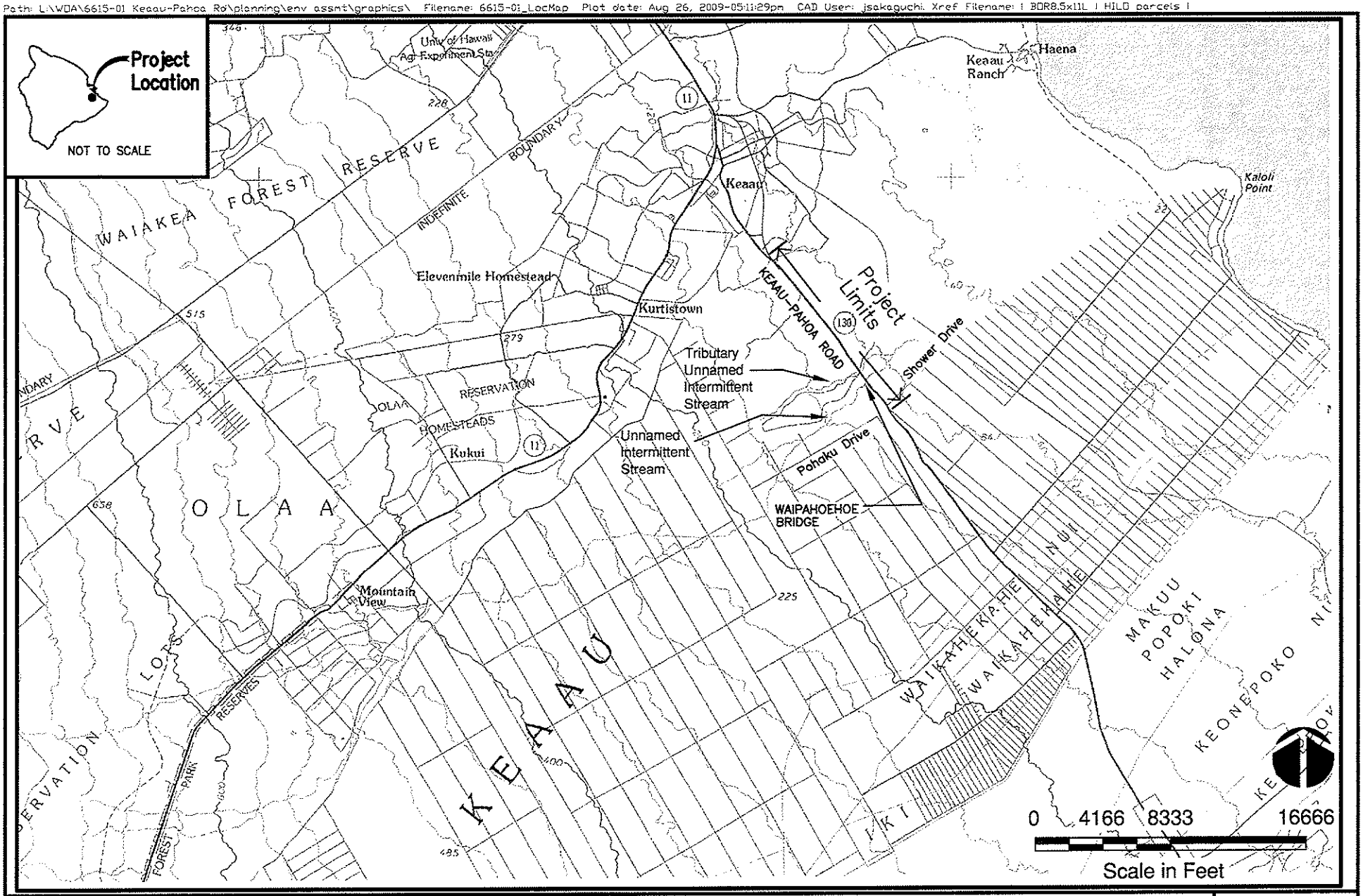
1.3.1 Project Location

The project limits are located along Keaau-Pahoa Road between the Keaau Bypass Road at the northern end (milepost 1.9) and the Keaau-Pahoa Road Shower Drive/Pohaku Drive intersection (milepost 4.2) at the southern end, a distance of about 2.31 miles, or approximately 12,210 feet. Shower Drive (TMK: 1-5-033:261) is a privately-owned roadway which starts at its intersection with Keaau-Pahoa Road and extends easterly, or makai. Pohaku Drive (TMK: 1-6-064:204) is also a privately-owned road which forms the opposite road of the intersection and extends westerly or mauka. Figure 1.1 shows the project location map. Figure 1.2 shows the project site map. Figure 1.3 shows the project vicinity map. Figure 1.4 shows the project site photographs.

1.3.2 Existing Project Site Conditions

In 1968, the existing alignment of Keaau-Pahoa Road was constructed as part of Federal Aid Secondary Project No. S-0130(7), which included realignment of the roadway between Waipahoehoe Bridge and Shower Drive, construction of Waipahoehoe Bridge at its current location, abandonment of the old roadway and bridge, and construction of the double 5-foot by 7-foot unlined box culverts north of the bridge.

Keaau-Pahoa Road currently has an 80-foot wide right-of-way (approximately 40 feet on the both sides of the road center line) along the project limits. Between Waipahoehoe



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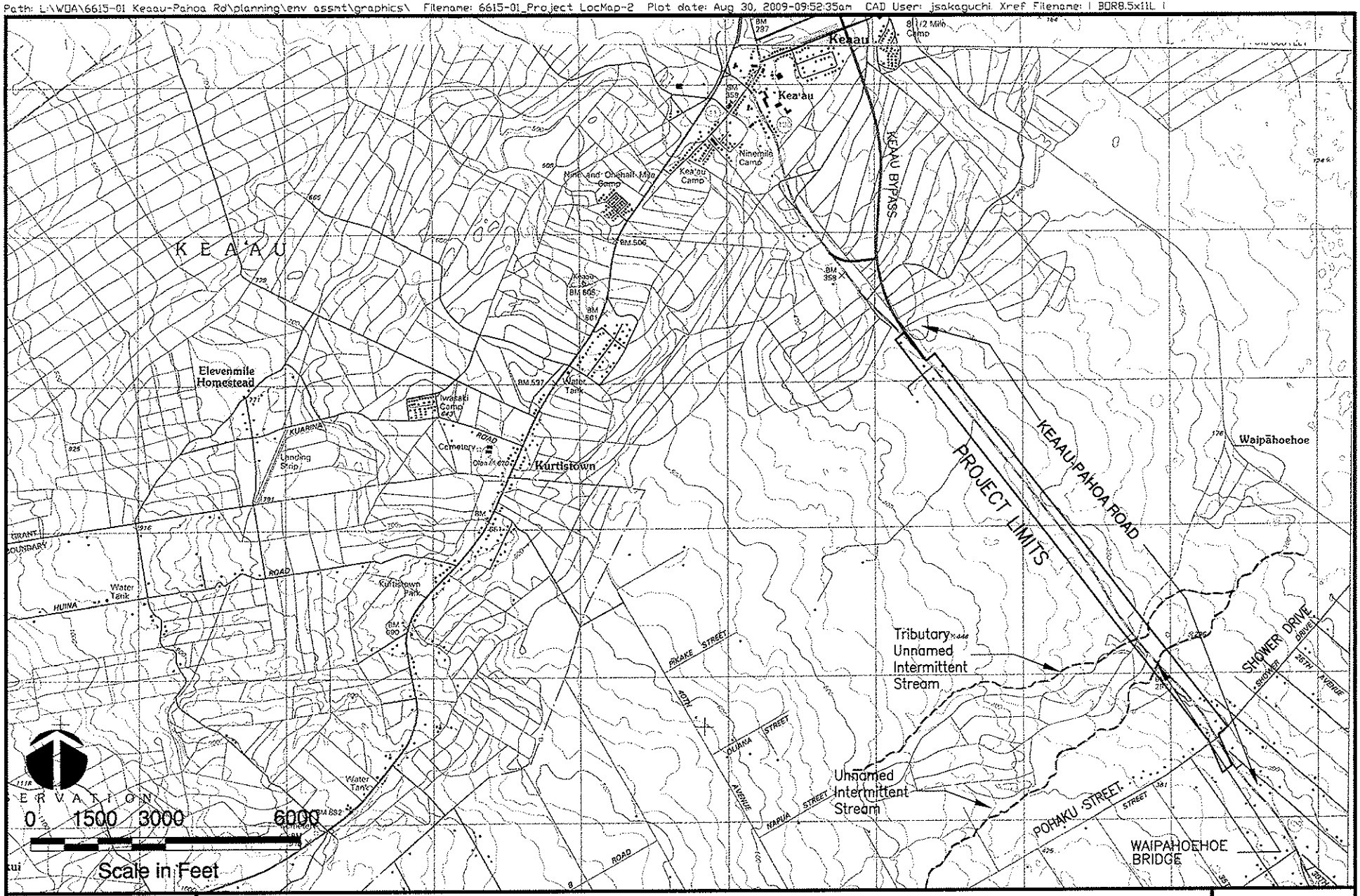
KEAAU-PAHOA ROAD SHOULDER LANE CONVERSION [PROJ NO. 0130 (28)]

PROJECT LOCATION MAP

FIGURE
1.1



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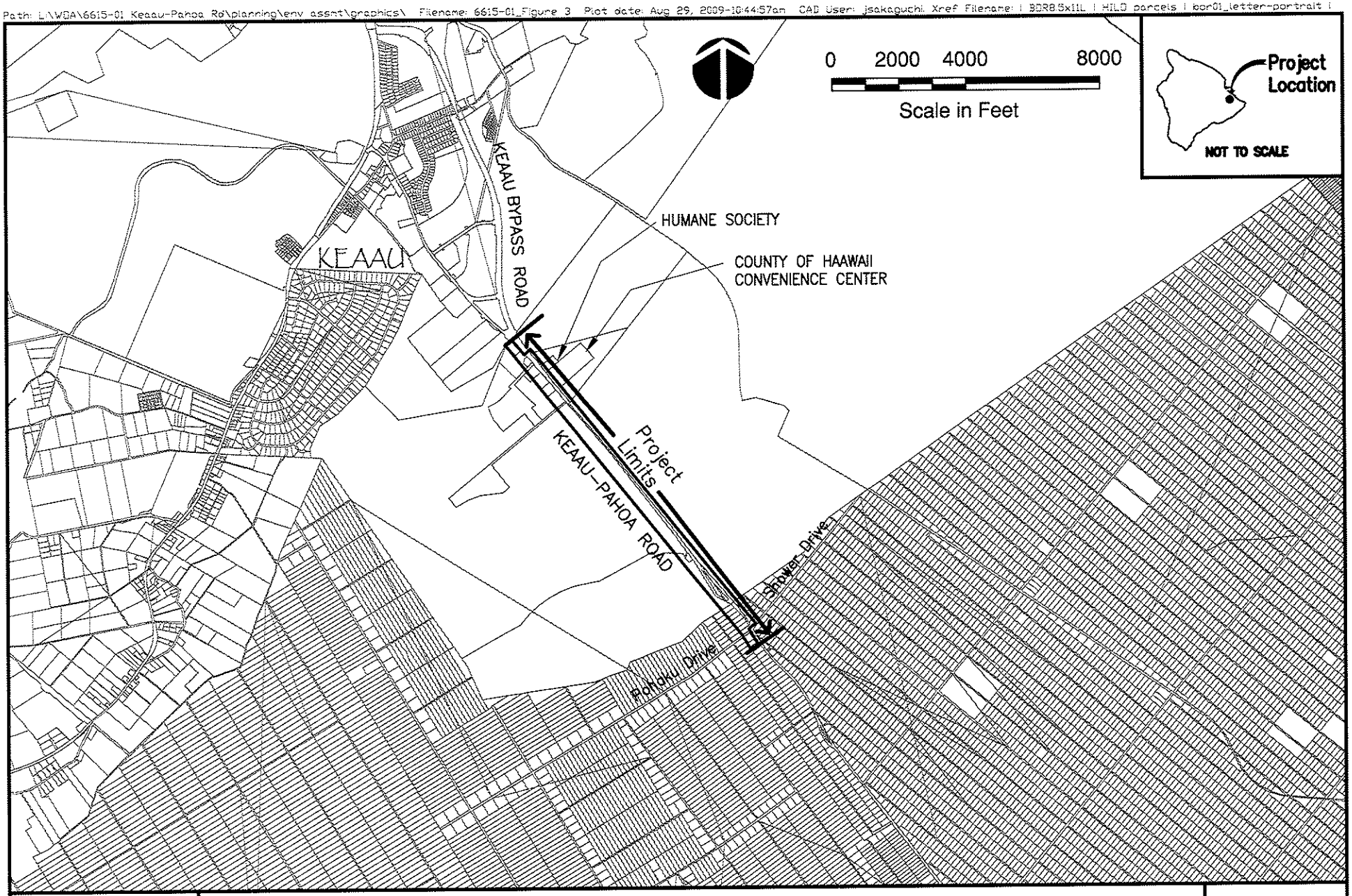
KEAAU-PAHOA ROAD SHOULDER LANE CONVERSION [PROJ NO. 0130 (28)]

PROJECT SITE MAP

FIGURE
1.2



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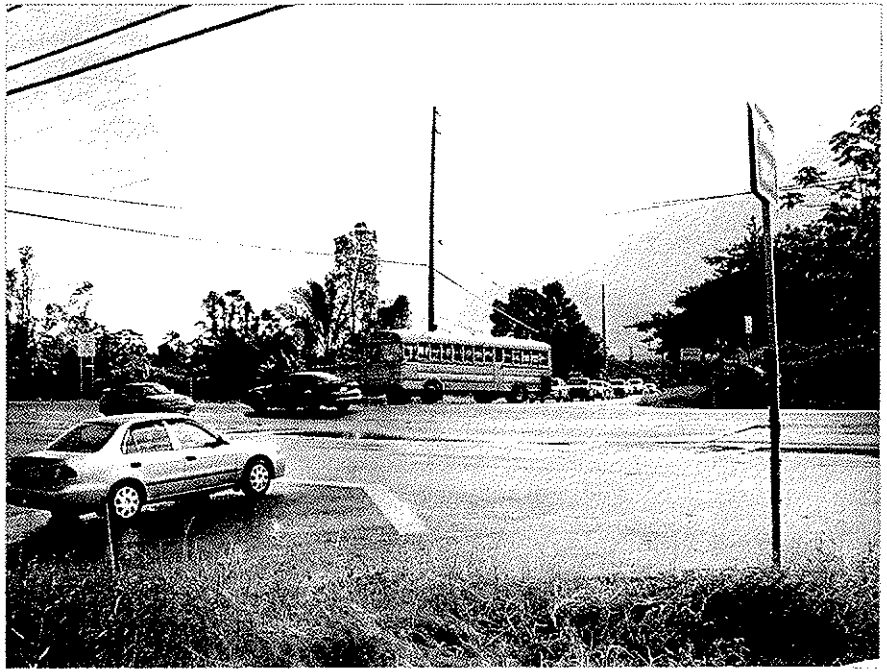
KEAAU-PAHOA ROAD SHOULDER LANE CONVERSION [PROJ NO. 0130 (28)]

PROJECT VICINITY MAP

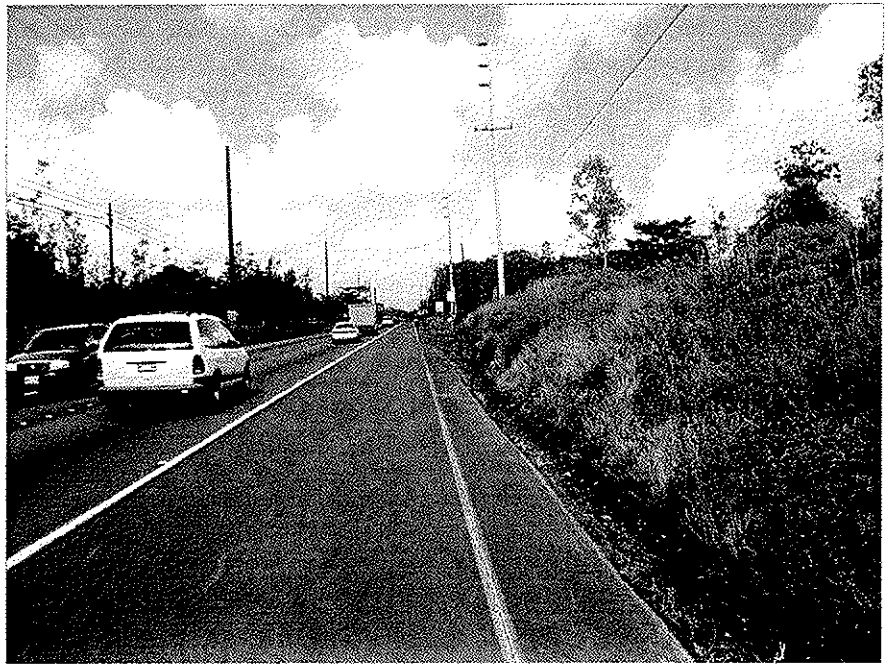
FIGURE
1.3



Morning peak hour traffic queue at Shower Drive

Keaau-Pahoa Road showing shoulder lane

Waipahoehoe Bridge showing box culvert construction



Keaau-Pahoa Road showing area of cut embankment

PROJECT SITE PHOTOGRAPHS Figure 1.4

Bridge and Shower Drive, there are remnant portions of the old State highway which remain from the realignment of the road during the 1968 construction. The State of Hawaii has retained ownership of these remnant lands. As previously discussed, access to the right-of-way is limited to specific access permitted locations along the project limits.

Within the project limits, Keaau-Pahoa Road currently consists of two 12-foot wide travel lanes, one in each direction, and on the makai side, one 10-foot wide northbound shoulder lane used as a travel lane, and a 4 foot wide shoulder with 2-foot paved, and on the mauka side, a 8-foot shoulder from the beginning of the project limits to the County convenience center and from there an 10-foot shoulder to Shower Drive Elevations along the project limits range from about 334 feet mean sea level (msl) at the northern end to 322 feet msl at Shower Drive. The high point along the project limits is about 345 feet msl just south of the County refuse convenience center. The low point (297 feet msl) is located about 140 feet north of Waipahoehoe Bridge.

On the northbound lane, the posted speed limit is 45 miles per hour (mph) at the beginning of the project limits, and then becomes 55 mph south of the County convenience center until the end of the project limits at Shower Drive. A school crossing with a posted 25 mph limit is located at the Hawaii Island Humane Society entrance. Currently, between 6:00am to 8:00am, the speed limit on the northbound lanes is 45 mph. As part of the Shoulder Lane Conversion project, this speed limit will be removed. Thus, northbound, the speed limit will be 55 mph from south of the convenience center to Shower Drive.

On the southbound lane, the posted speed limit is 25 mph near the Humane Society entrance and 55 mph for the remainder of the project limits.

A total of 9 drainage culverts (8 corrugated galvanized metal pipe (CGMP) culverts and one reinforced concrete double box culvert) are located within the project limits. There are 5 pipe culverts at 36 inches each; two at 30 inches each, and one at 24 inches. The double box culvert consists of two unlined 5-foot by 7-foot concrete structures. The nine culverts within the project limits are generally in good condition, with good concrete headwalls and slight to moderate corrosion of the metal pipes. The areas makai of the outlets are relatively flat and densely vegetated, making it difficult to pass flows from one side of the road to the other.

Aside from the culverts, the project limits do not include subsurface drainage systems or catch basins. Runoff currently sheet flows to areas adjacent to Keaau-Pahoa Road.

An 8-inch waterline owned by the County of Hawaii Department of Water Supply (DWS) is located along the mauka side of the road at the beginning project limits for about 1,000 feet. From there, the line crosses under the road to the makai side and becomes a 12-inch line for the remaining 11,210 feet of the project limits. The waterline is about 20 feet from the makai right-of-way. The existing 12-inch waterline is hung on the makai side of the bridge.

Utility poles are located along both sides of Keaau-Pahoa Road. On the makai side a total of about 42 wooden utility poles, of which 38 support electrical distribution lines, and 4 poles, located near Shower Drive, support electrical distribution and high voltage transmission lines along the project limits. The utility poles are located between the existing shoulder lane and the edge of the existing right-of-way. On the mauka side a total of about 63 wooden utility poles and guy poles support high voltage electrical transmission lines. The utility poles are located between the existing shoulder and the edge of the existing right-of-way. The utility poles also support telephone, cable, and street light lines.

The existing Waipahoehoe Bridge, located about 0.40 miles (2,157 feet) north of Shower Drive, is 40 feet wide, rail to rail, and 78 feet long, abutment to abutment. The existing bridge has two 12-foot travel lanes and one 10-foot shoulder lane, roadside shoulders less than 4-feet wide on each side and a 4-foot 6-inch high railing. The bridge consists of three 26-foot long unlined bays. The deck bridge bottom is approximately 8.5 feet above the grade of the unnamed intermittent stream shown on the USGS topographic map. (See Figure 1.2)

HDOT plans show the existing Waipahoehoe Bridge was constructed in late 1968 as part of the improvements to Keaau-Pahoa Road, Project No. S-0130(7).

[Note, although identified as a bridge, Waipahoehoe Bridge is an on-grade reinforced concrete culvert with deck slabs (the superstructure) that are integral with the abutments and interior walls. The bridge/culvert consists of three continuous deck slabs cast on top of concrete abutments and interior walls, with continuous concrete footings embedded in the rock stratum of the stream channel bed. A bridge typically consists of

a separate superstructure and supporting substructure connected by isolation bearings that act to restrain the superstructure freedom of movement from the substructure.]

Information from HDOT Hawaii District indicates that Waipahoehoe Bridge has not overtopped, even during the November 1-2, 2000 storm event that affected the other highway bridges on the eastern part of the island of Hawaii. However, the HDOT Hawaii District has indicated that the roadway between Waipahoehoe Bridge and a culvert crossing north of the bridge has overtopped on three separate occasions in September 1994, November 2000, and in 2002. This drainage condition is caused by the road's low point being located 220 feet north of Waipahoehoe Bridge. As discussed below, adding another culvert at the roadway's low point is included in the project.

In 1996, as a follow up to a previous 1983 study, HDOT in conjunction with the State Historic Preservation Division, HDOT's district offices, and the counties, conducted an evaluation of all of the bridges in the state. The results of the 1996 study were published in draft by the HDOT as the Historic Bridge Inventory. The 1996 draft study classified the state's bridges into three categories, Category I, II, and III. Category I bridges were determined eligible for the National Register of Historic Places. Category II bridges were determined to be potentially eligible for the National Register. Category III bridges were determined not eligible for the National Register.

A total of 18 criteria were used in the 1996 rating system. Of those, seven were integrity criteria: (location; design; setting; materials; workmanship; feeling; and association); nine were other National Register criteria: (events; persons; type; period; method of construction; work of a master; high artistic design; distinguishable entity; and information content); and two were Historic American Engineering Record (HAER) criteria; (early engineering structure and representative sample).

The abandoned bridge, located mauka (west) of the existing Waipahoehoe Bridge within State-owned land, is not listed in the 1983 and 1996 HDOT Historic Bridge Inventory studies.

1.3.3 Other Project Site Data

Land uses are vacant and undeveloped for most of the project limits on both sides of the road. The only developed land uses on the makai side of the road occur at the

beginning and end of the project limits. At the beginning of the project limits, the Hawaii Island Humane Society and the County of Hawaii refuse convenience center are located on the makai side. At the end of the project limits on the makai side, there are four residential parcels before the Shower Drive intersection with direct access to Keaau-Pahoa Road.

On the mauka side, there are 4 residential lots at the beginning of the project limits near the Keaau Bypass. Other lands along the mauka side within the project limits are currently undeveloped up to Waipahoehoe Bridge. Residential lots are located on the remnant HDOT roadway, which was Keaau-Pahoa Road, between the bridge and Pohaku Drive.

The State Land Use Commission (LUC) designates the lands adjacent to Keaau-Pahoa Road as in the Agricultural District, one of four land use districts identified by the LUC.

The adjacent lands are designated Extensive Agricultural on the County of Hawaii General Plan Map. The County of Hawaii zoning designation on Keaau-Pahoa Road on both sides for most of the project limits is Agriculture (A-20a). On the makai side, the zoning is Agriculture (A-1a) for the lots adjacent to Shower Drive. On the mauka side, the zoning is Agriculture (A-3a) for the lots near Pokahu Street.

The project limits are not located within the County of Hawaii Special Management Area (SMA).

Bike Plan Hawaii 2003 is the HDOT master plan to create a guide for enhancing the bicycling environment through a variety of channels - from grassroots initiatives to government actions. The Bike Plan recognizes that bicycle facilities have become an integral part of the State's transportation infrastructure. HDOT recognizes the need for safe, comfortable, and convenient travel alternatives that enhance the mobility of Hawaii's residents and visitors.

The Bike Plan shows the project limits as a proposed bicycle facility designated as a proposed "signed shared roadway". It should be noted, Keaau-Pahoa Road south from Shower Drive to Paradise Drive is shown on the Bike Plan as an existing bicycle facility designated as "signed shared roadway".

1.4 Project Description

The Keaau-Pahoa Road Shoulder Lane Conversion would occur on the both sides of Keaau-Pahoa Road between the project limits of Keaau Bypass Road on the north and the Shower Drive/Pohaku Drive intersection on the south. The existing center-line of the road will remain unchanged within the project limits. The Keaau-Pahoa Road Shoulder Lane Conversion project will meet the design guidelines of the American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA). These design guidelines have been adopted by the Hawaii Department of Transportation (HDOT) for transportation and highway planning and design purposes.

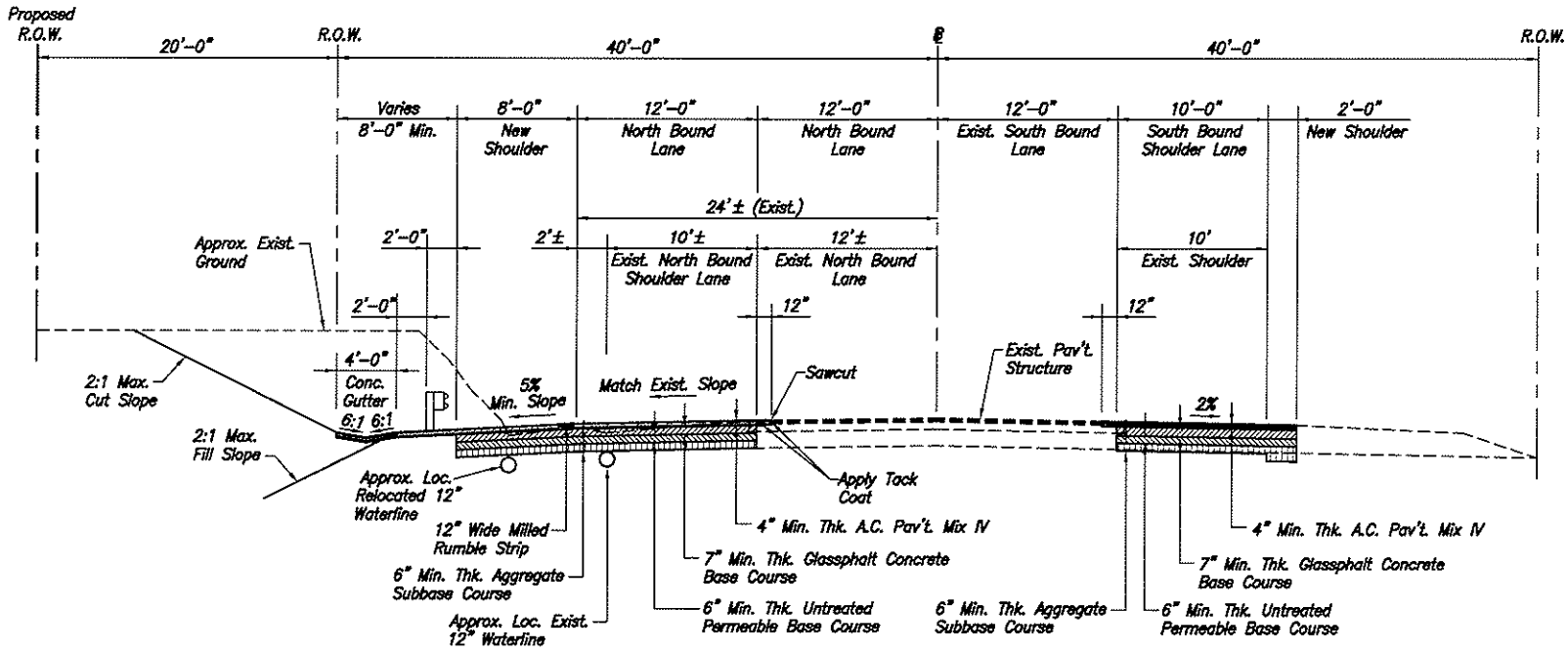
The Keaau-Pahoa Road Shoulder Lane Conversion project will consist of the following:

1. Taking/acquisition of 10 to 20 feet of right-of-way along the makai side of the project limits. (No additional right-of-way will be needed on the mauka side.)
2. Cutting embankments or grading and vegetation removal outside the existing right-of-way to match existing conditions within the acquired right-of-way.
3. Relocation of about 42 wooden utility poles outside (makai) of the new 8-foot wide paved shoulder and behind the guardrail. The utility relocation would be done by Hawaii Electric Light Company (HELCO) under a Utility Agreement between HDOT and HELCO.
4. Relocation of the 12-inch waterline to the new 8-foot shoulder on the east side along the entire project limits. The waterline relocation will be done by HDOT under a utility agreement between the HDOT and the County of Hawaii Department of Water Supply (DWS).
5. Demolition of the existing northbound (makai side) 10-foot wide shoulder lane and the existing shoulder.
6. Construction of the second northbound 12-foot wide travel lane, including excavation of about 24 inches for placing the new sub base, base course, and pavement surface, plus an 8-foot wide paved shoulder, and a 4-foot wide drainage swale/concrete gutters on the excavation segments of the makai side.
7. Striping and markings, including construction of a milled rumble strip between the travel lane and shoulder on the makai side only.
8. Installation of approximately 7,432 linear feet (1.40 miles) of guardrails along the makai side only.

9. Installation of street lights at two intersections.
10. Demolition of the existing southbound (mauka side) 8 to 10-foot wide shoulder.
11. Construction of a 10-foot wide southbound shoulder lane plus a 2-foot shoulder.
12. Demolition of the existing makai headwall on the existing 9 culverts and extension of the culvert and construction of new headwall within the right-of-way. Construction easements or acquisition of the adjacent land will be secured to allow equipment and contractor personnel onto the nearby lands.
13. Construction of a 4 pipe culvert about 140 feet north of the bridge. The culvert will consist of 4, 48-inch pipes angled at about 40 degrees to the center line of the road. The pipes will vary from about 130 to 160 feet.
14. Widening of Waipahoehoe Bridge from 40 feet wide to 70 feet wide by extending the width of the structure on both sides by 15 feet and reconstructing the bridge railings which will be 4-foot 6-inches (54 inches) above the bridge deck and include 2-foot 5-inch reinforced concrete traffic barrier plus 2-foot 1-inch pipe railing.
15. Striping of the bridge deck will consist of an 11-foot wide makai shoulder, two 12-foot wide northbound travel lanes, one 12-foot wide southbound travel lane, one 10-foot wide southbound shoulder lane and a 13-foot mauka shoulder for a total width of 70 feet.
16. Demolition of the abandoned bridge located mauka of Waipahoehoe Bridge.
17. Installation of a traffic signal at the Keaau-Pahoa Road/Shower Drive/Pohaku Drive intersection, including necessary controls on Keaau-Pahoa Road, Shower Drive, and Pohaku Drive, signage, and striping improvements.

Figure 1.5 shows the typical section for the roadway. Figures 1.5-0 to 1.5-9 at the end of this section show the project roadway plan and details, including the existing right-of-way (ROW) and the proposed ROW.

During construction, silt fences or silt barriers will be constructed around the work area to control surface runoff into adjacent areas. Construction will result in a total of 20 feet of impervious surface on the makai side and 12 feet on the mauka side. Since the existing makai roadway consists of a 10-foot travel lane and a 2-foot shoulder, there will be a net new 8-foot impervious area for the total project limits of 12,210 feet on the makai side plus about 4,300 feet of 4-foot wide drainage swale/concrete gutters on the excavation segments of the makai side. On the mauka side, there will be a net new 2 feet for 13,510 feet, which accounts for the lane tapering at the ends of the project



TYPICAL ROAD SECTION
Scale: 1/8" = 1'-0"

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KEAAU-PAHOA ROAD SHOULDER LANE CONVERSION [PROJ NO. 0130 (28)]

TYPCIAL ROAD SECTION

FIGURE
1.5

limits. Thus, the total new impervious surface within the project limits will be about 138,300 square feet (8 x 12,210+ 4 x 4,300+ 2 x 13, 510 = 138,300) or about 3.17 acres.

The improvements related to cutting slopes, constructing embankments, and grading to match existing grades would extend outside of the existing 80-foot wide right-of-way which runs for most of the project limits. This work would also include removal of vegetation to construct the improvements.

Preliminary estimates show that about 20,200 cubic yards of material will need to be removed for excavation for the sub base, base course, and pavement surface, and for cutting the embankments.

1.4.1 Right-of-Way Acquisition

The HDOT acquisition/taking of private property along almost the entire project limits will be necessary to construct the northbound travel lane and shoulder, and to cut or grade the adjacent private parcels to match the grades of the shoulder. Depending on the location within the project limits, the taking of private property will require acquisition or purchase of 10 to 20 feet from the makai edge of the existing 80-foot right-of-way. The taking involves portions of a total of 9 privately-owned parcels plus a portion of one parcel owned by the County of Hawaii used for the County refuse convenience center. The total acquisition/taking will be approximately 4.476 acres, or 194,975 square feet. The affected parcels and approximate amount of taking is shown in Table 1.1.

Table 1.1
Right-of-Way Taking by Parcel

TMK (from North to South)	TMK Parcel (Acres)	Right-of-Way Taking (approx. acreage)	TMK Remainder (Acres)	Ownership
1-6-003:065	19.493	0.215	19.278	County of Hawaii
1-6-001:015	897.947	3.884	894.063	Private
1-5-036:117	1.408	0.022	1.386	Private
1-5-036:116	1.026	0.009	1.017	Private
1-5-036:119	0.565	0.102	0.463	Private
1-5-036:120	0.763	0.102	0.661	Private
1-5-036:121	0.768	0.075	0.693	Private
1-5-033:261	137.509	0.029	137.48	Shower Drive
1-5-064:204	5.070	0.038	5.032	Pokahu Drive
Total Areas (*)		**4.476**		

(*) Excludes TMK: 1-5-036:118 0.074 acres owned by the State of Hawaii.

The HDOT taking involves the following:

1. Preparation of a right-of-way map to identify the parcels and areas of the taking;
2. HDOT appraisal of the affected areas;
3. Metes and bounds description of the taking;
4. Acquisition of the affected area.

In addition, it may be necessary to use adjacent properties during construction. If this is the case, the HDOT will execute a construction parcel agreement to use the adjacent lands during construction.

The existing culvert extensions will be constructed within the proposed makai right-of-way. The new pipe culvert will also be constructed within the proposed right-of-way.

The widening of Waipahoehoe Bridge will be constructed within the proposed right-of-way on the makai side and within the existing HDOT right-of-way on the mauka side.

Upon completion of the taking, the makai ROW would be about 60 feet from the center line of the road within the project limits. Thus the total ROW will be about 100 feet wide, with about 60 feet makai of the center line and 40 feet mauka of the center line.

1.4.2 Construction Activities

Relocation of the utility poles and overhead line will be undertaken along the makai side of the project limits. A total of 42 wooden utility poles will be relocated about 12 feet to about 14 feet within the proposed makai right-of-way. Relocation of the utility poles will require a Utility Agreement (UA) between HELCO and HDOT. According to Chapter 264.33 Hawaii Revised Statutes, the UA provides for equal cost sharing between HELCO and HDOT for the relocation, after the first $10,000.00 less depreciation, salvage value, and betterments. No utility poles will be relocated on the mauka side.

Typically, the poles will be placed in 10-foot deep by 2-foot diameter holes which will be filled with concrete to anchor them in-place.

Relocation of the 12-inch water line will require construction of new 2-foot wide by 5 foot deep trench in the 8-foot wide makai shoulder along the project limits. Typically, construction will be done in segments so the new line can be hydrotested, which includes cleaning the line of debris, adding chlorine to disinfect the line, and testing to ensure the proper pressure can be maintained. This process may be repeated to ensure the line meets Department of Water Supply standards. Since the work can be done in segments, the effluent water from the testing can be placed in the next segment of trench or used for dust control. This will ensure the effluent water does not affect nearby areas. At this point, a hydrotest permit from the State of Hawaii Department of Health is not anticipated. (Note, although described as a relocation, a new water line will be constructed and the existing water line will remain in service until service is switched to the new line.) After the new water line has been placed in service, a trench will be dug and the old line removed and the trench backfilled.

On the makai side, the existing 10-foot wide travel lane and 2-foot wide paved shoulder will be demolished by removing the existing asphalt pavement, then excavating to a total depth of about 24 inches for placement of new sub base (6-inch minimum aggregate), plus new base course (6-inch minimum permeable base course, 7-inch minimum glassphalt concrete base course) and a 4-inch minimum asphalt concrete pavement will be used for the new 12-foot travel lane and 8-foot shoulder. The roadway will be sloped for drainage. The removed pavement material could be reused for the new surface.

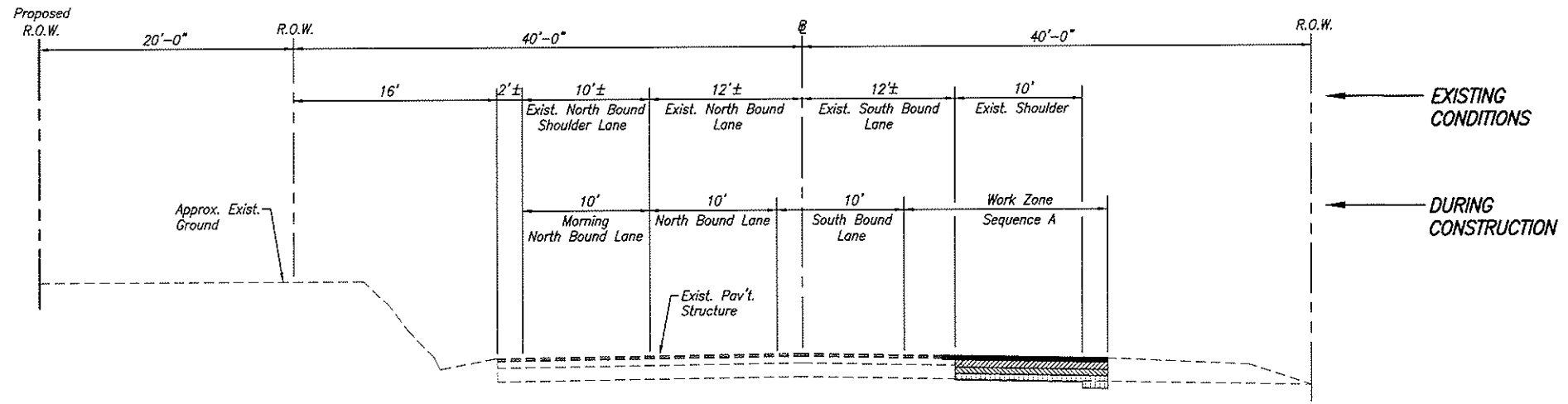
On the mauka side, the existing southbound (mauka side) 8 to 10-foot wide shoulder will be demolished by removing the existing asphalt pavement, then excavating to a total depth of about 22 inches, for placement of new sub-base, permeable base course, glassphalt concrete base course, and asphalt concrete pavement for the 10-foot wide southbound shoulder lane plus a 2-foot shoulder.

The Shoulder Lane Conversion will require shifting the travel lines to allow two 10-foot wide travel lanes, one in each direction, to be open to traffic at all times. During the morning peak travel period, an additional 10-foot wide northbound travel lane will be open to traffic. Work will initially proceed to construct the mauka shoulder lane, and mauka bridge widening, and convert the existing 12-foot wide travel lanes to 10-foot wide travel lanes and retaining the existing 10-foot wide northbound shoulder lane. The design drawings will include a construction traffic control plan showing two lanes will be available for travel at all times. Figure 1.6 shows the construction travel lanes.

Once the mauka improvements are complete, work will proceed to construct the northbound shoulder lane, culvert extensions, waterline relocation and makai bridge widening. The travel lanes will be shifted to the mauka side using the new 10-foot wide shoulder lane as a temporary 10-wide southbound travel lane. A temporary 10-foot wide northbound travel lane will be provided along the current southbound travel lane. In addition, the work area will shift makai during morning peak travel periods to allow a temporary 10-foot wide morning northbound shoulder lane. After 8:30 a.m., the construction work area will be expanded and the morning shoulder lane removed. Utility trenches across the roadway will be completed in their respective work zone and will be covered with steel plates each day prior to re-opening the morning shoulder lane. Figure 1.7 shows the construction travel lanes.

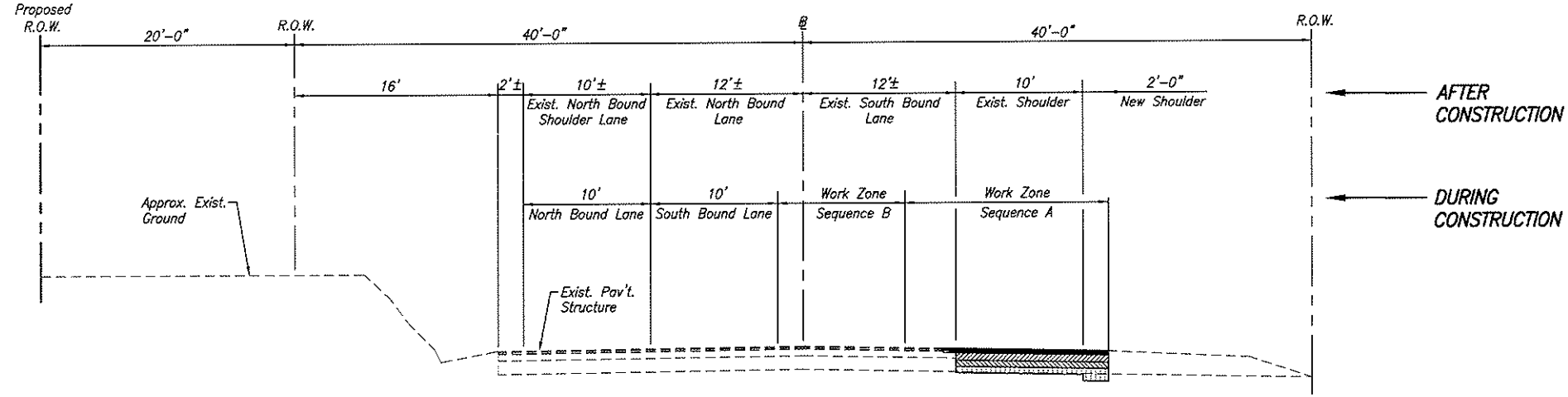
During the construction, the work area will be closed to travel to allow contractor access to the construction site. Since the surrounding land uses are not developed along most of the project limits, the contract documents would not preclude construction work at night. The contractor would make the decision related to night construction during the bidding.

Construction of the 4 pipe culvert will require excavation of an approximate 30 foot wide by 150 foot long trench across the roadway to allow placement of the 48-inch pipes.



MAUKA LANE TRAFFIC CONTROL -- MORNING PEAK HOURS

Scale: 1/8" = 1'-0"



MAUKA LANE TRAFFIC CONTROL – OTHER TIMES

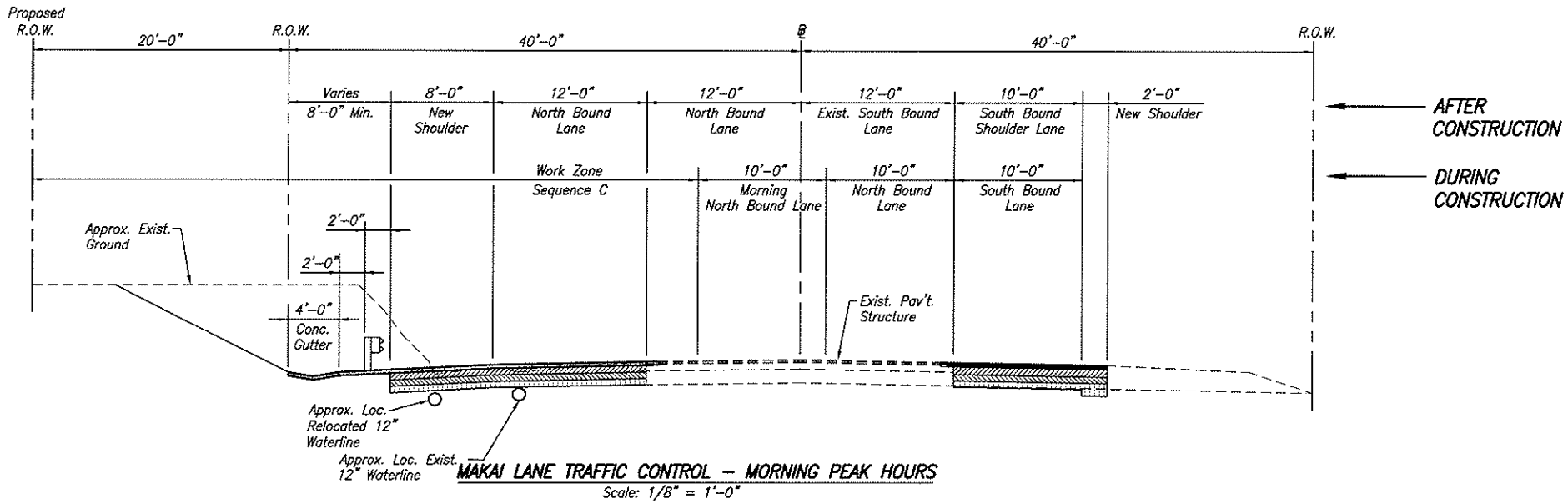
Scale: 1/8" = 1'-0"

WILSON OKAMOTO CORPORATION
ENGINEERS · PLANNERS

KEAAU-PAHOA ROAD SHOULDER LANE CONVERSION [PROJ NO. 0130 (28)]

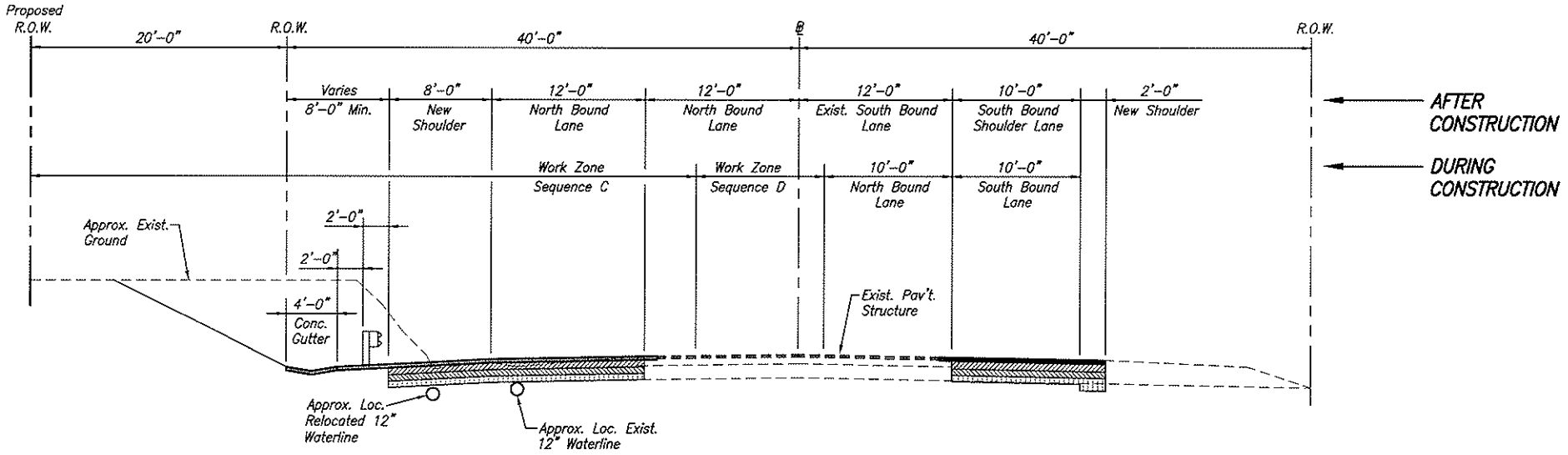
MAUKA CONSTRUCTION TRAVEL LANES

FIGURE
1.6



MAKAI LANE TRAFFIC CONTROL -- MORNING PEAK HOURS

Scale: 1/8" = 1'-0"



MAKAI LANE TRAFFIC CONTROL -- OTHER TIMES

Scale: 1/8" = 1'-0"

WILSON OKAMOTO CORPORATION
ENGINEERS · PLANNERS

KEAAU-PAHOA ROAD SHOULDER LANE CONVERSION [PROJ NO. 0130 (28)]

MAKAI CONSTRUCTION TRAVEL LANES

FIGURE
1.7

The 6 to 8-foot depth of the trench will include a 2-foot cover to meet HDOT design guidelines.

Construction of the culvert will follow the same traffic control sequence as the shoulders. Starting from the mauka side, construction of the culvert using precast sections will be done in sections to allow traffic on the travel lanes. Steel plates will be used to allow travel across the trench during construction. See Figures 1.6 and 1.7.

In addition to the roadway work, Waipahoehoe Bridge, located about 0.40 miles north of Shower Drive, will be widened from 40 feet wide to 70 feet wide by extending the width of the structure on both sides by 15 feet. The bridge will remain at its existing length of 78 feet. All four walls of the bridge structure will be extended 15 feet on both sides, plus adding wing walls on each end. The existing bridge railing will be removed along with a strip on the edge of the deck and the extension will then be joined to the existing bridge deck. Lastly, a 54-inch high replacement railing (4-foot 6-inch), the same height as the existing railing, will be added to both sides of the bridge.

The completed 70-foot wide (rail to rail) bridge deck will be able to accommodate a future 12-foot wide southbound lane after completion. The striping over the bridge for this project will reflect an 11-foot wide makai shoulder, two 12-foot wide northbound travel lanes, a 12-foot side southbound travel lane, a 10-foot wide afternoon southbound shoulder lane, and a 13-foot wide mauka shoulder for a total width of 70 feet.

Two travel lanes will be allowed on the bridge during construction by shifting the work areas from one side to the other side.

As part of the bridge work, the existing County of Hawaii Department of Water Supply (DWS) 12-inch water line hung on the makai side will be relocated to the mauka edge of the widened bridge.

The abandoned and closed bridge located west (mauka) of Waipahoehoe Bridge on State-owned land will be demolished and removed. As previously discussed, this abandoned bridge is not listed on the 1983 or 1996 State Historic Bridge studies.

In March 2007, the FHWA issued a memorandum related to Public Law 109-59, August 10, 2005, Section 1805, "Use of Debris From Demolished Bridges and Overpasses."

The legislation directs the State to first make the debris from the demolition of such structure available for beneficial use by a Federal, State, or local government, unless such use obstructs navigation. The "beneficial use" is defined as the use of the debris for purposes of shore erosion control or stabilization, ecosystem restoration, and marine habitat creation.

Concrete debris from the demolition of the abandoned bridge could be made available to re-use.

The existing intersection of Keaau-Pahoa Road and Shower Drive/Pohaku Drive consists of left turn storage lanes in both the northbound and southbound directions on Keaau-Pahoa Road. Installation of the traffic signal will not change this configuration of the intersection. The traffic signal will be set with "left-turn on arrow" for turning movements onto Shower Drive and Pohaku Drive from Keaau-Pahoa Road.

Traffic signal detector loops and related controls will be installed, and signage and striping improvements will be made at the intersection. Detector loops will be installed on Shower Drive, Pohaku Drive, and in both directions on Keaau-Pahoa Road.

A review of the AASHTO and FHWA design guidelines show the design drawings do not need to include improvements on the northbound shoulder approaching Shower Drive. However, given local driving habits, the design plans will include delineator posts to prevent vehicles from entering into the new northbound lane before the Shower Drive intersection. The traffic signal should also improve conditions related to early entry into the shoulder lane south of the Shower Drive intersection.

Upon completion of the improvements, the two 12-foot northbound travel lanes will be open at all times and the posted speed limit will be 55 mph for the two northbound lanes between the County refuse convenience center entry and Shower Drive.

The southbound 10-foot shoulder lane will be limited to traffic from 3:00pm to 6:00pm and the posted speed limit will be 45 mph on both the 12-foot travel lane and the 10-foot shoulder lane during the afternoon period. During all other times, the posted speed limit will remain at 55mph.

1.5 Preliminary Cost Estimate

The budgeted construction cost, excluding the equipment, for the Keaau-Pahoa Road, Shoulder Lane Conversion project is approximately $14.0 million which will be funded by HDOT and the Federal Highway Administration (FHWA).

1.6 Project Schedule

Construction is expected to start in February 2011 and should require about 24 months to complete. The roadway should be in operational by February 2013.

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156

BEGIN PROJECT
Project No. STP-0130(28)
B.L. P.O.C. Sta. 107+49.44
Keaau Bypass Road

R.O.W.

MATCH LINE
STA. 111+50

Match to exist. pavement

Baseline (B.L.)
Keaau Bypass Road

To Keaau

104+00 105+00 106+00 107+00 108+00 109+00 110+00 111+00

41'

2'

10'

2'

KEAAU BYPASS ROAD

To Pahoa

exist. edge of southbound travelway

Begin Merge Taper
Edge of New Shoulder Lane
B.L. P.O.C. Sta. 107+49.44
Keaau Bypass Rd.
(o/s 41' Rt.)

Match New Edge of Southbound Shoulder Lane to exist. edge of southbound travelway

New Edge of Southbound Shoulder Lane

New Edge of Shoulder

76+00 75+00 74+00 73+00 72+00 71+00 70+00 69+00

Baseline (B.L.)
Keaau–Pahoa Road

R.O.W.

PARCEL 69

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCEPT PLANS

Keaau–Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

Scale: As Shown Date: August 2007

SHEET No. OF SHEETS

FIGURE 1.5-0

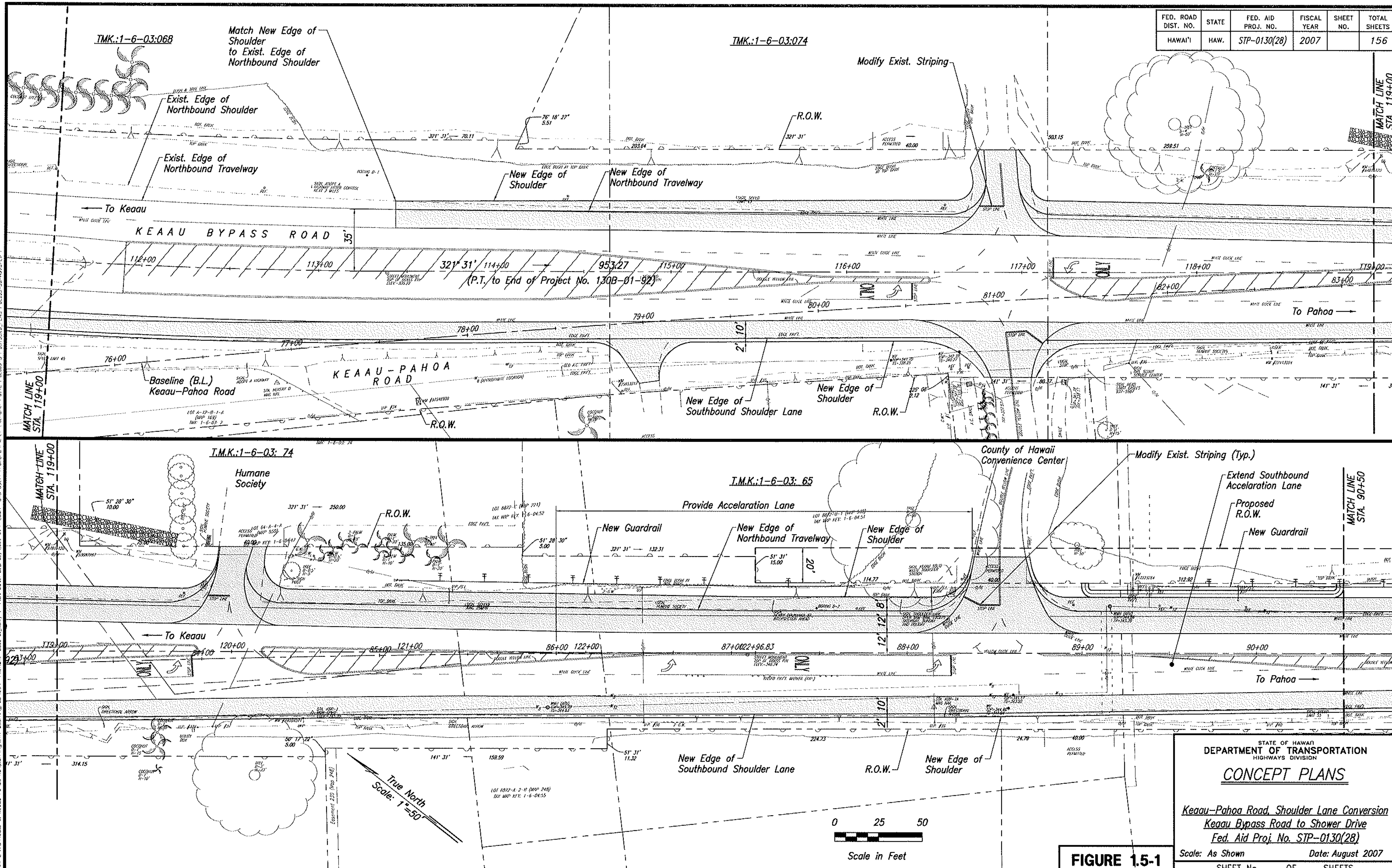

FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS
HAWAI'I | HAW. | STP-0130(28) | 2007 | | 156
TMK.:1-6-03:068
Match New Edge of Shoulder to Exist. Edge of Northbound Shoulder
Exist. Edge of Northbound Shoulder
Exist. Edge of Northbound Travelway
TMK.:1-6-03:074
Modify Exist. Striping
R.O.W.
New Edge of Shoulder
New Edge of Northbound Travelway
To Keaau
KEAAU BYPASS ROAD
(P.T. to End of Project No. 130B-01-92)
To Pahoa
KEAAU-PAHOA ROAD
Baseline (B.L.) Keaau-Pahoa Road
New Edge of Southbound Shoulder Lane
New Edge of Shoulder
MATCH LINE STA. 119+00
T.M.K.:1-6-03: 74
Humane Society
T.M.K.:1-6-03: 65
Provide Accelaration Lane
New Guardrail
New Edge of Northbound Travelway
New Edge of Shoulder
County of Hawaii Convenience Center
Modify Exist. Striping (Typ.)
Extend Southbound Accelaration Lane
Proposed R.O.W.
New Guardrail
MATCH LINE STA. 90+50
To Keaau
To Pahoa
New Edge of Southbound Shoulder Lane
R.O.W.
New Edge of Shoulder
True North
Scale: 1"=50'
0 25 50
Scale in Feet
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
CONCEPT PLANS
Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)
Scale: As Shown
Date: August 2007
SHEET No. OF SHEETS

FIGURE 1.5-1

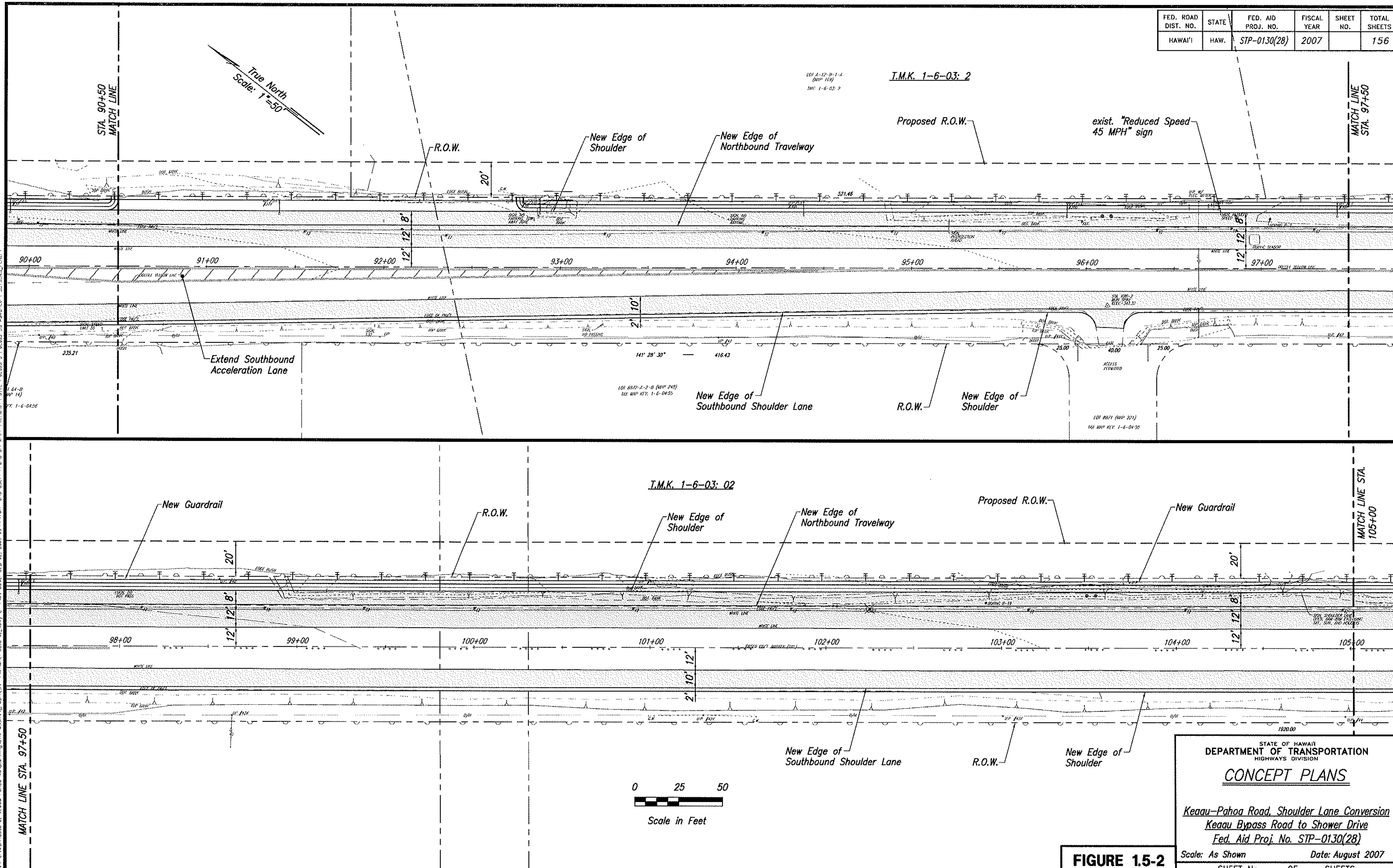
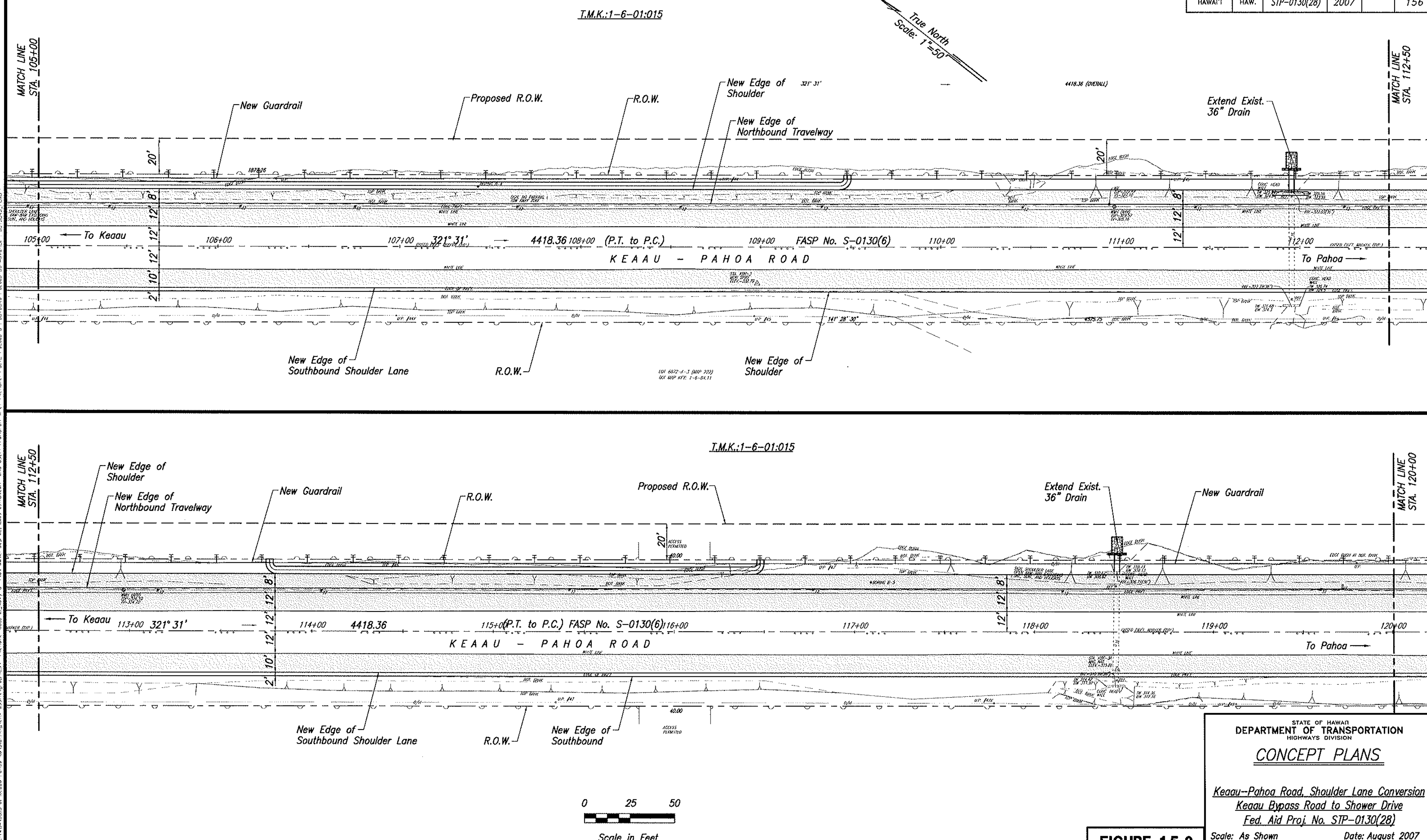

FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS
HAWAI'I | HAW. | STP-0130(28) | 2007 | | 156
True North
Scale: 1"=50'
STA. 90+50 MATCH LINE
T.M.K. 1-6-03: 2
Proposed R.O.W.
exist. "Reduced Speed 45 MPH" sign
MATCH LINE STA. 97+50
R.O.W.
New Edge of Shoulder
New Edge of Northbound Travelway
20'
8'
12'
12'
10'
2'
90+00
91+00
92+00
93+00
94+00
95+00
96+00
97+00
Extend Southbound Acceleration Lane
New Edge of Southbound Shoulder Lane
R.O.W.
New Edge of Shoulder
25.00
40.00
25.00
T.M.K. 1-6-03: 02
New Guardrail
R.O.W.
New Edge of Shoulder
New Edge of Northbound Travelway
Proposed R.O.W.
New Guardrail
MATCH LINE STA. 105+00
98+00
99+00
100+00
101+00
102+00
103+00
104+00
105+00
MATCH LINE STA. 97+50
New Edge of Southbound Shoulder Lane
R.O.W.
New Edge of Shoulder
0 25 50
Scale in Feet
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
CONCEPT PLANS
Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)
Scale: As Shown
Date: August 2007
SHEET No. OF SHEETS

FIGURE 1.5-2

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCEPT PLANS

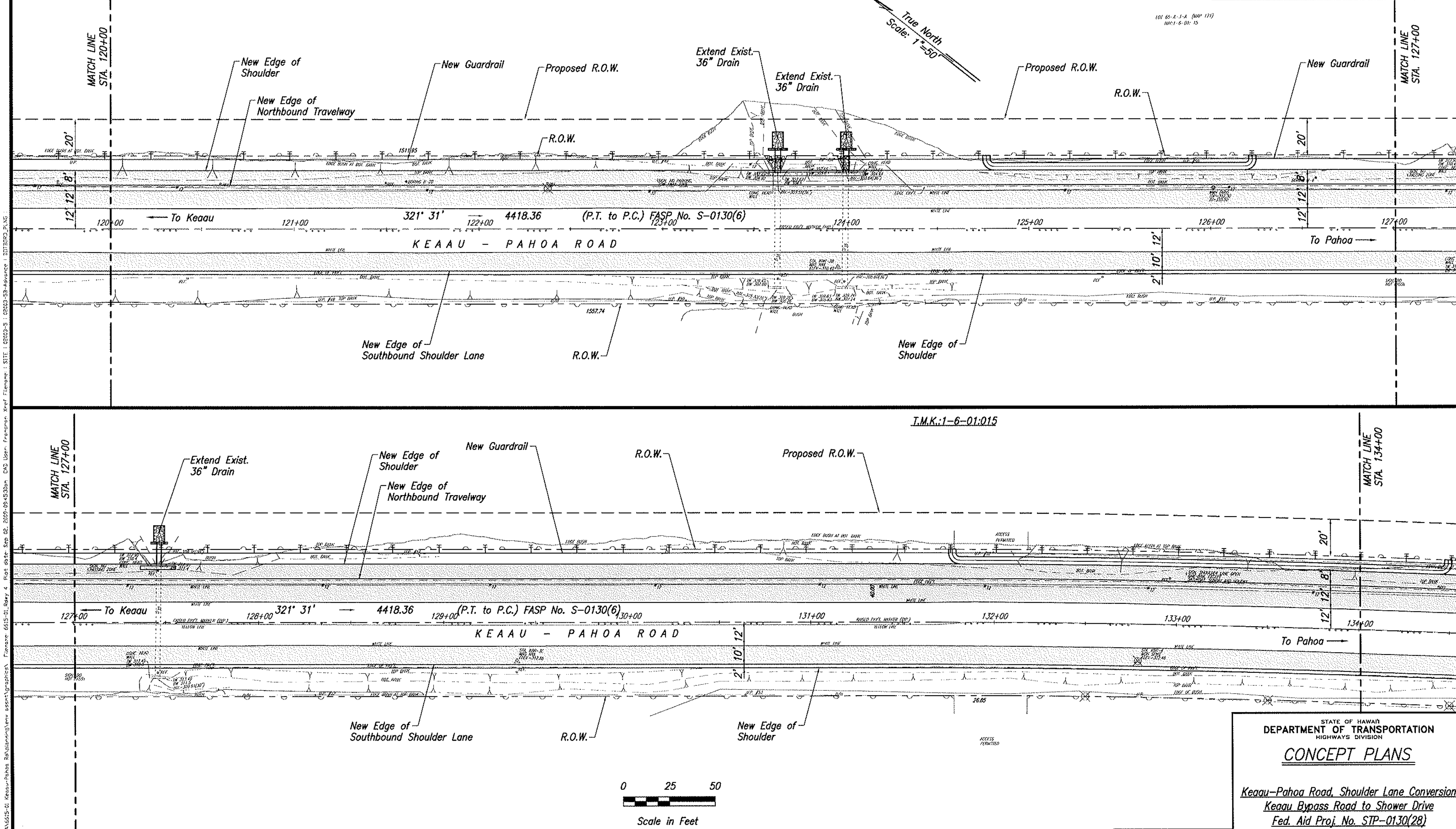
Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

FIGURE 1.5-3

Scale: As Shown | Date: August 2007

SHEET No. OF SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156



STATE OF HAWAI'I
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCEPT PLANS

Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

Scale: As Shown Date: August 2007

SHEET No. OF SHEETS

FIGURE 1.5-4

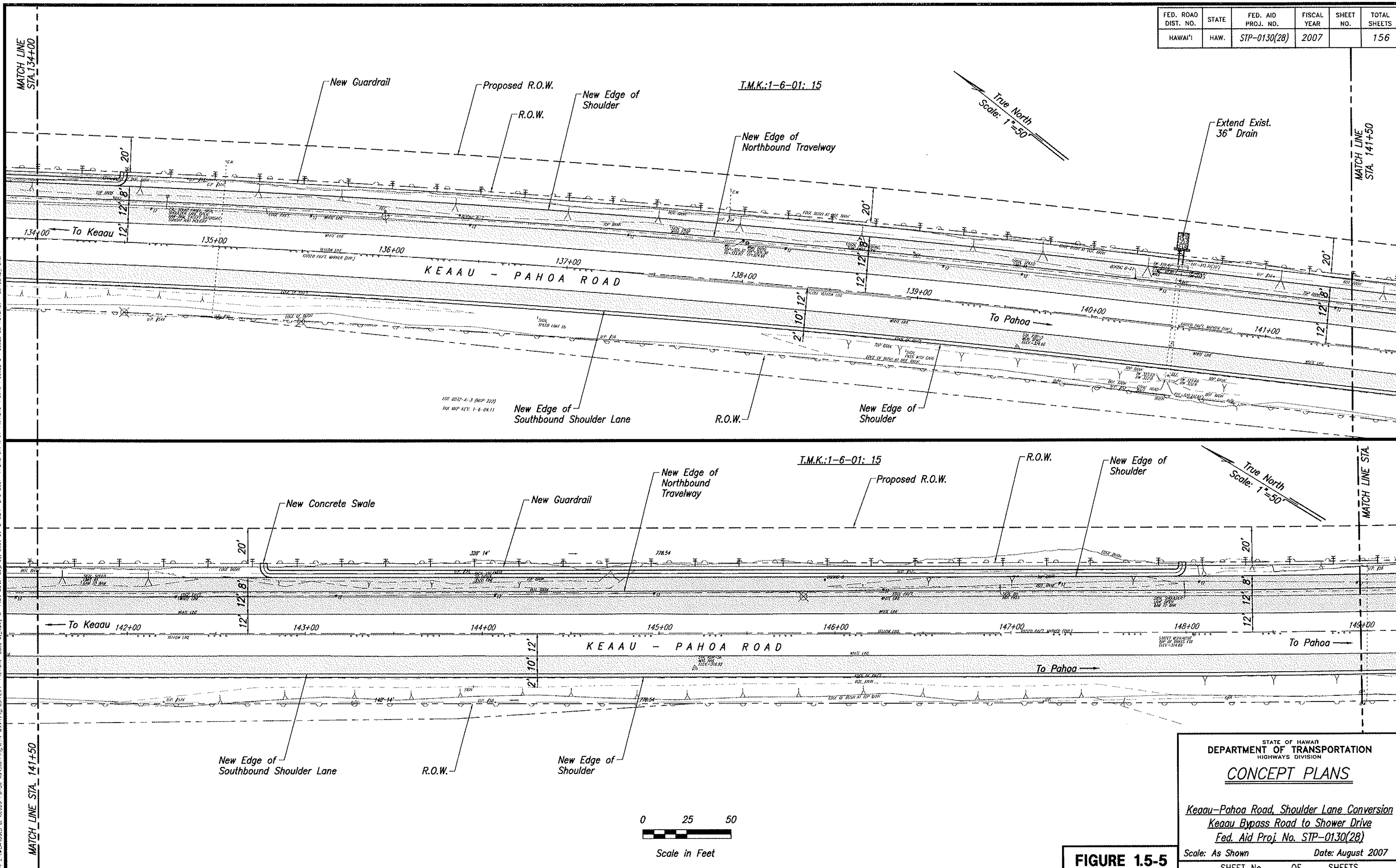
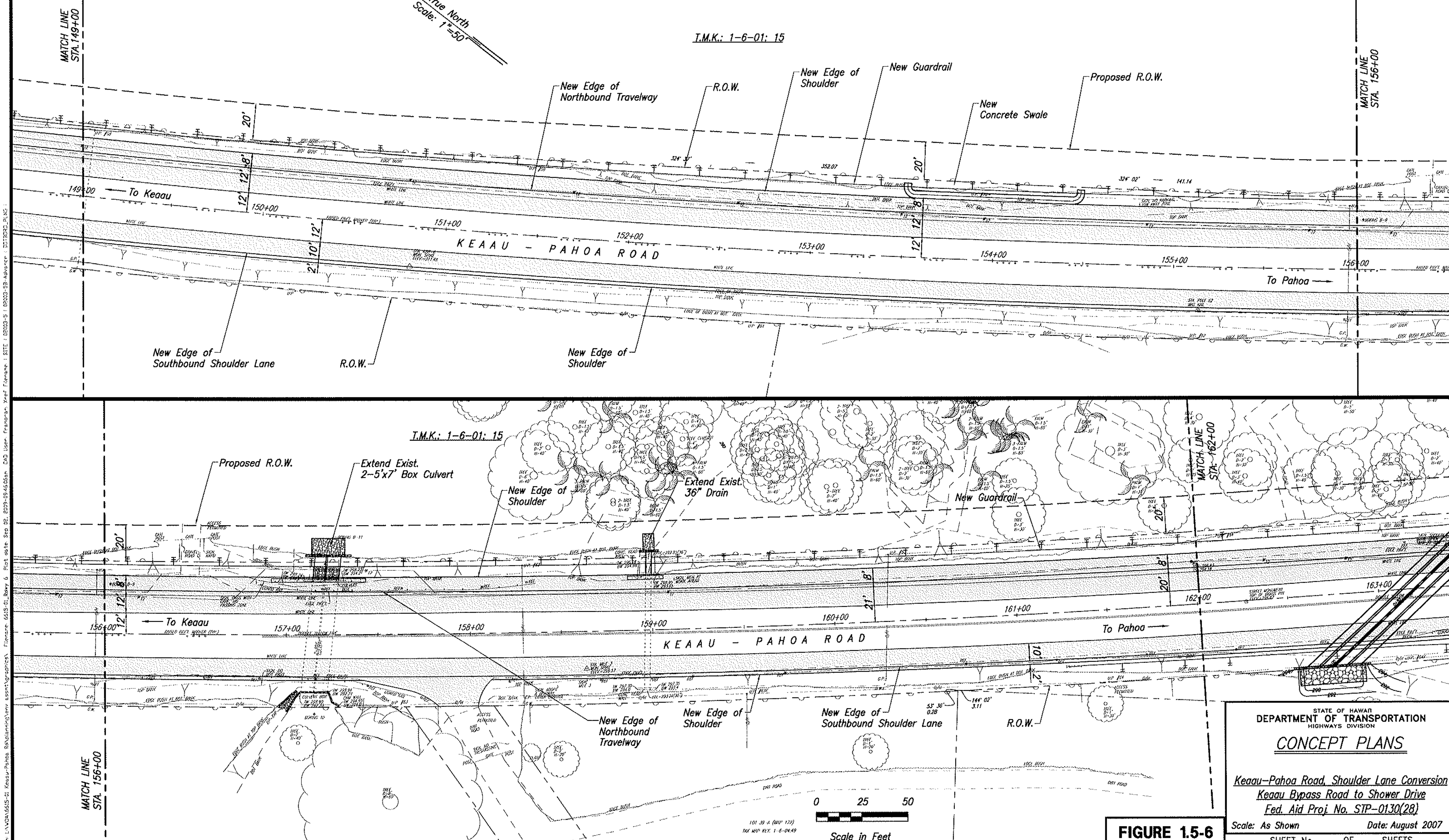

FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS
HAWAI'I | HAW. | STP-0130(28) | 2007 | | 156
MATCH LINE STA.134+00
New Guardrail
Proposed R.O.W.
New Edge of Shoulder
R.O.W.
T.M.K.:1-6-01: 15
True North
Scale: 1"=50'
New Edge of Northbound Travelway
Extend Exist. 36" Drain
MATCH LINE STA. 141+50
134+00
To Keaau
135+00
136+00
137+00
138+00
139+00
140+00
141+00
KEAAU - PAHOA ROAD
To Pahoa
New Edge of Southbound Shoulder Lane
R.O.W.
New Edge of Shoulder
T.M.K.:1-6-01: 15
R.O.W.
New Edge of Shoulder
New Edge of Northbound Travelway
Proposed R.O.W.
New Concrete Swale
New Guardrail
True North
Scale: 1"=50'
MATCH LINE STA.
To Keaau
142+00
143+00
144+00
145+00
146+00
147+00
148+00
149+00
KEAAU - PAHOA ROAD
To Pahoa
To Pahoa
New Edge of Southbound Shoulder Lane
R.O.W.
New Edge of Shoulder
MATCH LINE STA. 141+50
0 25 50
Scale in Feet
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
CONCEPT PLANS
Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)
Scale: As Shown
Date: August 2007
SHEET No. OF SHEETS

FIGURE 1.5-5

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCEPT PLANS

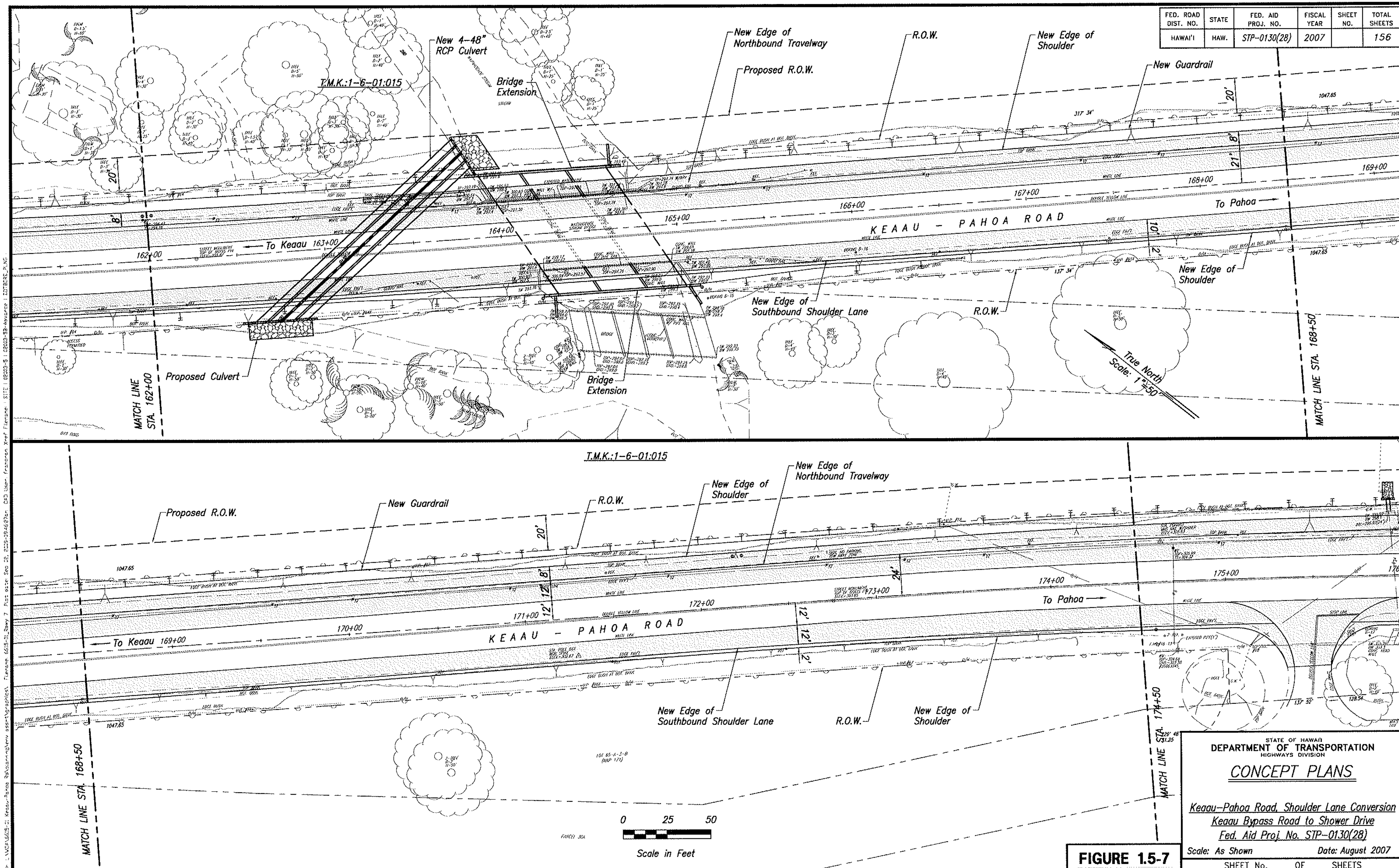
Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

Scale: As Shown — Date: August 2007

SHEET No. OF SHEETS

FIGURE 1.5-6

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCEPT PLANS

Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

Scale: As Shown Date: August 2007

SHEET No. OF SHEETS

FIGURE 1.5-7

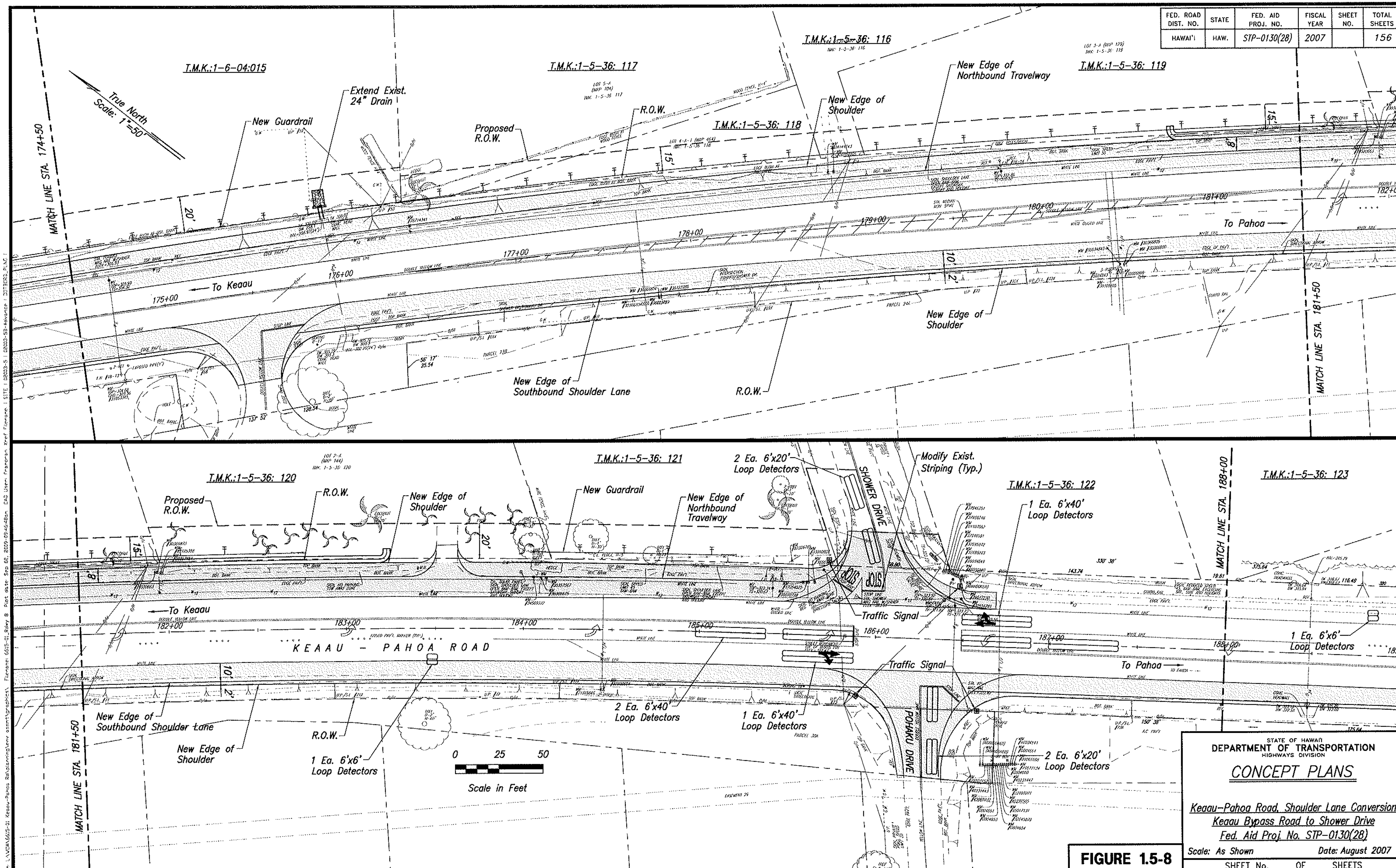
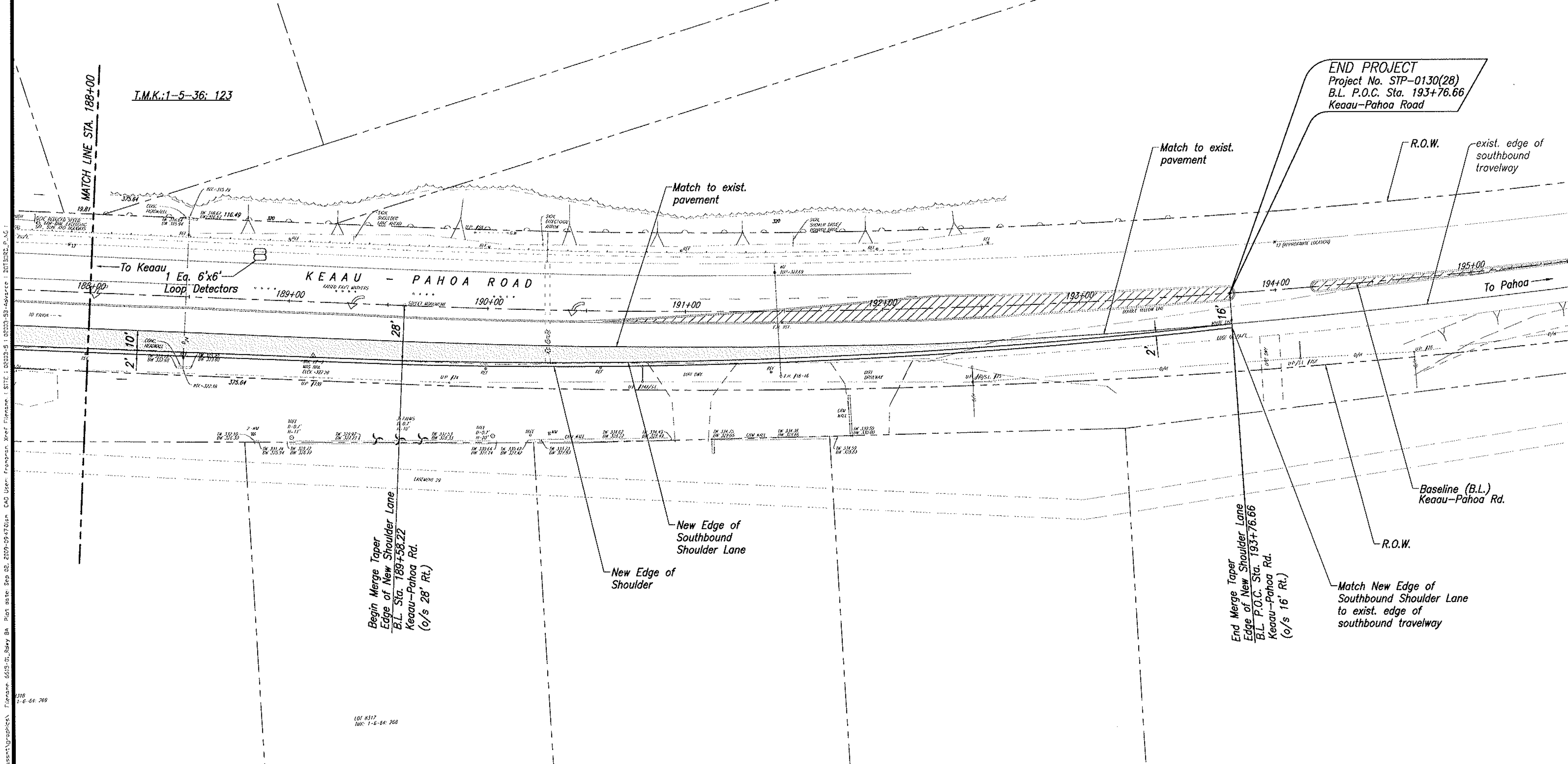

FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS
HAWAI'I | HAW. | STP-0130(28) | 2007 | | 156
True North
Scale: 1"=50'
MATCH LINE STA. 174+50
MATCH LINE STA. 181+50
MATCH LINE STA. 188+00
T.M.K.:1-6-04:015
T.M.K.:1-5-36: 117
T.M.K.:1-5-36: 116
T.M.K.:1-5-36: 118
T.M.K.:1-5-36: 119
T.M.K.:1-5-36: 120
T.M.K.:1-5-36: 121
T.M.K.:1-5-36: 122
T.M.K.:1-5-36: 123
Extend Exist. 24" Drain
New Guardrail
Proposed R.O.W.
R.O.W.
New Edge of Shoulder
New Edge of Northbound Travelway
New Edge of Southbound Shoulder Lane
To Keaau
To Pahoa
175+00
176+00
177+00
178+00
179+00
180+00
181+00
182+00
183+00
184+00
185+00
186+00
187+00
188+00
189+00
KEAAU - PAHOA ROAD
SHOWER DRIVE
POHAKU DRIVE
STOP
2 Ea. 6'x20' Loop Detectors
Modify Exist. Striping (Typ.)
1 Ea. 6'x40' Loop Detectors
Traffic Signal
1 Ea. 6'x6' Loop Detectors
2 Ea. 6'x40 Loop Detectors
0 25 50
Scale in Feet
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
CONCEPT PLANS
Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)
Scale: As Shown
Date: August 2007
SHEET No. OF SHEETS

FIGURE 1.5-8

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCEPT PLANS

Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

Scale: As Shown   Date: August 2007

SHEET No. OF SHEETS

FIGURE 1.5-8A

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156

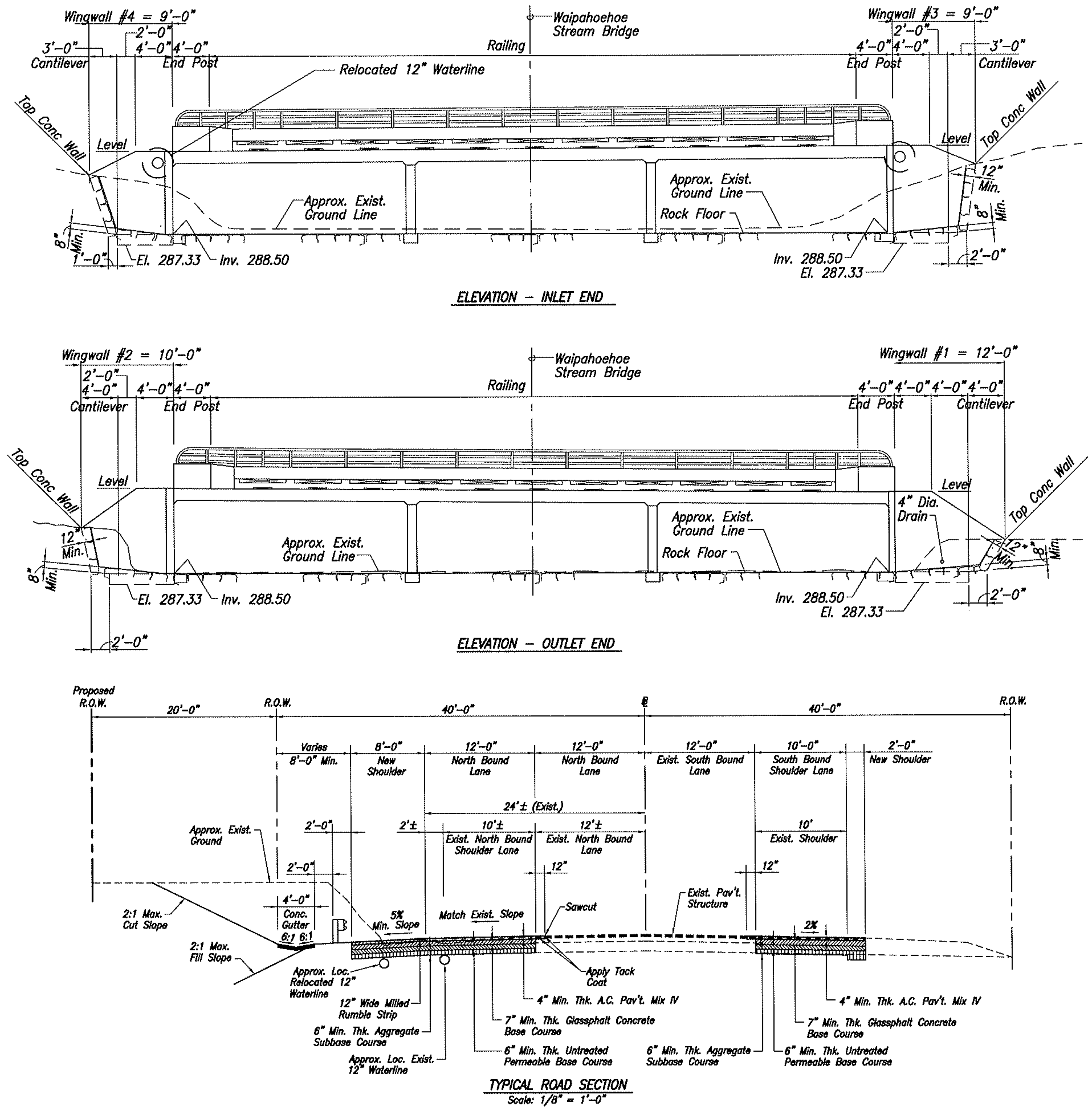


FIGURE 1.5-9

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCEPT PLANS

Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

Scale: As Shown | Date: August 2007

SHEET No. OF SHEETS

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156

BEGIN PROJECT
Project No. STP-0130(28)
B.L. P.O.C. Sta. 107+49.44
Keaau Bypass Road

104+00
105+00
106+00
107+00
108+00
109+00
110+00
111+00
75+00
76+00
74+00
73+00
72+00
71+00
70+00
69+00

To Keaau
To Pahoa
KEAAU BYPASS ROAD
Baseline (B.L.)
Keaau Bypass Road
Baseline (B.L.)
Keaau–Pahoa Road
R.O.W.
R.O.W.
MATCH LINE
STA. 111+50
41'
2'
10'
2'
exist. edge of southbound travelway
Begin Merge Taper
Edge of New Shoulder Lane
B.L. P.O.C. Sta. 107+49.44
Keaau Bypass Rd.
(o/s 41' Rt.)
Match New Edge of Southbound Shoulder Lane to exist. edge of southbound travelway
New Edge of Southbound Shoulder Lane
New Edge of Shoulder
Match to exist. pavement

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCEPT PLANS

Keaau–Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

Scale: As Shown Date: August 2007

SHEET No. OF SHEETS

FIGURE 1.5-0

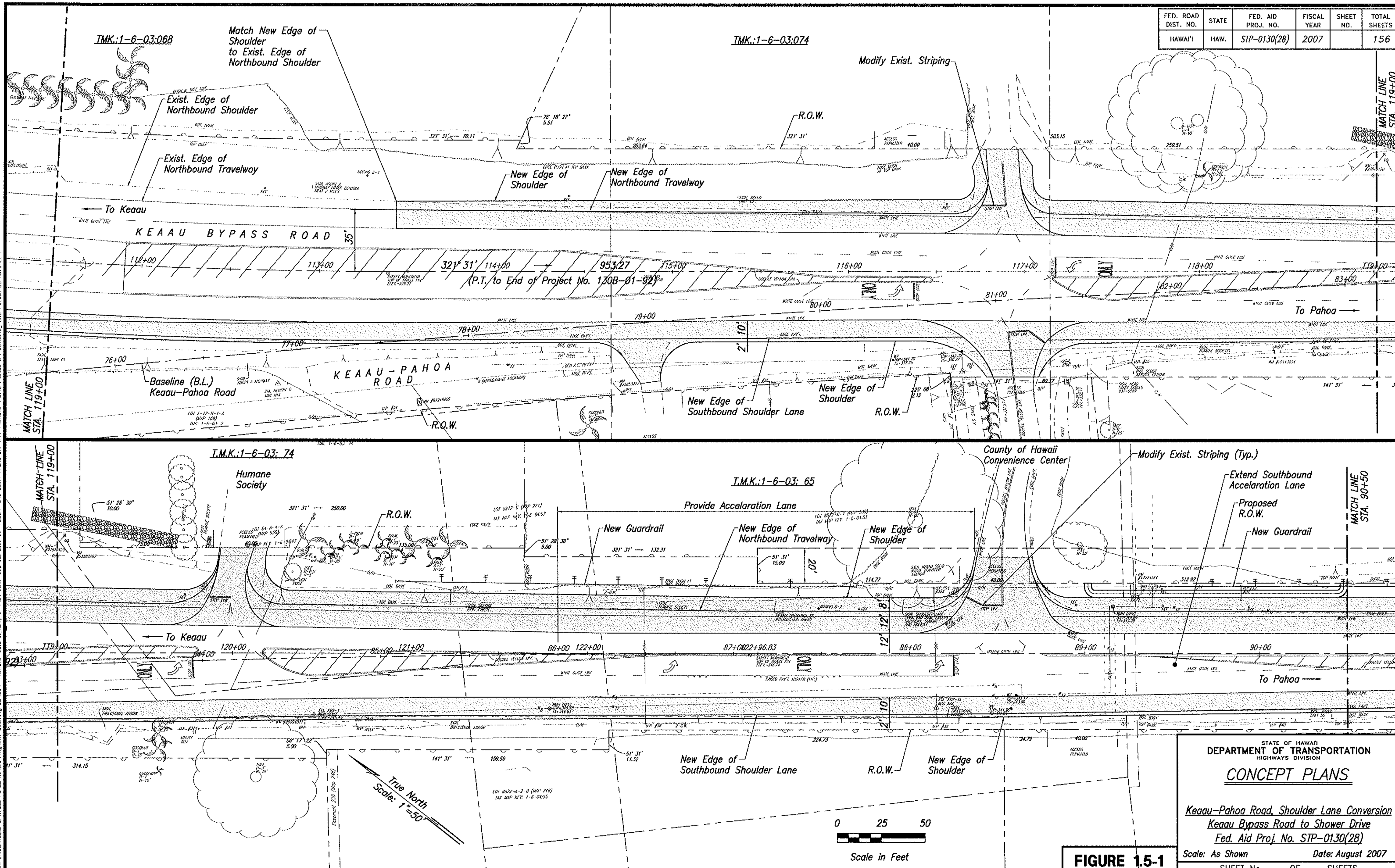
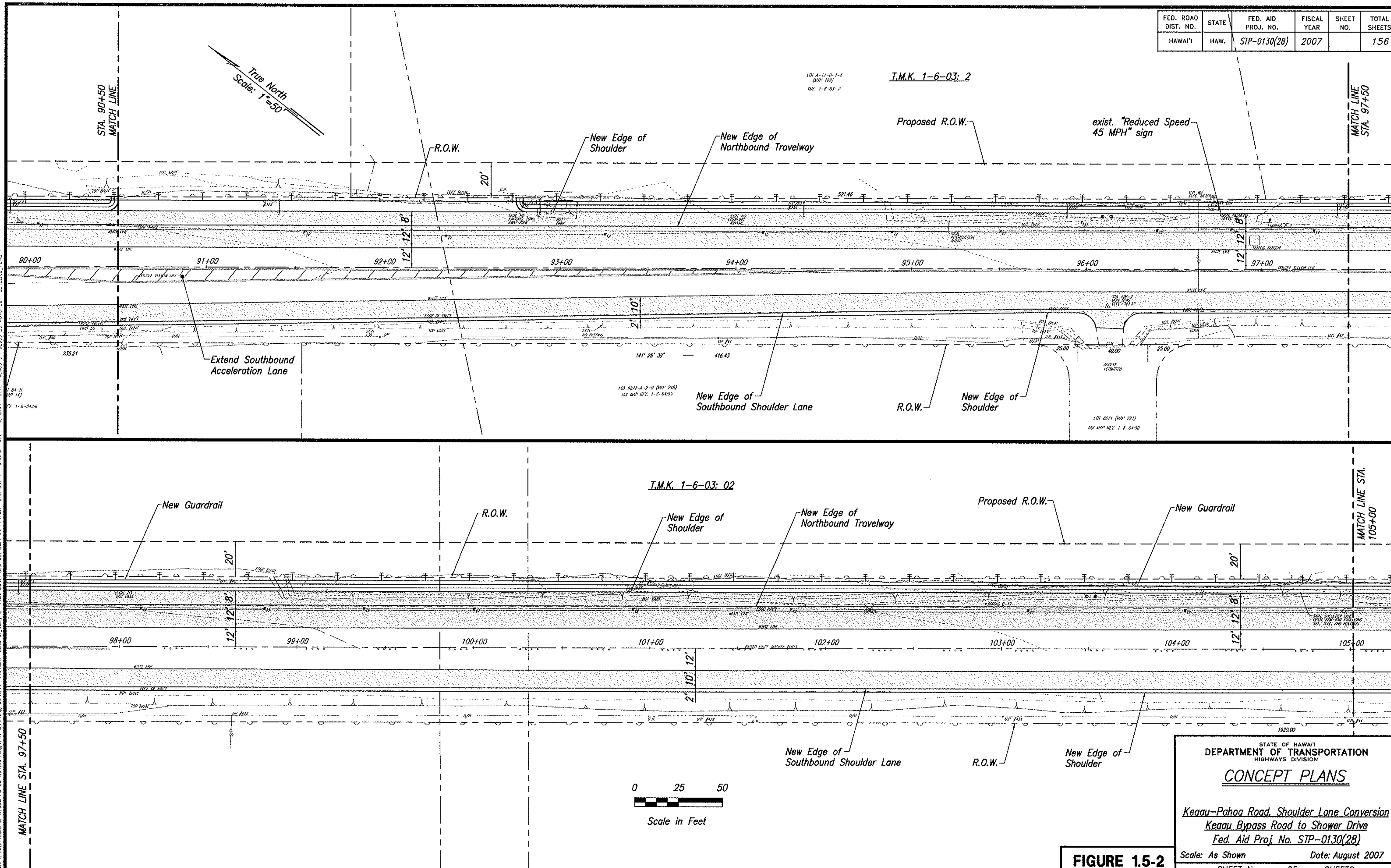

FED. ROAD DIST. NO. HAWAI'I
STATE HAW.
FED. AID PROJ. NO. STP-0130(28)
FISCAL YEAR 2007
SHEET NO.
TOTAL SHEETS 156
TMK.:1-6-03:068
Match New Edge of Shoulder to Exist. Edge of Northbound Shoulder
Exist. Edge of Northbound Shoulder
Exist. Edge of Northbound Travelway
New Edge of Shoulder
New Edge of Northbound Travelway
TMK.:1-6-03:074
Modify Exist. Striping
R.O.W.
To Keaau
KEAAU BYPASS ROAD
(P.T. to End of Project No. 130B-01-92)
To Pahoa
KEAAU-PAHOA ROAD
Baseline (B.L.) Keaau-Pahoa Road
R.O.W.
New Edge of Southbound Shoulder Lane
New Edge of Shoulder
R.O.W.
MATCH LINE STA. 119+00
T.M.K.:1-6-03: 74
Humane Society
R.O.W.
T.M.K.:1-6-03: 65
Provide Accelaration Lane
New Guardrail
New Edge of Northbound Travelway
New Edge of Shoulder
County of Hawaii Convenience Center
Modify Exist. Striping (Typ.)
Extend Southbound Accelaration Lane
Proposed R.O.W.
New Guardrail
MATCH LINE STA. 90+50
To Keaau
To Pahoa
New Edge of Southbound Shoulder Lane
R.O.W.
New Edge of Shoulder
True North
Scale: 1"=50'
0 25 50
Scale in Feet
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
CONCEPT PLANS
Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)
Scale: As Shown
Date: August 2007
SHEET No. OF SHEETS

FIGURE 1.5-1

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCEPT PLANS

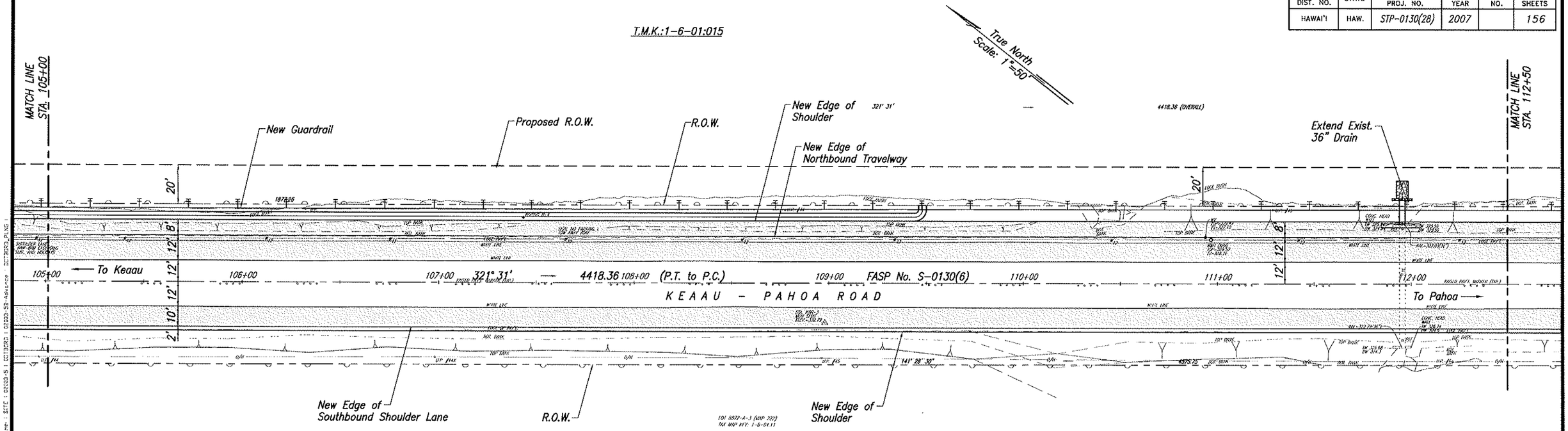
Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

Scale: As Shown Date: August 2007

SHEET No. OF SHEETS

FIGURE 1.5-2

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156



STATE OF HAWAI'I
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

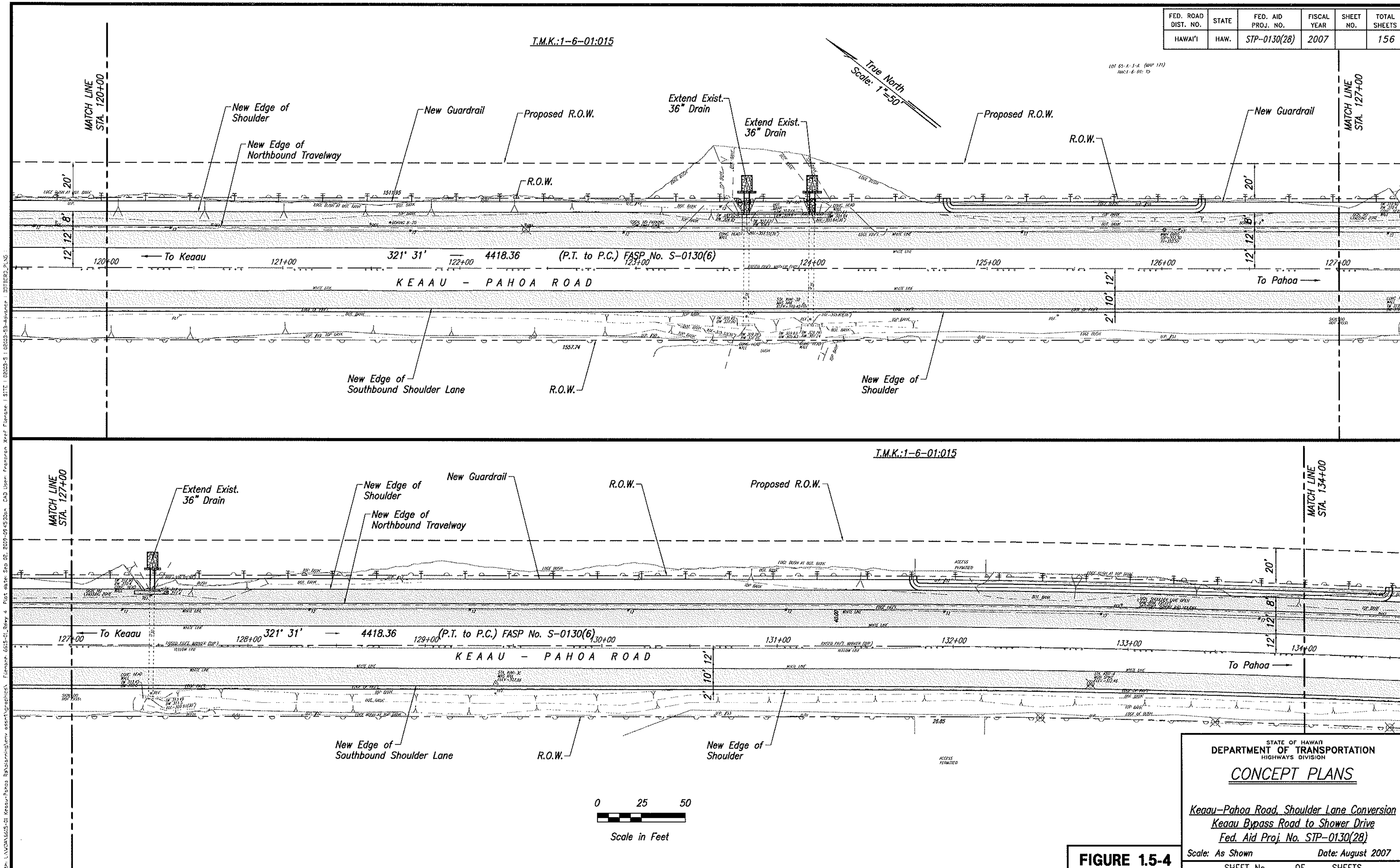
CONCEPT PLANS

Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

Scale: As Shown Date: August 2007

SHEET No. OF SHEETS

FIGURE 1.5-3



FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS
HAWAI'I | HAW. | STP-0130(28) | 2007 | | 156
T.M.K.:1-6-01:015
True North
Scale: 1"=50'
MATCH LINE STA. 120+00
MATCH LINE STA. 127+00
New Edge of Shoulder
New Edge of Northbound Travelway
New Guardrail
Proposed R.O.W.
R.O.W.
Extend Exist. 36" Drain
To Keaau
321° 31'
4418.36
(P.T. to P.C.) FASP No. S-0130(6)
120+00
121+00
122+00
123+00
124+00
125+00
126+00
127+00
KEAAU - PAHOA ROAD
To Pahoa
New Edge of Southbound Shoulder Lane
MATCH LINE STA. 134+00
128+00
129+00
130+00
131+00
132+00
133+00
134+00
0 25 50
Scale in Feet
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
CONCEPT PLANS
Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)
Scale: As Shown
Date: August 2007
SHEET No. OF SHEETS

FIGURE 1.5-4

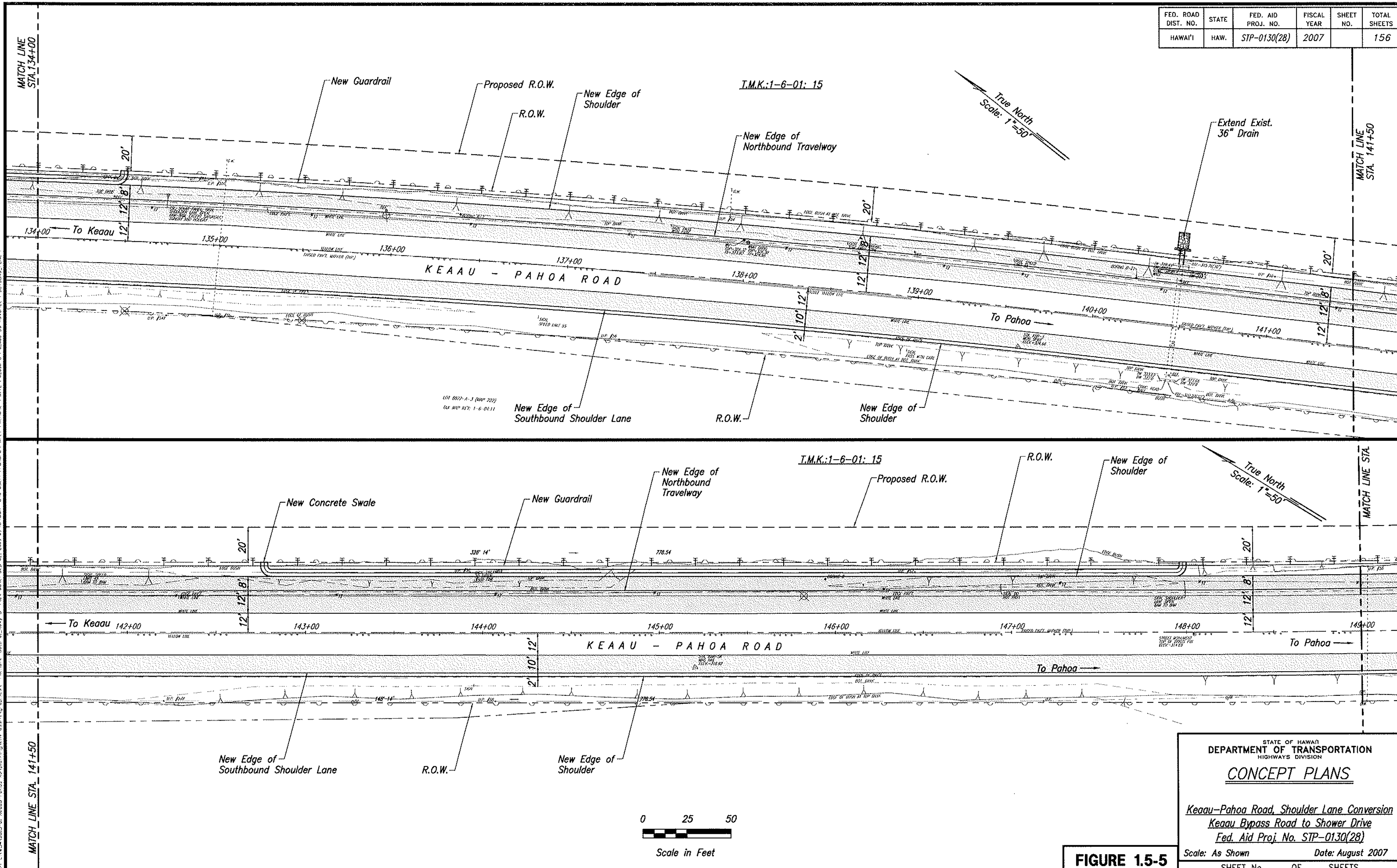
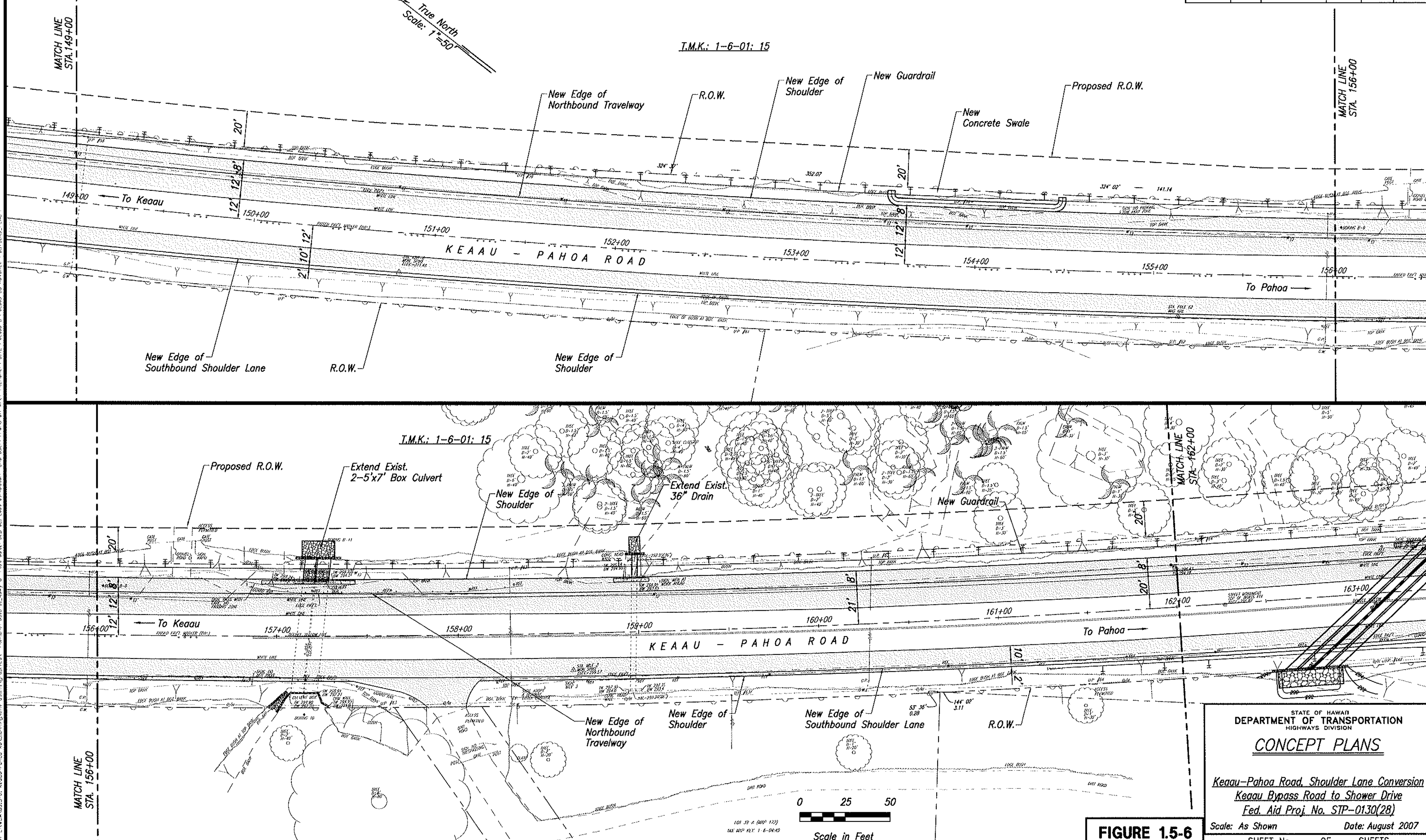

FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS
HAWAI'I | HAW. | STP-0130(28) | 2007 | | 156
MATCH LINE STA.134+00
New Guardrail
Proposed R.O.W.
New Edge of Shoulder
R.O.W.
T.M.K.:1-6-01: 15
True North
Scale: 1"=50'
New Edge of Northbound Travelway
Extend Exist. 36" Drain
MATCH LINE STA. 141+50
To Keaau
134+00
135+00
136+00
137+00
138+00
139+00
140+00
141+00
KEAAU - PAHOA ROAD
To Pahoa
New Edge of Southbound Shoulder Lane
R.O.W.
New Edge of Shoulder
T.M.K.:1-6-01: 15
R.O.W.
New Edge of Shoulder
New Edge of Northbound Travelway
Proposed R.O.W.
New Concrete Swale
New Guardrail
True North
Scale: 1"=50'
MATCH LINE STA.
To Keaau
142+00
143+00
144+00
145+00
146+00
147+00
148+00
149+00
KEAAU - PAHOA ROAD
To Pahoa
To Pahoa
New Edge of Southbound Shoulder Lane
R.O.W.
New Edge of Shoulder
MATCH LINE STA. 141+50
0 25 50
Scale in Feet
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
CONCEPT PLANS
Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)
Scale: As Shown
Date: August 2007
SHEET No. OF SHEETS

FIGURE 1.5-5

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCEPT PLANS

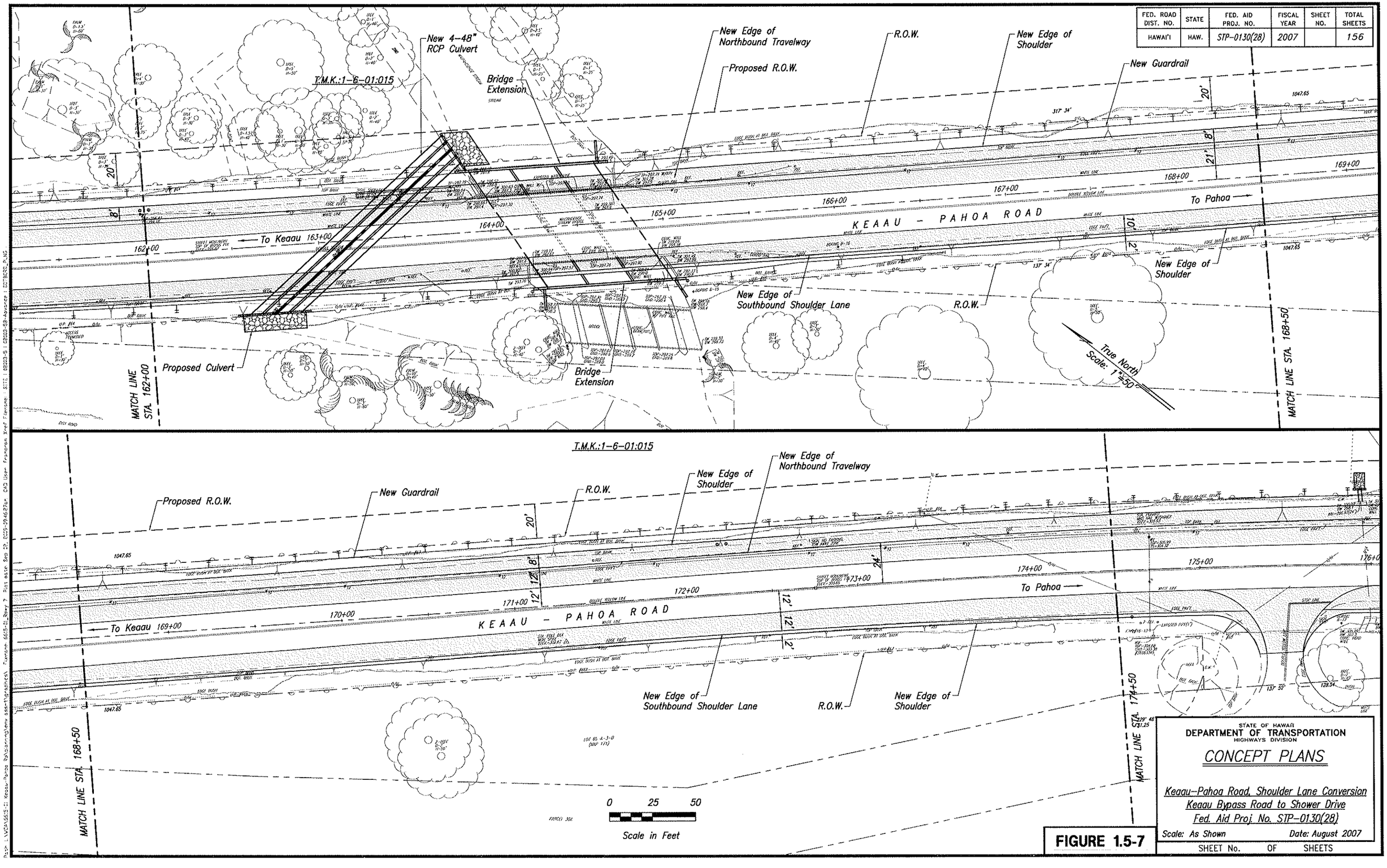
Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

Scale: As Shown Date: August 2007

SHEET No. OF SHEETS

FIGURE 1.5-6

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156



STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCEPT PLANS

Keaau--Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

Scale: As Shown Date: August 2007

SHEET No. OF SHEETS

FIGURE 1.5-7

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156

T.M.K.:1-6-04:015

T.M.K.:1-5-36: 117

T.M.K.:1-5-36: 116

T.M.K.:1-5-36: 119

T.M.K.:1-5-36: 118

True North
Scale: 1"=50

MATCH LINE STA. 174+50

Extend Exist. 24" Drain

New Guardrail

Proposed R.O.W.

R.O.W.

New Edge of Shoulder

New Edge of Northbound Travelway

20'

15'

8'

12'

10'

175+00

176+00

177+00

178+00

179+00

180+00

181+00

182+00

To Keaau

To Pahoa

New Edge of Southbound Shoulder Lane

R.O.W.

New Edge of Shoulder

MATCH LINE STA. 181+50

T.M.K.:1-5-36: 120

T.M.K.:1-5-36: 121

T.M.K.:1-5-36: 122

T.M.K.:1-5-36: 123

Proposed R.O.W.

R.O.W.

New Edge of Shoulder

New Guardrail

New Edge of Northbound Travelway

2 Ea. 6'x20' Loop Detectors

Modify Exist. Striping (Typ.)

SHOWER DRIVE

STOP

1 Ea. 6'x40' Loop Detectors

MATCH LINE STA. 188+00

Traffic Signal

1 Ea. 6'x6' Loop Detectors

KEAAU - PAHOA ROAD

183+00

184+00

185+00

186+00

187+00

188+00

189+00

To Keaau

To Pahoa

New Edge of Southbound Shoulder Lane

New Edge of Shoulder

R.O.W.

1 Ea. 6'x6' Loop Detectors

2 Ea. 6'x40' Loop Detectors

1 Ea. 6'x40' Loop Detectors

Traffic Signal

POHAKU DRIVE

2 Ea. 6'x20' Loop Detectors

MATCH LINE STA. 181+50

0 25 50

Scale in Feet

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCEPT PLANS

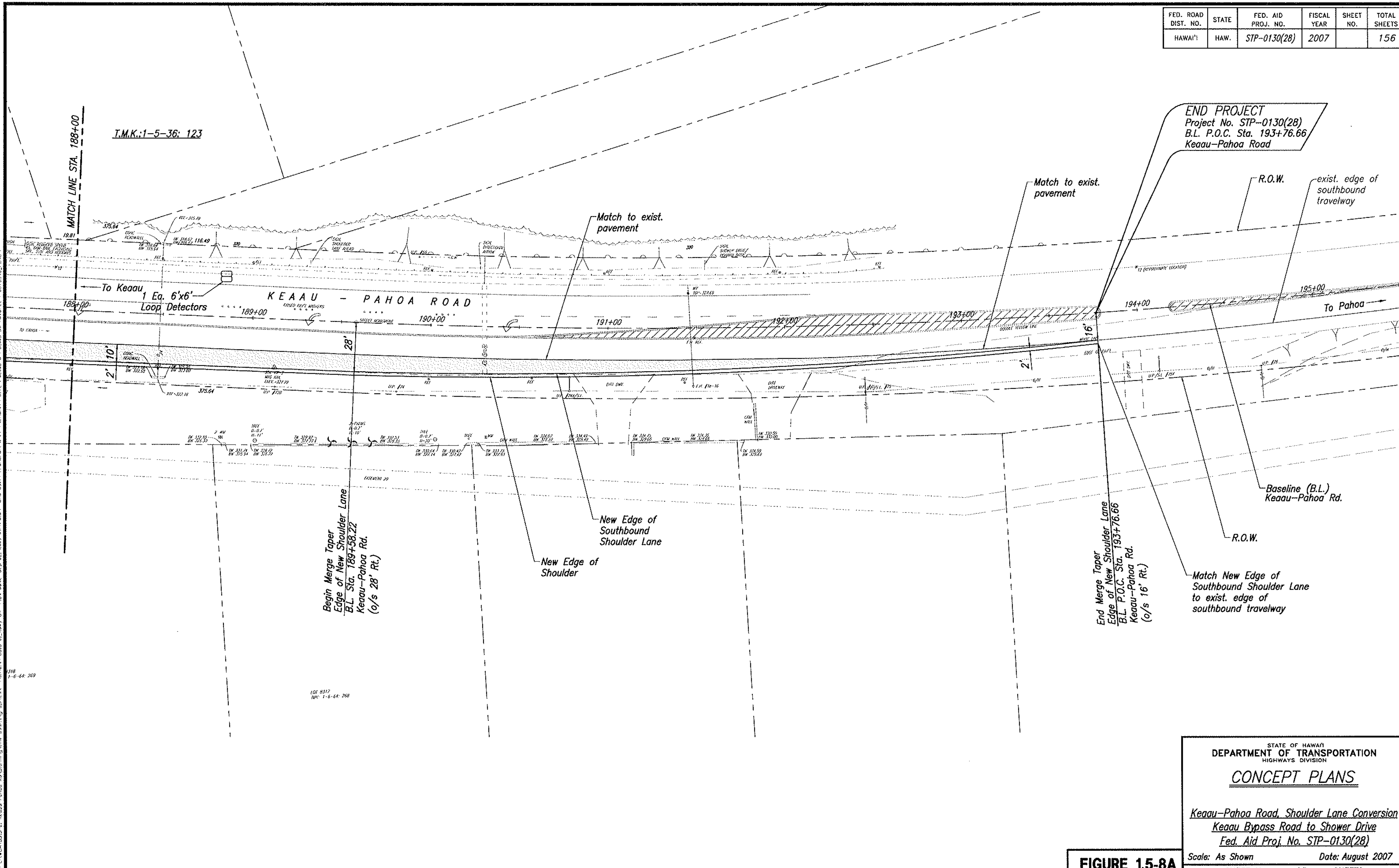
Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

Scale: As Shown Date: August 2007

SHEET No. OF SHEETS

FIGURE 1.5-8

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156



STATE OF HAWAI'I
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCEPT PLANS

Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

Scale: As Shown   Date: August 2007

SHEET No.   OF   SHEETS

FIGURE 1.5-8A

FED. ROAD DIST. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAI'I	HAW.	STP-0130(28)	2007		156

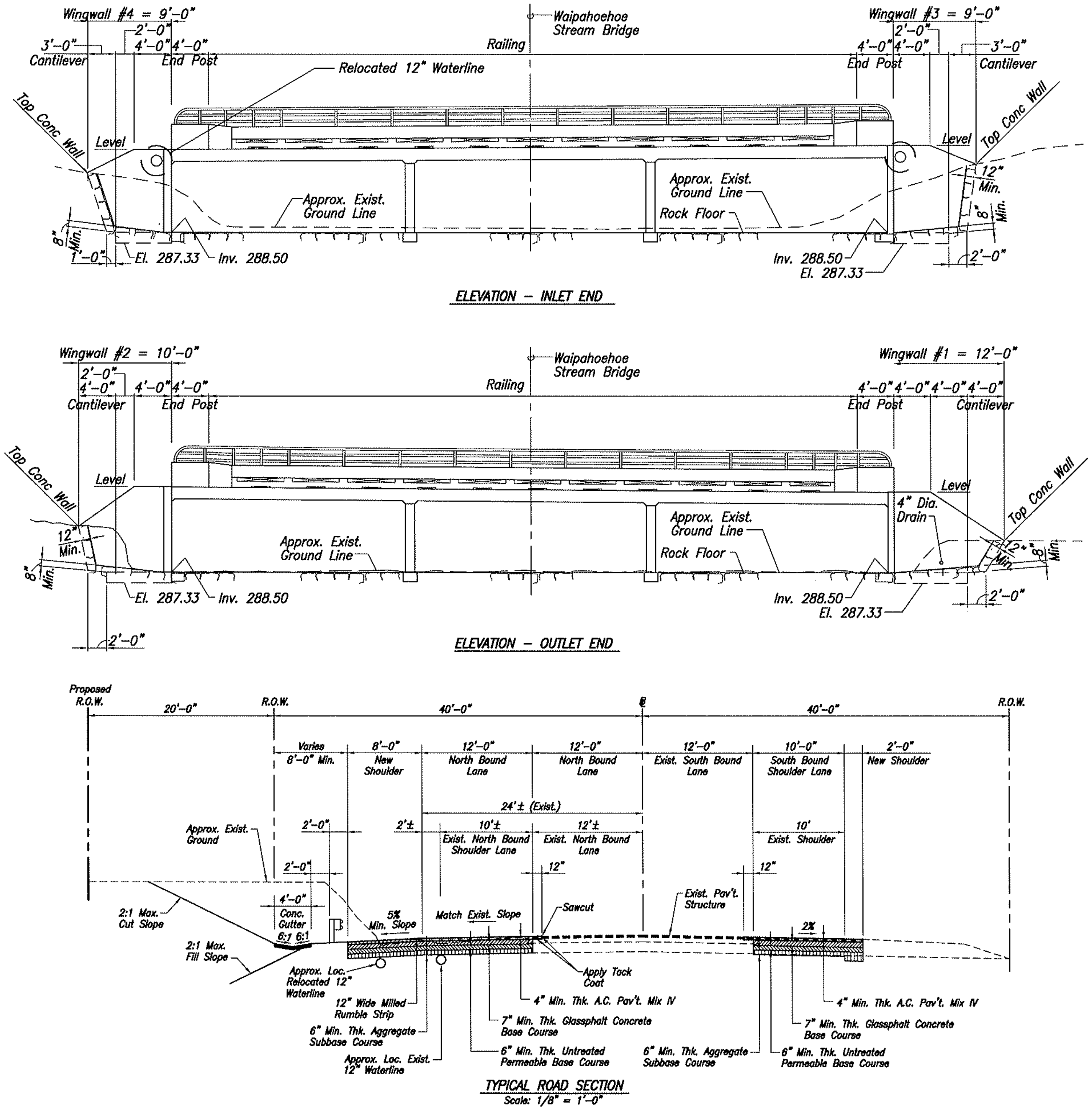


FIGURE 1.5-9

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

CONCEPT PLANS

Keaau-Pahoa Road, Shoulder Lane Conversion
Keaau Bypass Road to Shower Drive
Fed. Aid Proj. No. STP-0130(28)

Scale: As Shown Date: August 2007

SHEET No. OF SHEETS

3. RELATIONSHIP to PLANS, POLICIES and CONTROLS

3.1 Hawaii State Plan

The Hawaii State Plan, adopted in 1978 and revised in 1988, establishes the overall theme, goals, objectives, and priority guidelines to guide the future long-range development of the State. The Keaau-Pahoa Road Shoulder Lane Conversion project supports and is consistent with the following State Plan objectives and policies:

Section 226-6 Objectives and policies for the economy - in general.

> *(b) (6) Strive to achieve a level of construction activity responsive to, and consistent with, state growth objectives.*

The Keaau-Pahoa Road Shoulder Lane Conversion project will involve demolition of the existing shoulder lane and culvert headwalls and construction of a new travel lane and shoulder lane, culvert extensions, one new multiple pipe culvert, widening of Waipahoehoe Bridge, and installation of a new traffic signal. The Shoulder Lane Conversion project will increase the level of construction activity in the County of Hawaii during the period of construction which will enhance the state's growth objectives.

Section 226-14 Objectives and policies for the facility systems – in general.

> *(b) (1) Accommodate the needs of Hawaii's people through coordination of facility systems and capital improvements priorities in consonance with State and County plans.*

The Keaau-Pahoa Road Shoulder Lane Conversion project is a recommended action of the Puna Regional Circulation Plan, 2005. The project is also included in the Draft Hawaii State Transportation Improvement Program (STIP) for construction in FY 2009. Highway 130 between the Pahoa Bypass and the Keaau Bypass is identified as a "Primary Arterial to be Widened" in the Puna Community Development Plan (1995). The County of Hawaii General Plan contains language recognizing that Highway 130 is congested during the work week for Hilo-bound traffic as the population in the Puna district continues to grow. Thus, the Keaau-Pahoa Road Shoulder Lane Conversion

project is a capital improvement project which is in consonance with State and County plans.

Section 226-17 Objectives and policies for facility systems – transportation.

(b) (6) Encourage transportation systems that serve to accommodate present and future development needs of communities.

The Shoulder Lane Conversion project is necessary to accommodate future development needs of the Puna district, one of the fastest growing district's in the State.

3.2 Hawaii Statewide Transportation Improvement Plan

Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU), was enacted August 10, 2005, as Public Law 109-59. The SAFETEA-LU maintains the structure and funding balance established in 1991's Intermodal Surface Transportation Efficiency Act (ISTEA) and continued in Transportation Equity Act for the 21st Century (TEA-21). SAFETEA-LU was designed to improve and maintain the transportation infrastructure in the United States, especially the highway and interstate road system.

The Hawaii Statewide Transportation Improvement Program (STIP) provides a multi-year listing of the State and County projects and identifies those projects slated for Federal funding. It is a multi-modal transportation improvement program that is developed utilizing existing transportation plans and policies, and current highway, transit and transportation programming processes. The STIP delineates the funding categories and the federal and local share required for each project. Although projects are on the STIP, it does not necessarily mean those projects will be planned, designed, or constructed within the fiscal period due to unforeseen occurrences such as project readiness or project priorities.

With the passage of SAFETEA-LU, the STIP is now a four-year programming implementation document that identifies State and County transportation projects statewide, to be funded, in part, with Federal Highway and Transit funds.

Regionally significant projects requiring an action by the Federal Highway Administration or the Federal Transit Administration should be included in the STIP, even when Federal Highway or Transit funds are not used.

In May 2009, the State DOT published the most recent STIP, Revision #7 for Fiscal Year 2008 – 2013, which includes the Shoulder Lane Conversion project.

3.3 Land Use Plans and Policies

3.3.1 State Land Use District

The Hawaii Land Use Law of Chapter 205, Hawaii Revised Statutes, classifies all land in the State into four land use districts: Urban, Agriculture, Conservation, and Rural. The Shoulder Lane Conversion project is located in the Agricultural District classification.

3.3.2 County of Hawaii General Plan

The County of Hawaii General Plan is a policy document for the long-range comprehensive development of the island of Hawaii and also provides the direction for future growth of the County. The current General Plan was adopted as Ordinance 05 25 on February 9, 2005.

Among its various sections, the County of Hawaii General Plan contains a series of policies for the long-range comprehensive development of the county and statements of development standards and principles with respect to the most desirable use of land within the county.

With regard to roadway transportation in the Puna District, the General Plan contains the following relating to Highway 130:

> *"As the only two primary routes serving the district, Highway 130 and Highway 11 are congested during the work week for Hilo-bound traffic as the population in the district continues to grow." (p. 13-7)*

The goals, policies and standards from Section 13 of the General Plan applicable to the Shoulder Lane Conversion project are set forth below.

I. Roadways

Goal: Provide a system of roadways for the safe, efficient and comfortable movement of people and goods.

Policy: The County shall coordinate with appropriate State agencies and for the provision of public facilities to serve the needs of the community.

The Shoulder Lane Conversion project along the remaining portion of Keaau-Pahoa Road is the primary access between Keaau and Pahoa, and to the residential areas along the road. The Shoulder Lane Conversion project will provide a permanent second northbound travel lane which can be used at all times for motorists to reach Keaau and a shoulder lane to reach Pahoa.

In addition, the Shoulder Lane Conversion project will install a traffic signal at the Shower Drive/Pohaku Drive intersection. The traffic signal will allow motorists to make left-turn movements from and onto Keaau-Pahoa Road without long queues, especially during the peak morning and afternoon travel times. The traffic signal will also allow access into the residential areas of Hawaiian Paradise Park and Orchidland, both of which have growing population bases. Thus, the Shoulder Lane Conversion project will be consistent with the County General Plan.

3.3.3 Puna Community Development Plan

The County of Hawai'i General Plan, approved in 2005, established the Community Development Plan Program (CDP). Community Development Plans are intended to translate broad General Plan Goals, Policies, and Standards into Implementation Actions as they apply to specific geographical regions around the Island. CDPs are also intended to serve as a forum for community input into land-use, delivery of government services and any other matters relating to the planning area.

The Puna CDP was completed in September 2008 and adopted by Ordinance No. 08 116. The plan addresses 13 elements contained within the General Plan as they relate to Puna. The transportation portion of the plan is broken into four sections which include an Overview and three subgroup reports covering Mass Transit, Existing Roadways, and New Alternative Roadways. The Existing Roadways subgroup report

contains recommendations that pertain to the Shoulder Lane Conversion project. The recommendations are found in two of four priority areas on Safety and Traffic Congestion.

Priority #1 Safety

The CDP Existing Roadways report notes that, in terms of road safety, the Shower Drive/ Pohaku Drive intersection is unsafe for merging and left turns. The report recommends the installation of a traffic roundabout or, as a last resort, a traffic signal at the intersection.

Given the design guidelines for roundabouts from the Federal Highway Administration and the space constraints at the intersection, a roundabout is considered an infeasible alternative. The Shoulder Lane Conversion project will include installation of a traffic signal at the intersection which will improve safety for merging and left-turn traffic movements. A more detailed discussion of the roundabout option is contained in Section 4.3.

The report also notes that there are no dedicated routes for non-motorized traffic along Highway 130 and recommends that the State DOT conduct a study to determine how to modify Highway 130 to accommodate such traffic. The Shoulder Lane Conversion project will include an 8-foot wide paved shoulder for use by pedestrians and bicyclists.

Priority #2: Traffic Congestion

The Existing Roadways report notes that peak demand exceeds roadway capacity on Highway 130. The report recommends the widening of Highway 130 by constructing a reversible middle lane that will carry a second lane of traffic northbound during the morning rush hour and southbound during the evening rush hour. The Shoulder Lane Conversion project will provide a permanent third lane within the project limits that can be coned and/or striped such that the middle lane can be used as a reversible lane.

3.3.4 Puna Regional Circulation Plan

The Puna Regional Circulation Plan (Final Report dated November 2005) addresses future automobile, bicycle, pedestrian and transit corridors of the Puna District. The Plan was initiated to evaluate existing regional transportation systems and proposed future transportation corridors in Puna until the year 2030. The Plan was developed in close coordination with County officials, staff, an advisory group, and interested citizens.

Recommendations of the PRCP include the proposed widening of Highway 130 from two to four lanes from Keaau to Pahoa, a distance of about 8 miles. This proposal includes the approximately 2.31 mile segment of Keaau-Pahoa Road from the Keaau Bypass Road to Shower Drive.

3.3.5 County of Hawaii Zoning

The County of Hawaii zoning designation for the lands adjacent to the project limits is Agricultural District, A-20a. According to Hawaii County Code Chapter 25, Zoning, the Agricultural District provides for agriculture and very low density agricultural-based residential use, encompassing rural areas of good to marginal agricultural and grazing land, forest land, game habitats, and areas where urbanization is not found to be appropriate.

3.3.6 County of Hawaii Special Management Area

The Coastal Zone Management Act contains the general objectives and policies upon which all counties within the State have structured specific legislation which created Special Management Areas (SMA). Any development within the Special Management Area boundary requires a SMA Use permit which is administered by the County of Hawaii.

The Keaau-Pahoa Road Shoulder Lane Conversion project site is not located within the County's SMA.

4. ALTERNATIVES TO THE PROPOSED ACTION

4.1 No Action Alternative

Under the No Action alternative, the 2.31 mile segment of Keaau-Pahoa Road between the Keaau Bypass Road and Shower Drive would remain unchanged without improvements. The additional 12-foot travel lane for northbound traffic would remain as a 10-foot shoulder lane and the 2-foot shoulders would remain. There would be no reduction of traffic congestion related to vehicles traveling southbound near Keaau. In addition, a traffic signal would not be installed at the Keaau-Pahoa Road Shower Drive/Pohaku Drive intersection. Lastly, drivers would continue to use secondary streets through Hawaiian Paradise Park subdivision in an attempt to bypass congestion.

This alternative would have no short-term, construction related environmental impact with regard to soils, flora and fauna, noise, and air quality. However, in the long-term, the No Action alternative would have adverse air quality impacts due to decreased traffic movement. Most importantly, as transportation becomes increasingly difficult, the No Action alternative would have significant adverse social and economic impacts for the residents of the Puna District.

For all of these reasons, the No Action alternative is not considered a feasible alternative.

4.2 Alternate Route to Highway 130

The Puna Regional Circulation Plan (PRCP) considered a total of six alternatives to evaluate the best solution for improving transportation throughout the district. The alternatives incorporated various combinations of land use type, bus only lanes, percentages of transit and bike ridership, reuse of an existing railroad path, connectivity projects, and road widening. Of the six alternatives, only one alternative (Alternative D) excluded the eventual widening of Highway 130 to four lanes, while the preferred plan included the widening of Highway 130 to four lanes. The Shoulder Lane Conversion project is an integral part of the HDOT plan to widen Keaau-Pahoa Road to four travel lanes.

Also included in the Puna Regional Circulation Plan was an examination of several proposed alternative routes from Hilo to Puna Makai. Known as Puna Makai Alternative Route (PMAR), the two-lane PMAR would be an alternative to the increased use and reliance on Keaau-Pahoa Road for access to Hilo. However, the selection of a route, the need to acquire the right-of-way, and the unknown source of funds for the Puna Makai Alternative Route makes this alternative a long-term proposal which would not meet the current transportation needs of the residents of the Puna district. Therefore, the PMAR is not considered a feasible alternative to the proposed project.

4.3 Roundabout at Shower Drive

Use of a roundabout at the Keaau-Pahoa Road Shower Drive/Pohaku Drive intersection can be considered an alternative to use of a traffic signal. A roundabout is a type of circular intersection with specific design features which include: 1) yield control of all entering traffic; 2) channelized approaches; and 3) geometric design of the curvature to ensure travel speed is less than 30 mph on the circular roadway. Roundabouts have been used in other parts of the US and have long been used on many roads in Europe. To date, roundabouts have not been used on rural roads in the State of Hawaii or in the County of Hawaii.

The major advantage of a roundabout is that traffic on the through road (Keaau-Pahoa Road) does not need to come to a complete stop to exit onto a side street (Shower Drive or Pohaku Drive). All motorists must slow down when approaching the roundabout. Through motorists would continuing circulating and others would exit as appropriate.

A key dimension of a roundabout is the size of the circular area needed for construction. A roundabout includes the travel lanes plus an inner or inscribed circle to separate the vehicles. For a four-lane road such as is planned for Keaau-Pahoa Road, the diameter for the inscribed circle is recommended to be 180 to 200 feet.

The existing right-of-way of Keaau-Pahoa Road at the Shower Drive intersection is 80 feet. Thus, to construct a roundabout at the intersection, the right-of-way would require a minimum of an additional 100 to 120 feet of land area, or 50 to 60 feet on each side of the existing right-of-way. The additional land area needed and the unfamiliarity of motorists with roundabouts make use of a roundabout an infeasible alternative.

Lastly, the HDOT has generally limited roundabouts to single lane roundabouts. Thus, sue of a roundabout in lieu of a traffic signal at the Keaau-Pahoa Road Shower Drive/ Pohaku Drive intersection would not be compatible with the HDOT project which would construct 4 lanes or 6 lanes of travel lanes along Keaau-Pahoa Road.

5. DETERMINATION

Short-term construction impacts include disruption along the project limits and surrounding areas during construction, decline in air quality from construction activities, and increase in noise levels. Once construction has been completed, the short-term adverse impacts will no longer occur.

Based on analysis of the probable impacts, a Finding of No Significant Impact (FONSI) is anticipated for the Keaau-Pahoa Road Shoulder Lane Conversion project. The significance criteria to make this determination are set forth below and in Hawaii Administrative Rules Title 11, State of Hawaii Department of Health, Chapter 200, Environmental Impact Statement Rules.

1) *Involve an irrevocable commitment to loss or destruction of any natural or cultural resources*;

The Keaau-Pahoa Road Shoulder Lane Conversion project site does not provide habitat for Federal or State of Hawaii listed or candidate threatened or endangered species of flora or fauna.

The archaeological survey found nearly half of the project limits was altered by previous highway-related construction activity. Much of the remainder was probably modified by sugar cane cultivation. Based on the results of the archaeological field survey, construction of the Keaau-Pahoa Road Shoulder Lane Conversion project should have no adverse impacts to historic sites.

The Cultural study found that, since there are no cultural resources within the area between the Keaau Bypass Road and Shower Drive, there will be no adverse effects to cultural practices.

2) *Curtail the range of beneficial uses of the environment*;

The Keaau-Pahoa Road Shoulder Lane Conversion project will use lands that are currently vacant and undeveloped. The Keaau-Pahoa Road Shoulder Lane Conversion project will require the taking of approximately 4.476 acres right-of-way which is a minor

portion of available developable land area in the Puna region. Thus, the Keaau-Pahoa Road Shoulder Lane Conversion project will not curtail the beneficial uses of the environment.

3) *Conflict with the State's long-term environmental policies or goals as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders*;

The Keaau-Pahoa Road Shoulder Lane Conversion project will not involve actions or activities which would adversely affect natural resources within the project area. The Keaau-Pahoa Road Shoulder Lane Conversion project will be consistent with the guidelines of Chapter 344, HRS, as it will provide a public transportation infrastructure improvement to support the population and economic growth of the Puna region. As such, the Keaau-Pahoa Road Shoulder Lane Conversion project will not conflict with the State's long-term environmental policies or goals as expressed in Chapter 344, HRS.

4) *Substantially affect the economic or social welfare of the community or state*;

The Keaau-Pahoa Road Shoulder Lane Conversion project is expected to result in decreased travel times between Pahoa, Keaau, and Hilo, especially during the morning and afternoon peak periods. In addition, the new culvert is intended to decrease the need to close the Keaau-Pahoa Road during heavy rain storm events. Therefore, there will be a positive impact on the economic and social welfare of the community.

5) *Substantially affect public health*;

An efficient transportation system is needed to protect the public health of the residents and visitors on Hawaii. The Keaau-Pahoa Road Shoulder Lane Conversion project will improve emergency vehicle access and travel times between Puna and the hospitals in Hilo. Thus, the Keaau-Pahoa Road Shoulder Lane Conversion project will not have an adverse effect on public health.

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

The Keaau-Pahoa Road Shoulder Lane Conversion project is a planned infrastructure improvement that responds to population growth that has already occurred in the Puna region. As such, it will not contribute to population changes or other secondary impacts.

7) *Involve a substantial degradation of environmental quality*;

The Keaau-Pahoa Road Shoulder Lane Conversion project is anticipated to result in short-term impacts to noise, air quality and traffic in the immediate vicinity of the project limits during the period of construction. The Shoulder Lane Conversion project limits does not contain Federal or State listed or candidate threatened or endangered species of flora or fauna.

The archaeological survey found nearly half of the project limits was altered by previous highway-related construction activity. Much of the remainder was probably modified by sugar cane cultivation. Based on the results of the archaeological field survey, construction of the Keaau-Pahoa Road Shoulder Lane Conversion project should have no adverse impacts to historic sites.

The Cultural study found that, since there are no cultural resources within the area between the Keaau Bypass Road and Shower Drive, there will be no adverse effects to cultural practices.

Based on the above findings, the Keaau-Pahoa Road Shoulder Lane Conversion project will not result in a substantial degradation of environmental quality.

8) *Have a cumulative effect upon the environment or involves a commitment for larger actions*;

The Keaau-Pahoa Road Shoulder Lane Conversion project does not involve a commitment to further actions to other State of Hawaii related projects on Hawaii. As a result, the Keaau-Pahoa Road Shoulder Lane Conversion project will not have a cumulative effect upon the environment or involve a commitment by the State to larger actions on Hawaii.

9) *Affect a rare, threatened or endangered species;*

The Keaau-Pahoa Road Shoulder Lane Conversion project site does not contain Federal or State listed or candidate threatened or endangered species of flora or fauna. Thus, the Keaau-Pahoa Road Shoulder Lane Conversion project will not affect threatened or endangered species.

At this time, the construction schedule for the Shoulder Lane Conversion project has not been determined, especially for work related to vegetation removal. However, to ensure the contractor does not disturb vegetation which might be used by Hawaiian hoary bat, the HDOT contract documents will include a provision that the vegetation greater than 15 feet tall should not be removed during the bat birthing and pup rearing season (May 15 through August 15).

The HDOT contract documents will include a provision, if vegetation and tree clearing is to be done during the Hawaiian hawk breeding season (March through September), additional biological surveys will be required, as directed by the USFWS.

These mitigation measures will ensure the Hawaiian hoary bat and Hawaiian hawk will not be adversely affected by the Shoulder Lane Conversion project. These mitigation measures will be required for the HDOT to meet its responsibilities pursuant to the Endangered Species Act of 1973, as amended, if a listed species may be affected by the Shoulder Lane Conversion project.

10) *Detrimentally affect air or water quality or ambient noise levels*;

Operation of construction equipment will increase short-term noise and exhaust emission levels in the immediate vicinity of the Keaau-Pahoa Road Shoulder Lane Conversion project limits. Once operational, the Shoulder Lane Conversion project should result in decreased travel times which should improve air quality in the immediate vicinity. There will be no impact on water quality from the project.

11) *Affects or likely to suffer damage by being located in an environmentally sensitive area such as a floodplain, tsunami zone, beach, erosion-prone*

area, geographically hazardous land, estuary, fresh water or coastal water;

According to the Flood Insurance Rate Map (FIRM), the Keaau-Pahoa Road Shoulder Lane Conversion project is located in an area not subject to flood hazards, a hazardous floodplain or a tsunami zone. The project will improve the hydraulic conditions along the road by constructing a new multi-celled reinforced concrete pipe culvert system about 140 feet north of the existing Waipahoehoe Bridge where the road currently overtops during heavy rainfall events.

The Keaau-Pahoa Road Shoulder Lane Conversion project site is also not within the County of Hawaii Special Management Area. In addition, the Keaau-Pahoa Road Shoulder Lane Conversion project site is not within the coastal shoreline area. Thus, the Keaau-Pahoa Road Shoulder Lane Conversion project site is not located in an environmentally sensitive area.

12) *Substantially affect scenic vistas and viewplanes identified in county or state plans or studies;*

The County of Hawaii General Plan 2005 identifies sites of natural beauty in the Puna district and the goals, policies and standards for their protection. Chief among the policies for protecting sites of natural beauty are access to lands that have scenic value, and the protection of important viewplanes from obstruction.

One of the sites identified on the list of natural beauty sites is the view of Mauna Kea and Mauna Loa from Keaau-Pahoa Road. The Keaau-Pahoa Road Shoulder Lane Conversion project will not result in any obstruction of views of these mountains and may actually result in an expanded viewplane due to the widening on the makai side of the highway. Thus, the project will not create a significant adverse impact to scenic vistas or viewplanes.

13) *Require substantial energy consumption.*

Construction of the Keaau-Pahoa Road Shoulder Lane Conversion project will require the short-term use of energy resources associated with construction equipment, but in the long-term, no new demand for energy consumption will result. Thus, the Keaau-Pahoa Road Shoulder Lane Conversion project will not create a substantial increase in energy consumption.

Based on these findings and the assessment of potential impacts from the Keaau-Pahoa Road Shoulder Lane Conversion project, a Finding of No Significant Impact (FONSI) is anticipated.

6. LIST OF PERMITS

State

- National Pollutant Discharge Elimination System Storm Water Associated with Construction Activities

- Stream Channel Alternation Permit

7. CONSULTED PARTIES

7.1 Pre-Assessment Consultation

The following agencies were consulted during the pre-assessment phase of the Draft Environmental Assessment. Each agency was sent a copy of a project summary and a request for their written comments on the project. All written comments and responses are reproduced in Appendix A.

US Department of the Army, Honolulu District Engineer
US Fish and Wildlife Service
State of Hawaii Department of Land and Natural Resources
State of Hawaii DLNR – Historic Preservation Division
State of Hawaii DLNR - Water Resources Management
State of Hawaii Department of Health
State of Hawaii Department of Health – Environmental Management Division
County of Hawaii Environmental Management Department
County of Hawaii Department of Parks and Recreation
County of Hawaii Planning Department
County of Hawaii Department of Research and Development
County of Hawaii Department of Public Works
Hawaii Electric Light Company

7.2 Agencies and Organizations to be Consulted on the Draft EA

The following is a list of agencies and organizations to be consulted during the Draft Environmental Assessment 30-day comment period.

Federal

Department of the Army, US Army Engineer District, Honolulu
US Department of the Interior of the Fish and Wildlife Service
US Department of the Interior Geological Survey

State Agencies

Department of Agriculture
Department of Business, Economic Development and Tourism
DBED&T - State Energy Office
Department of Defense
Department of Hawaiian Home Lands
Department of Health
Department of Health - Environmental Management Division
Department of Land and Natural Resources
Department of Land and Natural Resources Historic Preservation Division
Department of Land and Natural Resources - Water Resource Management
Office of Hawaiian Affairs
Office of Environmental Quality Control
University of Hawaii Water Resources Research Center
University of Hawaii Environmental Center
Keaau Public and School Library

County of Hawaii Agencies

County of Hawaii Civil Defense
County of Hawaii Department of Environmental Management
County of Fire Department
County of Hawaii Department of Parks and Recreation
County of Hawaii Planning Department
County of Hawaii Police Department
County of Hawaii Department of Research and Development
County of Hawaii Department of Public Works
County of Hawaii Department of Water Supply

Officials

Senator Russell S. Kokubun
Representative Faye P. Hanohano
Representative Robert N. Herkes
Councilmember Emily I. Naeole

Public Utilities

Hawaii Electric Light Company, Inc.
Hawaiian Telcom
Oceanic Time Warner Cable

Organizations

Hawaii Humane Society
W.H. Shipman, Limited

8. REFERENCES

American Association of State Highway Officials (AASHO). *LRFD Bridge Design Specifications, Customary US Units, 4th Edition.* 2007.

Community Management Associates, Inc. *Puna Community Development Plan.* Prepared for County of Hawaii Planning Department. October 1995.

County of Hawaii Planning Department. *County of Hawaii General Plan, Ordinance 439.* November 14, 1989.

County of Hawaii Planning Department. *County of Hawaii General Plan.* February 2005.

County of Hawaii Department of Water Supply. *Final Environmental Assessment Construction of Islandwide Spigot Facilities.* February 2006.

County of Hawaii Code Chapter 25 Zoning.

Federal Emergency Management Flood Insurance Rate Map Community Panel Number 155166 INDOA. April 2, 2004 (Revised).

GK & Associates/Imata & Associates. *Final Environmental Assessment, Keaau-Pahoa Road, Keaau Town Section (Keaau Bypass Road) Project No. 130B-01-92, Keaau, Puna District, Island of Hawaii.* December 1995.

Puna Community Development Plan team. *Working Paper No. 1, Elements of a Growth Management Strategy.* 2007.

Puna Community Development Plan Transportation Working Group Existing Roadways Task Partnership. *Recommendations for Existing Roadways in the District of Puna.* February 15, 2007.

State of Hawaii Land Evaluation and Site Assessment Commission. *A Report of the State of Hawaii Land Evaluation and Site Assessment System.* February 1986.

State of Hawaii *Hawaii Administrative Rules Title 11, Department of Health Chapter 54 Water Quality Standards.*

State of Hawaii Department of Transportation. State of Hawaii Statewide Transportation Improvement Program (STIP) Fiscal Years 2008 thru 2011 (+2). State of Hawaii Department of Transportation. October 2007.

The Hawaii State Plan Chapter226, Hawaii Revised Statutes . Office of the Governor, Office of State Planning. !988.

Title 11 Hawaii Administrative Rules State of Hawaii Department of Health Chapter 46 Community Noise Control. September 23, 1996.

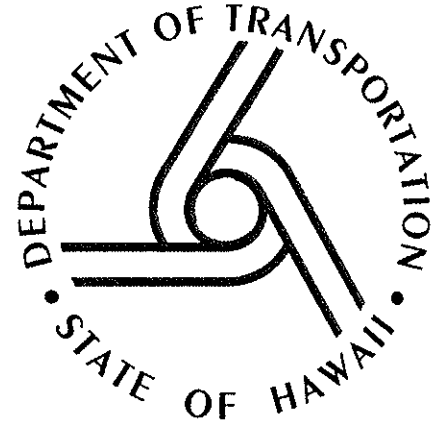
Townscape, Inc. *Final Report - Puna Regional Circulation Plan.* Prepared for County of Hawaii Planning Department. November 2005.

US Department of Agriculture Soil Conservation Service. *Soil Survey of Island of Hawaii, State of Hawaii.* December 1973.

US Department of Transportation Federal Highway Administration. *Roundabouts: An Informational Guide.* (Publication No. FHWA-RD-00-067). June 2000.

US Department of Transportation Federal Highway Administration. Memorandum. Use of Debris from Demolished Bridges and Overpasses. March 7, 2006.

Wilson Okamoto Corporation. *Traffic Signal Warrant Study – Keaau-Pahoa Road, Pohaku Drive and Shower Drive Intersection. Prepared for State Department of Transportation.* May 2005 (Revised).



APPENDIX A

6615-01
6/11/09

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122, Box 50088
Honolulu, Hawaii 96850

TAKE PRIDE IN AMERICA

In Reply Refer To:
2009-TA-0267

JUN 09 2009

John Sakaguchi, AICP
Senior Planner
1907 South Beretania Street, Suite 400
Honolulu, Hawaii 96826

Subject: Comments for Draft Environmental Assessment for Keaau-Pahoa Road, Shoulder Lane Conversion, Puna District, Island of Hawaii

Dear Mr. Sakaguchi:

Thank you for your April 20, 2009, letter requesting our comments for Draft Environmental Assessment for Keaau-Pahoa Road, Shoulder Lane Conversion, Puna District, Island of Hawaii. Based on the information you provided and pertinent information in our files, the following listed species have been observed in the vicinity of the proposed project: (1) the endangered Hawaiian hawk (*Buteo solitarius*); and (2) the endangered (*Lasiurus cinereus semotus*). There is no federally designated critical habitat in the vicinity of this proposed project. We recommend the following measures be incorporated into the Draft Environmental Assessment to minimize potential impacts to listed species. These recommendations do not alleviate your responsibilities pursuant to the Endangered Species Act of 1973, as amended, if a listed species may be affected by the proposed action.

- Hawaiian hoary bats nest in both exotic and native woody vegetation. To minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15-feet (4.6-meters) tall should not be disturbed, removed or trimmed during the bat birthing and pup rearing season (May 15 through August 15). If you must disturbed, remove or trim woody vegetation greater than 15 feet tall during the Hawaiian hoary bat pupping season, we recommend conducting biological surveys to determine if bats are present. Please contact our office regarding survey methodology.

- Hawaiian hawks nest in both exotic and native woody vegetation. To avoid impacts to Hawaiian hawks we recommend avoiding tree clearing during their breeding season (March through September). If you must clear the property during the Hawaiian hawk breeding season, we recommend conducting biological surveys to determine if hawk nests are present.

If you have questions regarding this letter, please contact Dr. Jeff Zimpfer, Fish and Wildlife Biologist at (808)792-9400.

Sincerely,

Gina Shultz
Acting Field Supervisor

6615-01
September 1, 2009

Mr. Loyal Mehrhoff, PhD, Field Supervisor
Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
U.S. Department of the Interior
300 Ala Moana Boulevard, Suite 3108
Honolulu, Hawaii 96813

Attention: Dr. Jeff Zimpfer Fish and Wildlife Biologist

Subject: Draft Environmental Assessment, Pre-Assessment Consultation;
Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive; Federal Aid Project No. STP-130 (028)
Keaau, Puna District, Island of Hawaii
Response to Comment

Dear Dr. Mehrhoff:

Thank you for your June 10, 2009 comment letter on the Draft Environmental Assessment/ Pre-Assessment Consultation on the Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive Federal Aid Project No. STP-130 (028) project.

The Draft EA will include that Fish and Wildlife Service files show the following listed species have been observed in the vicinity of the project limits: (I) the endangered Hawaiian hawk *(Buteo solitarius)*; and (2) the endangered Hawaiian hoary bat *(Lasiurus cinereus semotus)*. Also, there is no Federally designated critical habitat in the vicinity of the project limits.

The Draft Environmental Assessment will include the following mitigation measure to minimize potential impacts to listed species. To minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15-feet (4.6meters) tall should not be disturbed, removed or trimmed during the bat berthing and pup rearing season (May 15 through August 15).

At this time, the construction schedule for the Shoulder Lane Conversion project has not been determined, especially for work related to vegetation removal. However, to ensure the contractor does not disturb vegetation which might be used by Hawaiian hoary bat, the DOT contract documents will include a provision that woody plants greater than 15-feet

(4.6 meters) tall should not be disturbed, removed or trimmed during the bat birthing and pup rearing season (May 15 through August 15).

The DOT contract documents will include a provision, if vegetation and tree clearing is to be done during the Hawaiian hawk breeding season (March through September), the contractor will be responsible to conduct additional biological surveys, as directed by the USFWS.

These mitigation measures will ensure the Hawaiian hoary bat and Hawaiian hawk will not be adversely affected by the Shoulder Lane Conversion project.

We appreciate your participation in the Draft EA review process.

Sincerely,

John L. Sakaguchi, AICP
Senior Planner

cc: E. Barroga; DOT

L:\WOA\6615-01 Keaau-Pahoa Rd\planning\env assmt\pre assmt\pre assmt rsp New\usfws LT-1.doc; 9/1/2009

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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

May 18, 2009

RECEIVED
MAY 19 2009
WILSON OKAMOTO CORPORATION

Wilson Okamoto Corporation
1907 South Beretania Street Suite 400
Honolulu, Hawaii 96826

Attention: Mr. John L. Sakaguchi, AICP, Senior Planner

Ladies and Gentlemen:

Subject: Pre-Assessment for Draft Environmental Assessment for Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive

Thank you for the opportunity to review and comment on the subject matter. The Department of Land and Natural Resources' (DLNR), Land Division distributed or made available a copy of your report pertaining to the subject matter to DLNR Divisions for their review and comment.

Other than the comments from Division of Aquatic Resources, Division of Forestry & Wildlife, Land Division-Hawaii District, the Department of Land and Natural Resources has no other comments to offer on the subject matter. Should you have any questions, please feel free to call our office at 587-0433. Thank you.

Sincerely,

Morris M. Atta
Administrator

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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

2009 APR 27 P 12:34
STATE OF HAWAII
DEPT OF LAND & NATURAL RESOURCES

April 23, 2009

MEMORANDUM

TO: **DLNR Agencies:**
x Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
x Engineering Division
x Div. of Forestry & Wildlife
__Div. of State Parks
__Commission on Water Resource Management
__Office of Conservation & Coastal Lands
x Land Division –Hawaii District

STATE OF HAWAII
DEPT OF LAND & NATURAL RESOURCES
HONOLULU, HAWAII
2009 MAY 11 A 10:09
RECEIVED
LAND DIVISION

FROM: Morris M. Atta
SUBJECT: Pre-Assessment for Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive
LOCATION: Keaau, Hawaii
APPLICANT: Wilson Okamoto Corporation

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by May 15, 2009.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

( ) We have no objections.
(✓) We have no comments.
( ) Comments are attached.

Signed:
Date: 5/8/09

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
LAND DIVISION
2009 MAY -1 A 9:07

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

To: Morris Atta

AQ REC	
PLANNER	
STAFF SVCS	
RCUH/UH	
STATISTICS	
APPROVED AID	
EDUCATION	
SECRETARY	
OFFICE SVCS	
TECH ASST	

April 23, 2009

MEMORANDUM

TO: DLNR Agencies:
x Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
x Engineering Division
x Div. of Forestry & Wildlife
__Div. of State Parks
__Commission on Water Resource Management
__Office of Conservation & Coastal Lands
x Land Division –Hawaii District

FROM: for Morris M. Atta
SUBJECT: Pre-Assessment for Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive
LOCATION: Keaau, Hawaii
APPLICANT: Wilson Okamoto Corporation

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by May 15, 2009.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

(✓) We have no objections.
( ) We have no comments.
( ) Comments are attached.

Signed:
Date: 29 April 2009

RECEIVED
APR 29 2009
DAR - HILO

LINDA LINGLE
GOVERNOR OF HAWAII

LAURA H. THIELEN
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

RECEIVED
LAND DIVISION
2009 APR 29 A 10:07

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

April 23, 2009

MEMORANDUM

TO: DLNR Agencies:
x Div. of Aquatic Resources
__Div. of Boating & Ocean Recreation
x Engineering Division
x Div. of Forestry & Wildlife
__Div. of State Parks
__Commission on Water Resource Management
__Office of Conservation & Coastal Lands
x Land Division –Hawaii District

FROM: for Morris M. Atta
SUBJECT: Pre-Assessment for Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive
LOCATION: Keaau, Hawaii
APPLICANT: Wilson Okamoto Corporation

Transmitted for your review and comment on the above referenced document. We would appreciate your comments on this document. Please submit any comments by May 15, 2009.

If no response is received by this date, we will assume your agency has no comments. If you have any questions about this request, please contact my office at 587-0433. Thank you.

Attachments

(X) We have no objections.
( ) We have no comments.
( ) Comments are attached.

Signed:
Date: APR 27 2009

PAUL J. CONRY, ADMINISTRATOR
DIVISION OF FORESTRY AND WILDLIFE

6615-01
August 29, 2009

Mr. Morris Atta, Administrator
Land Division
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Room 220
Honolulu, Hawaii 96813

Attention: Land Division – Hawaii District

Subject: Draft Environmental Assessment, Pre-Assessment Consultation; Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive; Federal Aid Project No. STP-130 (028) Keaau, Puna District, Island of Hawaii Response to Comment

Dear Mr. Atta:

Thank you for your May 8, 2009 comment letter on the Draft Environmental Assessment/ Pre-Assessment Consultation on the Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive Federal Aid Project No. STP-130 (028) project.

The Draft EA will include that the Department of Land and Natural Resources Land Division Hawaii District had no comments.

We appreciate your participation in the Draft EA review process.

Sincerely,

John L. Sakaguchi, AICP
Senior Planner

cc: E. Barraga, DOT

6615-01
August 29, 2009

Mr. Morris Atta, Administrator
Land Division
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Room 220
Honolulu, Hawaii 96813

Attention: Mr. Paul Conry, Administrator Division of Forestry and Wildlife

Subject: Draft Environmental Assessment, Pre-Assessment Consultation; Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive; Federal Aid Project No. STP-130 (028) Keaau, Puna District, Island of Hawaii Response to Comment

Dear Mr. Conry:

Thank you for your April 27, 2009 comment letter on the Draft Environmental Assessment/ Pre-Assessment Consultation on the Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive Federal Aid Project No. STP-130 (028) project.

The Draft EA will include that the Department of Land and Natural Resources Land Division of Forestry and Wildlife no objections.

We appreciate your participation in the Draft EA review process.

Sincerely,

John L. Sakaguchi, AICP
Senior Planner

cc: E. Barroga, DOT

6615-01
August 29, 2009

Mr. Morris Atta, Administrator
Land Division
Department of Land and Natural Resources
State of Hawaii
1151 Punchbowl Street, Room 220
Honolulu, Hawaii 96813

Attention: Division of Aquatic Resources

Subject: Draft Environmental Assessment, Pre-Assessment Consultation; Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive; Federal Aid Project No. STP-130 (028)
Keaau, Puna District, Island of Hawaii
Response to Comment

Dear Mr. Atta:

Thank you for your April 29, 2009 comment letter on the Draft Environmental Assessment/ Pre-Assessment Consultation on the Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive Federal Aid Project No. STP-130 (028) project.

The Draft EA will include that the Department of Land and Natural Resources Land Division of Aquatic Resources no comments.

We appreciate your participation in the Draft EA review process.

Sincerely,

John L. Sakaguchi, AICP
Senior Planner

cc: E. Barroga, DOT

LINDA LINGLE
GOVERNOR OF HAWAII

WILSON OKAMOTO CORPORATION
JUN 18 2009

LAURA H. THIELEN
RUSSELL Y. TSUJI
KEN C. KAWAHARA

(6615-01) JS 6/21/09

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

cc: DOT
AHKID /2m

June 15, 2009

LOG NO: 2009.1481
DOC NO: 0906MD13
Archaeology

John L. Sakaguchi, AICP, Senior Planner
Wilson Okamoto Corp.
1907 South Beretania Street
Artesian Plaza, Suite 400
Honolulu, Hawaii 96826

Dear Mr. Sakaguchi:

SUBJECT: **National Historic Preservation Review (NHPA) Section 106 Review – Section 106 Historic Preservation Review Pre-Assessment Consultation for the Keaau-Pahoa Road, Federal Aid Project No. STP-130 (028)**
Kea'au Ahupua'a Puna District, Island of Hawaii
TMKs: (3) 1 (var.)

Thank you for the opportunity to comment on the aforementioned undertaking, which we received on April 27, 2009. We apologize for the delay in our reply. Repair work will entail widening of both sides of the highway for a total of 30-70 feet enlargement including culvert repairs/construction of stream tunnels.

We do not have records of archaeological surveys for these particular locations, but are aware of lava tube complexes (including many with associated burials) that cross under these stretches of the highway. For this reason we request you have a qualified archaeologist assess the area and include their report in the draft environmental assessment. Should archaeological sites or historic properties be noted during that assessment we will require an archaeological inventory survey of the project area.

Please contact Morgan Davis at (808) 933-7650 if you have any questions or concerns regarding this letter.

Aloha,

Nancy McMahon, Deputy SHPO/State Archaeologist
and Historic Preservation Manager
State Historic Preservation Division

6615-01
August 31, 2009

Ms. Nancy McMahon, Deputy SHPO/State Archaeologist
Historic Preservation Division
State of Hawaii
Department of Land and Natural Resources
601 Kamokila Boulevard
Kapolei, Hawaii 96707

Attention: Ms. Morgan Davis

Subject: Draft Environmental Assessment, Pre-Assessment Consultation;
Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive; Federal Aid Project No. STP-130 (028)
Keaau, Puna District, Island of Hawaii
Response to Comment

Dear Ms. McMahon:

Thank you for your June 15, 2009 comment letter (LOG NO: 2009.1481, DOC No. 0906MD13) on the Draft Environmental Assessment/ Pre-Assessment Consultation on the Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive Federal Aid Project No. STP-130 (028) project. Two archaeological surveys, an Archaeological Assessment on the east (makai) side and an Archaeological Inventory Survey on the west (mauka) side, were conducted along the project limits. Both documents are enclosed and will also be included in the Draft Environmental Assessment.

We appreciate your participation in the Draft EA review process.

Sincerely,

John L. Sakaguchi, AICP
Senior Planner

cc: E. Barroga; DOT

Enclosures

William P. Kenoi
Mayor

County of Hawaii

POLICE DEPARTMENT
349 Kapiolani Street • Hilo, Hawaii 96720-3998
(808) 935-3311 • Fax (808) 961-8865

Harry S. Kubojiri
Police Chief

Paul K. Ferreira
Deputy Police Chief

6615-01
4/30/09

cc: DOT Hwy/Lem

April 24, 2009

RECEIVED
APR 28 2009
WILSON OKAMOTO CORPORATION

Mr. John L. Sakaguchi, AICP
Senior Planner
Wilson Okamoto Corporation
1907 South Beretania St., Suite 400
Honolulu, HI 96826

Dear Mr. Sakaguchi:

Subject: Draft Environmental Assessment, Pre-Assessment Consultation; Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive; Federal Aid Project No. STP-130 (028); Keaau, Puna District, Island of Hawaii

Staff, upon reviewing the project summary report involving the proposed shoulder lane conversion for Keaau-Pahoa Road between the Keaau Bypass and Shower Drive to improve traffic flow, does not anticipate any significant law enforcement and/or public safety concerns at this time.

Thank you for allowing us the opportunity to comment.

If you have any questions, please contact Captain Steven Guillermo of the Puna District at 966-5835.

Sincerely,

DEREK D. PACHECO
ASSISTANT POLICE CHIEF
AREA I OPERATIONS

SG/ST:lli

6615-01
August 29, 2009

Chief Derek D. Pacheo, Assistant Police Chief
Area 1 Operations
Police Department
County of Hawaii
349 Kapiolani Street
Hilo, Hawaii 96720

Subject: Draft Environmental Assessment, Pre-Assessment Consultation;
Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive; Federal Aid Project No. STP-130 (028)
Keaau, Puna District, Island of Hawaii
Response to Comment

Dear Chief Pacheo:

Thank you for your April 24, 2009 comment letter on the Draft Environmental Assessment/ Pre-Assessment Consultation on the Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive Federal Aid Project No. STP-130 (028) project.

The Draft EA will include that the County of Hawaii Police Department does not anticipate any significant law enforcement and /or public safety concerns at this time.

We appreciate your participation in the Draft EA review process.

Sincerely,

John L. Sakaguchi, AICP
Senior Planner

cc: E. Barroga, DOT

6615-01

William P. Kenoi
Mayor

County of Hawai'i
FIRE DEPARTMENT
25 Aupuni Street • Suite 103 • Hilo, Hawai'i 96720
(808) 981-8394 • Fax (808) 981-2037

Darryl J. Oliveira
Fire Chief

Glen P. I. Honda
Deputy Fire Chief

5/5/09 BL
cc: DOT) em

April 30, 2009

RECEIVED
MAY 04 2009
WILSON OKAMOTO CORPORATION

Mr. John L. Sakaguchi, AICP, Senior Planner
Wilson Okamoto Corporation
1907 South Beretania Street, Suite 400
Honolulu, HI 96826

Dear Mr. Sakaguchi,

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT, PRE-ASSESSMENT CONSULTATION
KEAAU-PAHOA ROAD, SHOULDER LANE CONVERSTION, KEAAU BYPASS TO SHOWER DRIVE
FEDERAL AID PROJECT NO. STP-130 (028)
KEAAU, PUNA DISTRICT, ISLAND OF HAWAII

The Hawaii Fire Department does not have any comments to offer at this time regarding the above-referenced draft Environmental Assessment.

Thank you for the opportunity to comment.

Sincerely,

DARRYL OLIVEIRA
Fire Chief

RP:lk

Hawai'i County is an Equal Opportunity Provider and Employer.

6615-01
August 29, 2009

Fire Chief Darryl J. Oliveria, Fire Chief
County of Hawaii
Fire Department
25 Aupuni Street, Suit 103
Hilo, Hawaii 96720

Subject: Draft Environmental Assessment, Pre-Assessment Consultation;
Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower
Drive; Federal Aid Project No. STP-130 (028)
Keaau, Puna District, Island of Hawaii
Response toComment

Dear Chief Oliveria:

Thank you for your April 30, 2009 comment letter on the Draft Environmental Assessment/ Pre-Assessment Consultation on the Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive Federal Aid Project No. STP-130 (028) project.

The Draft EA will include that the County of Hawaii Fire Department does not have any comments at this time.

We appreciate your participation in the Draft EA review process.

Sincerely,

John L. Sakaguchi, AICP
Senior Planner

cc: E. Barroga, DOT

6615-01
4/30/09
Lono A. Tyson
Director

Ivan M. Torigoe
Deputy Director

cc: DOT-HWY-Sem

1/2

William P. Kenoi
Mayor

County of Hawai'i

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
25 Aupuni Street • Hilo, Hawai'i 96720
(808) 961-8083 • Fax (808) 961-8086
http://co.hawaii.hi.us/directory/dir_envmng.htm

April 27, 2009

RECEIVED
APR 29 2009
WILSON OKAMOTO CORPORATION

Mr. John L. Sakaguchi, AICP
Senior Planner
Wilson Okamoto Corporation
1907 South Beretania St.
Artesiaon Plaza, Suite 400
Honolulu, HI 96826

RE: Draft EA Pre-Assessment Consultation
Kea'au-Pāhoa Road, Shoulder Lane Conversion, Kea'au Bypass to Shower Drive
Federal Aid Project No. STP-130 (028)
Kea'au, Puna District, Island of Hawai'i

Dear Mr. Sakaguchi,

We have enclosed our comments.

Thank you for allowing us to review and comment on this project.

Sincerely,

Lono A. Tyson
DIRECTOR

enclosure: Solid Waste Division Comment Memo

cc: SWD

SOLID WASTE DIVISION

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

COUNTY OF HAWAII - 108 RAILROAD AVENUE - HILO, HI 96720
HILO (808) 961-8514 WAIMEA (808) 887-3018 KONA (808) 327-3507
Fax: 961-8553 887-3025 327-3506

April 26, 2009

TO: Lono Tyson, Director

FROM: Mike Dworsky, SWD Chief

RE: Comments on Draft EA – Pre-Assessment Consultation
Federal Aid Project No. STP-130 (028)

We have read the Project Summary provided and offer the following comments:

- We note that the consultant is aware of the County of Hawai'i Refuse Transfer Station (Kea'au Convenience Center) located on the makai side of the Kea'au-Pahoa Road at the beginning of the project limits.

- The Department of Environmental Management will continue to expand the Convenience Center to utilize the available land that will provide additional services in the future. As the population along the Kea'au-Pahoa road increases, we anticipate additional traffic utilizing of the existing access road. We also anticipate reducing hours of operation, so the same or growing number of people will utilize the Convenience Center in a more concentrated period of hours per day, including your high traffic usage. We have also made application to the State Department of Health to change the Solid Waste Permit for the Kea'au Convenience Center to the Kea'au Transfer Station. Changing the designation to a Transfer Station will allow non-residential vehicles to utilize the Kea'au facility. For all the above reasons we believe that the usage will increase.

- There are also plans by the Department of Water Supply to construct a spigot facility off the Convenience Center access road as indicated in the Final Environmental Assessment Construction of Island-wide Spigot Facilities prepared by M&E Pacific as amended April 2006.

- Finally, W.H. Shipman, property owner, has requested an easement through the Kea'au Transfer Station access road to gain access to property located behind the convenience center. We require that any widening or modifications of the Kea'au-Pahoa Road comply with the State of Hawai'i Department of Transportation (DOT) requirements. The Solid Waste Division utilizes large tractor-trailer compactor trucks and large roll-on trailers at our convenience center/transfer station. Appropriate access for our vehicles must be provided. For more information about the vehicles that utilize the site, please contact Bobby Gonsalves, Solid Waste Superintendent at 961-8514.

2/2

6615-01
August 31, 2009

Mr. Lono Tyson, Director
Department of Environmental Management
County of Hawaii
25 Aupuni Street
Hilo, Hawaii 96720

Subject: Draft Environmental Assessment, Pre-Assessment Consultation;
Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive; Federal Aid Project No. STP-130 (028)
Keaau, Puna District, Island of Hawaii
Response to Comment

Dear Mr. Tyson:

Thank you for your April 30, 2009 comment letter on the Draft Environmental Assessment/ Pre-Assessment Consultation on the Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive Federal Aid Project No. STP-130 (028) project.

The Draft EA will include that the County of Hawaii Department of Environmental Management will continue to expand the Convenience Center to utilize the available land to provide additional services in the future. As the population along the Keaau-Pahoa Road increases, additional traffic should be anticipated to use the existing convenience center. Further, the Department of Environmental Management anticipates reducing hours of operation, so the same or growing number of people will utilize the Convenience Center in a more concentrated period of hours per day, including during high traffic periods. The Draft EA will also note the County has submitted an application to the State Department of Health to change the Solid Waste Permit for the Keaau Convenience Center to the Keaau Transfer Station. Changing the designation to a Transfer Station will allow non-residential vehicles to utilize the Keaau facility. Based on these factors, the County believes that the usage of the Keaau facility will increase.

The Draft EA will note, to mitigate the expected increase in usage of the County facility, a short shelter lane could be added for northbound (toward Hilo) vehicles exiting the facility. The Draft EA will add a full length acceleration lane would conflict with adjacent driveways to the north (Human Society). The left turn storage lane into the County facility will not be extended at this time due to it's proximity to the Humane Society driveway.

Lastly, to mitigate increase use of the facility for southbound (toward Pahoa) vehicles, the existing center shelter lane will be extended to allow easier exiting for vehicles bound in the Pahoa direction.

Regarding expansion of the transfer station and potential road easement for W.H. Shipman property, a traffic study and signal warrant study should be included at that time. A consolidation of all three driveways with the transfer station driveway and the addition of a traffic signal should also be included at that time. These two changes will not be part of the Shoulder Lane Conversion project.

We appreciate your participation in the Draft EA review process.

Sincerely,

John L. Sakaguchi, AICP
Senior Planner

cc: E. Barroga, DOT

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

May 20, 2009

RECEIVED
MAY 22 2009
WILSON OKAMOTO CORP

Mr. John L. Sakaguchi
Wilson Okamoto Corporation
1907 South Beretania Street, Suite 400
Honolulu, HI 96826

PRE-ENVIRONMENTAL ASSESSMENT CONSULTATION
KEAAU-PAHOA ROAD SHOULDER LANE CONVERSION, KEAAU BYPASS TO SHOWER DRIVE
TAX MAP KEY 1-5 AND 1-6

This is in response to your Pre-Environmental Assessment Consultation letter dated April 20, 2009.

Please be informed that there is an existing 12-inch waterline within Keaau-Pahoa Road in the proposed project area. The 12-inch waterline is located mostly on the makai side of the road. We have no objection to the proposed project with the condition that the applicant/contractor will be responsible for the cost of relocating or modifying any of our water system facilities within the project area, should it be necessary.

Should you have any questions, please contact Mr. Finn McCall of our Water Resources and Planning Branch at (808) 961-8070, extension 255.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

FM:dfg

6615-01
August 29, 2009

Mr. Milton Pavao, PE, Manager
Department of Water Supply
County of Hawaii
345 Kekuanaoa Street, Suite 20
Hilo, Hawaii 96720

Subject: Draft Environmental Assessment, Pre-Assessment Consultation;
Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive; Federal Aid Project No. STP-130 (028)
Keaau, Puna District, Island of Hawaii
Response to Comment

Dear Mr. Pavao:

Thank you for your May 20, 2009 comment letter on the Draft Environmental Assessment/ Pre-Assessment Consultation on the Keaau-Pahoa Road, Shoulder Lane Conversion, Keaau Bypass to Shower Drive Federal Aid Project No. STP-130 (028) project.

The Draft EA will note an 8-inch waterline owned by the County of Hawaii Department of Water Supply (DWS) is located along the mauka side of the road at the beginning project limits for about 1,000 feet. From there, the line crosses under the road to the makai side and becomes a 12-inch line for the remaining 11,210 feet of the project limits. The waterline is about 20 feet from the makai right-of-way. The existing 12-inch waterline is hung on the makai side of the bridge.

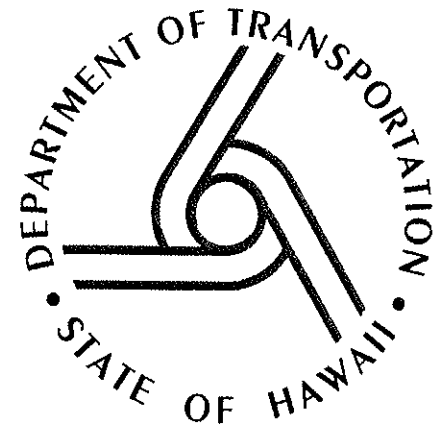
The Draft EA will also state the Shoulder Lane Conversion project includes relocation of the 12-inch waterline to the new 8-foot shoulder on the east side along the entire project limits. The waterline relocation will be done by HDOT under a utility agreement between the HDOT and the County of Hawaii Department of Water Supply (DWS).

We appreciate your participation in the Draft EA review process.

Sincerely,

John L. Sakaguchi, AICP
Senior Planner

cc: E. Barroga, DOT



APPENDIX B

AECOS No. 1054

Biological and water quality reconnaissance survey of an unnamed stream along the Keaau-Pahoa Road, Puna District, Island of Hawai`i

AECOS, Inc., 45-939 Kamehameha Hwy., No. 104
Kane`ohe, Hawai`i 96744

April 2004

Biological and water quality reconnaissance survey of an unnamed stream along the Keaau-Pahoa Road, Puna District, Island of Hawai`i[1]

April 20, 2004 *AECOS* No. 1054

Susan Burr
AECOS, Inc. 45-939 Kamehameha Hwy, Suite 104
Kaneohe, Hawai`i 96744
Phone: (808) 234-7770 Email: aecos@aecos.com

Introduction

This report provides a description of an unnamed stream near Kea`au of the Big Island for the purpose of assessing impacts of a proposed shoulder lane conversion project on Keaau-Pahoa Road between Keaau Bypass Road and Shower Lane. The project will create a new permanent northbound lane and improve the existing drainage structures (one bridge and six culverts) to alleviate flooding conditions. Two branches of the terminal end of this unnamed stream flow beneath the bridge and one of the culverts. Biologists from *AECOS*, Inc. visited the site on March 4, 2004 and conducted a reconnaissance survey of the area immediately around the existing road bridge and large culvert next to the bridge. The biologists collected one water quality sample for analysis in the laboratory, made two sets of water quality measurements in the field, and identified aquatic biota present.

Stream Description

The unnamed stream is part of an intermittently flowing stream system that arises around the 730 to 760 m (2400 to 2500 ft) elevation on the east slope of Mauna Loa above Mountain View (Figure 1). This is an area marked by an extensive deposit of Pahala ash (Macdonald and Abbott, 1970), a weathered material resembling tuff, which accounts for the presence of surface streams here in contrast to the fact that very few streams exist anywhere else on Mauna Loa or Kilauea volcanoes because youthful lavas of these mountains are too porous to support channelized water flow for any significant

[1] Report prepared for Wilson Okamoto Corporation for their project: "Keaau-Pahoa Road, Shoulder Land Conversion." This report will become part of the public record.

permeable Kilauea lavas. Consequently, when flowing, this stream does not empty into the ocean and is considered an interrupted stream. Whatever water it does carry arrives at the coast after dispersing underground. Because this stream system is not perennial, it is not listed in the Hawaii Stream Assessment (Hawaii Cooperative Park Service Unit, 1990).

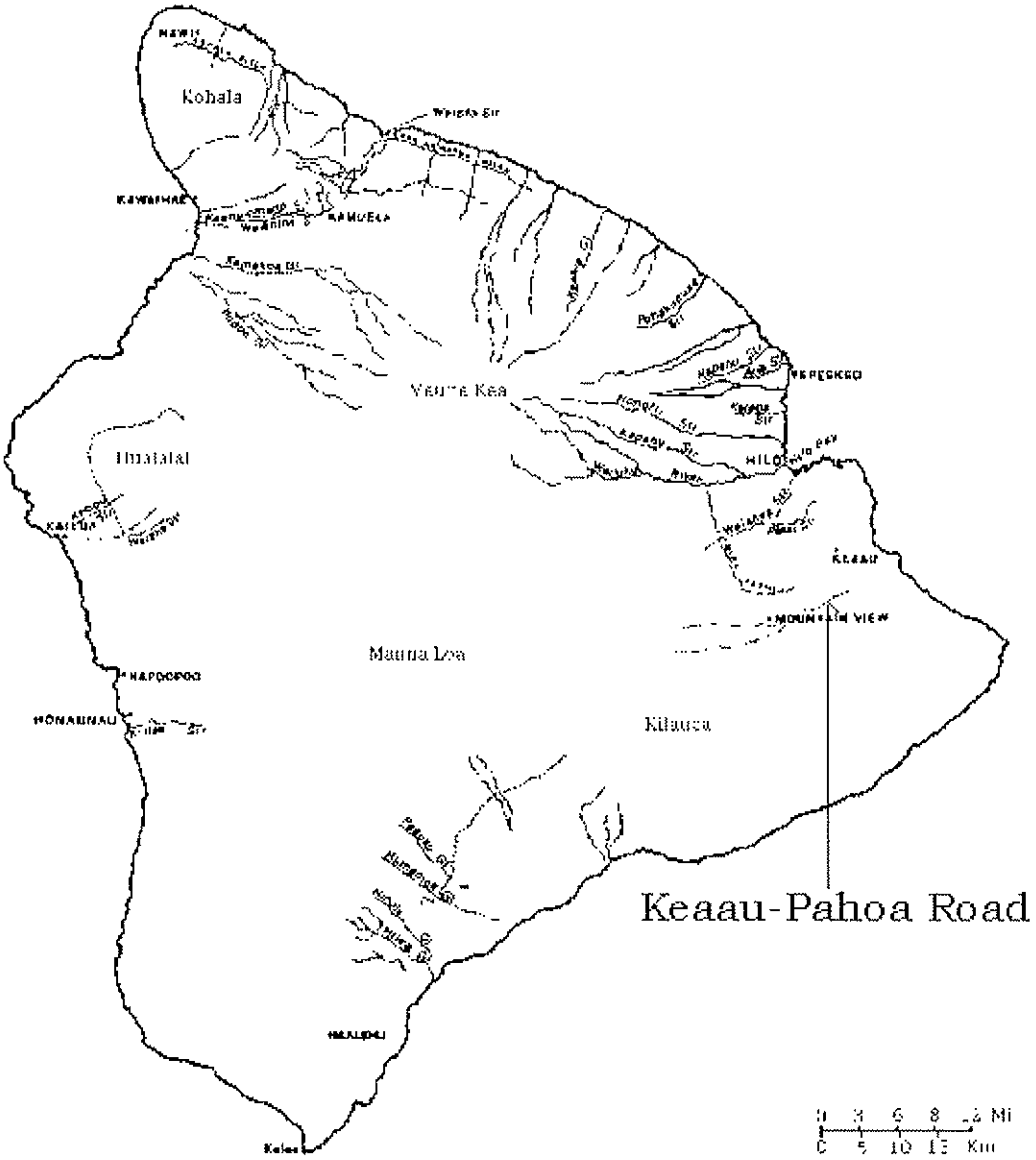


Figure 1. Approximate location of the Keaau-Pahoa Road and the unnamed stream on a map of the Big Island (Hawai`i) showing distribution of streams and diversion ditches.

The elevation in the project area is approximately 100 m (330 ft). Upstream from the road, the unnamed stream has eroded downward only a couple of meters relative to the surrounding land (Figure 2). Downstream from the road, the stream bed is much less distinct as it merges with the

floodplain and soon thereafter disappears completely. The stream bed in the immediate vicinity of the road consists of basalt bedrock and scattered rough, blocky basalt boulders (Figure 3). During the survey on March 4, 2004, the stream was dry at both the bridge and culvert and only a few small pools were observed between approximately 80 m and 100 m (260 to 330 ft) downstream from the bridge. The dimension of the largest pool was approximately 1 x 1 m (3 x 3 ft) and no more than 10 cm (4 in) deep (Figure 4). A single, much smaller pool (1 x 0.3 m or 3 x 1 ft) was observed in a small depression underneath the bridge.

Water Flow and Water Quality

There was no water flowing in the stream on the day of the survey and only a small amount of water, remnants of earlier rainfall, was present in ponds. Flow beneath the bridge could be occurring in the porous bed material and therefore not readily observable. Given that annual rainfall in this part of the Big Island is between 3810 and 5080 mm (150 and 200 in) (Taliaferro, 1959), some pools of water in the stream bed are likely to be semi-permanent aquatic features.

A water sample was collected from the largest pool located approximately 100 m (330 ft) downstream from the bridge (Pool No. 1). Some water quality parameters were measured *in situ* in this pool and in a smaller one underneath the bridge (Pool No. 2). These waters were analyzed for the water quality parameters indicated in Table 1. At the time of sampling (09:45 AM), the weather was sunny and winds were calm. It had rained lightly earlier that morning or the previous evening.

Table 2 presents the *in situ* and laboratory measurements taken from the unnamed stream near Keaau-Pahoa Bypass Road. The results of the *in situ* measurements (temperature, pH, and DO) indicated relatively good water quality, considering the site was an isolated pond. Water quality might be expected to be better if measurements had been made when the stream was flowing. Total nitrogen levels were moderately high, but nitrate + nitrite and ammonia levels are low; indicating most of the pond nitrogen is organic nitrogen. Turbidity, TSS, and total phosphorus levels are all normal or low. The measurements taken on March 4, 2004 do not reveal any obvious water quality problems, and in fact, water quality is indicated as very good, perhaps reflecting a relatively constant turnover of the water in the isolated pools due to regular rainfall inputs.

Figure 2. Slightly downward-cut stream bed upstream from the culvert on Keaau-Pahoa Road.

Figure 3. Stream bed in the vicinity of the Keaau-Pahoa Road, consisting of basalt bedrock and boulders.

Figure 4. Small pool downstream from the Keaau-Pahoa Road from which Pool #1 water quality sample was collected.

Table 1. Analytical methods and instruments used for the March 4, 2004 water quality sampling of an unnamed stream on the Keaau-Pahoa Bypass Road in Kea`au, Puna District, Hawai`i.

Analysis	Method	Reference	Instrument
Ammonia	alkaline phenol	Karoleff in Grasshoff et al. (1986)	Technicon AutoAnalyzer II
Dissolved Oxygen	EPA 360.1	EPA (1979)	YSI Model 550 DO meter
Nitrate + Nitrite	EPA 353.2	EPA (1993)	Technicon AutoAnalyzer II
pH	EPA 150.1	EPA (1993)	SA 250
Temperature	thermister calibrated to NBS cert. thermometer (EPA 170.1)	EPA (1979)	YSI Model 550 DO meter
Total Nitrogen	persulfate digestion/EPA 353.2	D'Elia et al. (1977) / EPA (1993)	Technicon AutoAnalyzer II
Total Phosphorus	persulfate digestion/EPA 365.1	Koroleff in Grasshoff et al. (1986)/EPA (1993)	Technicon AutoAnalyzer II
Total Suspended Solids	Method 2540D (EPA 160.2)	Standard Methods 18th Edition (1992); EPA (1979)	Mettler H31 balance
Turbidity	Method 2130B (EPA 180.1)	Standard Methods 18th Edition (1992); EPA (1993)	Hach 2100P Turbidimeter

D'Elia, C.F., P.A. Stendler, & N. Corwin. 1977. *Limnol. Oceanogr.* 22(4): 760-764.

EPA. 1979. Methods for Chemical Analysis of Water and Wastes. U.S. Environmental Protection Agency, EPA 600/4-79-020.

EPA. 1993. Methods for the Determination of Inorganic Substances in Environmental Samples. EPA 600/R-93/100.

EPA. 1994. Methods for Determination of Metals in Environmental Samples, Supplement 1. EPA/600/R-94/111. May 1994.

Grasshoff, K., M. Ehrhardt, & K. Kremling (eds). 1986. Methods of Seawater Analysis (2nd ed). Verlag Chemie, GmbH, Weinheim.

Standard Methods. 1992. Standard Methods for the Examination of Water and Wastewater. 18th Edition. 1992. (Greenberg, Clesceri, and Eaton, eds.). APHA, AWWA, & WEF. 1100 p.

Table 2. Water quality characteristics on March 4, 2004 of an unnamed stream near the Keaau-Pahoa Bypass Road, Keaau, Puna District, Hawai`i.

	Time sampled	Temp. (°C)	DO (mg/l)	DO (% Sat.)	pH (pH units)	
Pool # 1	0945	23.2	6.0	70	6.87	
Pool # 2	1005	22.5	4.3	50	5.73	
	Turbidity (ntu)	TSS (m/l)	Ammonia (µg N/l)	Nitrate + nitrite (µg N/l)	Total N (µg N/l)	Total P (µg P/l)
Pool # 1	2.32	6.2	<1	1	462	23
Pool # 2	---	--	--	--	--	--

Biota

The area surrounding the bridge project is former sugar cane land. Today, diversified crops are being grown on some of the surrounding parcels. A variety of grasses, sedges, and herbaceous weeds occur within the stream bed. No hydrophytic (aquatic) vegetation was observed. Only one aquatic animal, an indigenous dragonfly nymph, was observed in the stream, in the pool approximately 100 m (330 ft) downstream from the bridge in a pool (see Table 3). Though not an aquatic species, several *Euglandina rosea* (cannibal snail) shells were observed throughout the stream bed downstream from the bridge.

In 1998, *AECOS*, Inc. conducted a survey of this same stream for a similar road project at approximately the 595 m (1950 ft) elevation (*AECOS*, 1998). At the time of that survey there was also no flowing water in the stream, but there were several larger pools present in the area. A large plunge pool supported small numbers of guppies (*Poecilia reticulata*) and American bullfrog adult and tadpoles (*Rana catesbeiana*). In smaller, isolated pools downstream of the road, a dragonfly nymph, which may have been the giant Hawaiian dragonfly (*Anax* sp.), was collected, as were several individuals of two species of small pond snails, *Physa* sp. and *Pseudosuccinea columella*. No other reports providing data on stream biota from this system were located.

Table 3. Checklist of aquatic biota observed on March 4, 2004 in an unnamed stream at Keaau-Pahoa Road, Kea`au, Puna District, Hawai`i.

Species	Common name	Status	QC Code	Abundance
INVERTEBRATES				
ARTHROPODA, INSECTA				
ODONATA, LIBELLULIDAE	(dragonfly)			
Pantala flavescens (Fabricius)	nymph	**ind.**	20	P

KEY TO SYMBOLS USED:

Status:

nat. - naturalized. An introduced or exotic species.
ind. - indigenous. A native species also found elsewhere in the Pacific.
end. - endemic - A native species found only in the Hawaiian Islands.
pol. - Polynesian introduction.

QC Code:

10 - Observed and identified in the field.
20 - Collected; identified in the laboratory; specimen(s) not saved.
21 - Collected; identified in the laboratory; voucher specimen(s) saved.
† - Identified from non-living material (e.g., shell), sign, or call.

Abundance at survey location:

P - present; not common, but unable to assess abundance.
R - rare; only one or two individuals seen.
U - uncommon; several individuals seen, in some habitat places visited.
C - common; numerous individuals seen, or seen in most habitat places visited.
A - abundant; numerous in most habitat places visited

Assessment

The quality of the small amount of water that was present near the Keaau-Pahoa Bridge and culvert at the time of sampling was good. Regular rainfall is responsible for regular turnover of the water in these pools. The only native aquatic organisms observed within 100 m (330 ft) of the existing bridge on Keaau-Pahoa Road was the dragonfly nymph, *Pantala flavescens*. No threatened or endangered species were observed in the stream.

The unnamed stream flows only intermittently, although the isolated pools downstream from the bridge may be semi-permanent aquatic features. Isolated pools will support a variety of aquatic insects, perhaps including native species, although only one dragonfly was collected during the field reconnaissance. The stream does not open to the ocean, precluding recruitment of Hawaiian diadromous[2] stream fauna. Aquatic habitat is very limited in the vicinity of the road and absent during dry periods. Reconstruction of the bridge on Keaau-Pahoa Road will have no adverse impacts on aquatic resources in the area.

[2] Diadromous – aquatic species that regularly migrate between the ocean and freshwater streams. In Hawai`i, native aquatic species, including `o`opu (fishes), hihiwai (snail), and `opae (prawns), develop as larvae in the ocean, then migrate as juveniles into streams.

References

AECOS, Inc. 1998. Biological reconnaissance survey for an unnamed stream at Oshiro Road, Puna District, Island of Hawai`i. Prep. for Wilson Okamoto and Associates. *AECOS*, Inc., Kane`ohe, 889F: 6 pp.

Hawaii Cooperative Park Service Unit. 1990. Hawaii stream assessment. A preliminary appraisal of Hawaii's stream resources. Prep. for State of Hawaii, Commission on Water Resource Management. National Park Service, Hawaii Cooperative Park Service Unit, Rept. No. R84: 294 pp.

Macdonald, G. A., and A. T. Abbott. 1970. *Volcanoes in the Sea. The Geology of Hawaii.* University of Hawaii Press, Honolulu. 441 pp.

Taliaferro, W. J. 1959. Rainfall of the Hawaiian Islands. State of Hawaii, Hawaii Water Authority 394 pp.

6615-01
8/21/09

Supplemental surveys for the Kea'au-Pahoa Road, Shoulder Lane Conversion Project, Puna District, Island of Hawai'i

cc: DOT/em

August 20, 2009 *AECOS* No. 1054B

Eric Guinther
AECOS, Inc. 45-939 Kamehameha Hwy, Suite 104
Kāne'ohe, Hawai'i 96744
Phone: (808) 234-7770 Email: aecos@aecos.com

Introduction

This report[1] supplements descriptions of the natural environment along Kea'au-Pahoa highway between Kea'au Bypass Road/Keaau-Pahoa Road intersection and Shower Drive (State Route 130) on the Island of Hawai'i (Fig. 1) for the purpose of assessing impacts of a proposed shoulder lane conversion project. This project will create a new permanent northbound lane and improve the existing drainage structures (one bridge and six culverts) to alleviate flooding conditions. Two branches of an unnamed stream[2] Stream flow beneath a bridge at project survey point 164+60 and a culvert at project survey point 157+20. Biologists from *AECOS*, Inc. originally visited the project site on March 4, 2004 and conducted a reconnaissance survey of the area immediately around the existing road bridge and large culvert north of the bridge (see AECOS, 2004). For this report, a second visit was made on December 9, 2008 to conduct a botanical survey of the entire mauka (west) side of the road for the length of the project (the east side and part of the west side had been surveyed previously; Funk, 2004) and to investigate the lower course of the unnamed stream to confirm that no outlet to the ocean exists for this stream system arising around the 2500-ft (760-m) elevation in the Twentytwo Mile Road area above Mountain View.

[1] Report prepared for Wilson Okamoto Corporation for their project: "Keaau-Pahoa Road, Shoulder Land Conversion." This report will become part of the public record.

[2] "Waipāhoehoe" is marked on the bridge of the larger branch, but may be only a reference to the old village (site) by that name located roughly 0.9 mi to the east of the bridge. There is a Waipāhoehoe Stream on the Island of Hawai'i in the Kaumana area above Hilo, a stream that also terminates far back from the coastline in the lava flow of 1881.

Botanical Survey

Methods

The west side of the highway right-of-way was surveyed by traversing on foot the entire distance (twice) between the Kea'au-Pahoa Bypass intersection on the south side of Kea'au town to a point approximately 1.0 mi (1.6 km) south of Pōhaku Drive while recording all plants as they were encountered. In general, the survey area was limited to the highway verge and a distance of approximately 50 ft (15 m) distant from the highway edge, although this varied somewhat dependent upon access. For example, where houses and landscaped yards occurred adjacent to the roadway, a narrower area was surveyed.

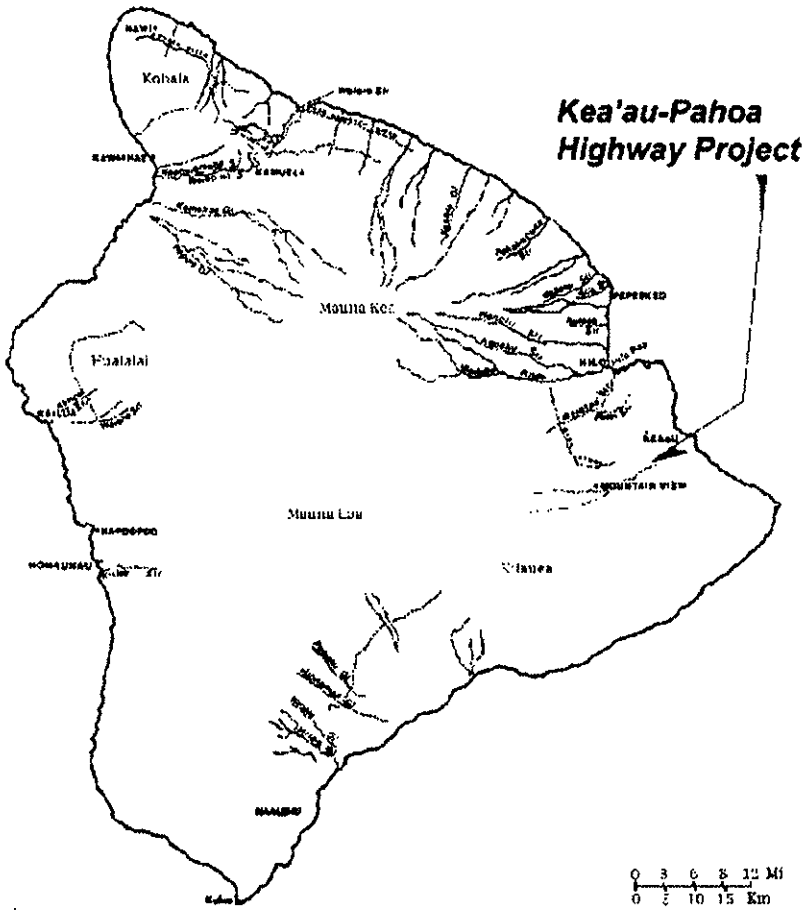
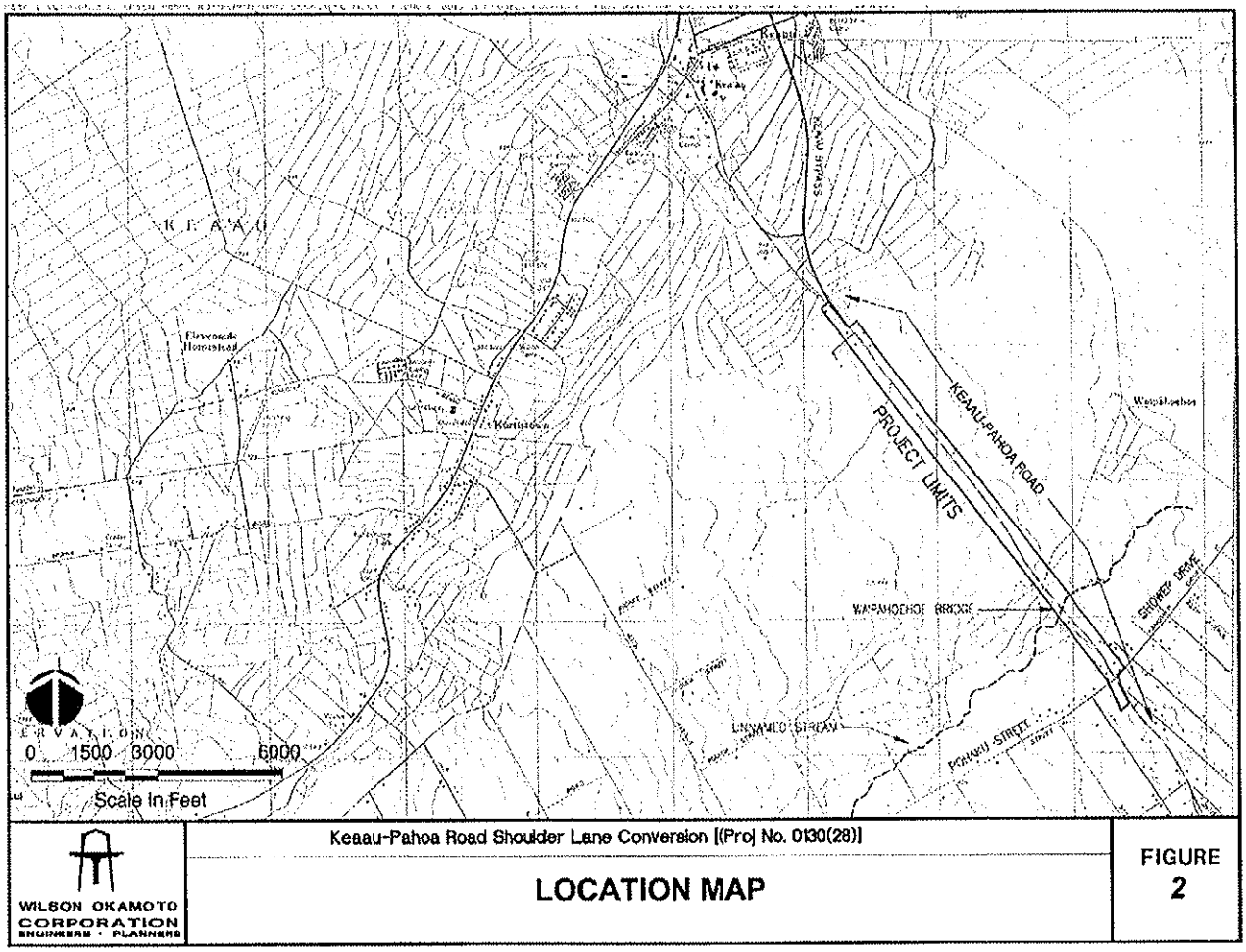


Figure 1. Location of Kea'au-Pahoa Highway project on the Island of Hawai'i.



Results

The result of the botanical survey is a listing of the species encountered (Table 1). Semi-quantitative abundance estimates of the plants divided between verge and "interior" areas is provided in the table. In addition, all of the species observed by Funk (2004) along this same highway corridor are included, marked by note <1> in the last column.

A total of 140 species of flowering plants and ferns have now been identified from along the stretch of highway extending south from Kea'au to 1 mi south of Pōhaku Drive. This number reflects the results of two independent surveys conducted in the project area. The species lists from the two surveys are very similar, differing mostly in the large number of ornamentals (23) identified in 2008 (only 4 were listed in 2004, either because ornamentals were ignored, or the slightly different survey areas covered fewer house lots). Other differences in the species lists are clearly explained in the Funk report as reflecting true differences in the flora on the east versus west sides of the highway.

Table 1. Flora listing for the Kea'au-Pahoa Highway Shoulder Lane Conversion Project.

Species listed by family	Common name	Status	Abundance VERGE/INTERIOR		Notes
FERNS AND FERN ALLIES					
GLEICHENIACEAE					
Dicranopteris linearis (Burm. f.) Underw.	*uluhe*	**Ind**	--	A	<1>
NEPHROLEPIDACEAE					
Nephrolepis exaltata (L.) Schott *hawaiiensis* W. H. Wagner	*kupukupu*	**End**	--	--	<1>
Nephrolepis multiflora (Roxb.) F.M. Jarrette ex C. V. Morton	---	Nat	O	C	
POLYPODIACEAE					
Lepisorus thunbergianus (Kaulf.) Ching	*pākahakaha*	**Ind**	--	R	
Phlebodium aureum (L.) J. Sm.	rabbit's foot fern	Nat	--	R	
Phymatosorus grossus (Langsd. & Fisch.) Brownlie	*laua'e*	Nat	--	U2	<1>
PSILOTACEAE					
Psilotum nudum (L.) P. Beauv.	*moa*	**Ind**	--	R	<1>
THELYPTERIDACEAE					
Christella parasitica (L.) Lév	oak fern	Nat	P	--	
FLOWERING PLANTS					
Dicotyledons					
ACANTHACEAE					
Asystasia gangetica (L.) T. Anderson	Chinese violet	Nat	--	--	<1>
Justicia betonica L.	white shrimp plant	Nat		R3	<1>
Thunbergia fragrans Roxb.	white thunbergia	Nat	R	--	<1>
ANACARDIACEAE					
Mangifera indica L.	mango	Nat	--	O	<1>
APIACEAE					
Centella asiatica (L.) Urb.	Asiatic pennywort	Nat	--	--	<1>
APOCYNACEAE					
Allamanda cathartica L.	allamanda	Orn	--	U	
Nerium oleander L.	oleander	Orn	--	U	
Plumeria rubra L.	frangipani	Orn	--	U	
ARALIACEAE					
Schefflera arboricola (Hayata) Merr.	dwarf umbrella tree	Orn	--	R	
Schefflera actinophylla (Endl.) Harms	octopus tree	Nat	--	O	
ASTERACEAE (COMPOSITAE)					
Ageratum conyzoides L.	*maile hohono*	Nat	A	--	<1>
Ageratum houstonianum Mill.	*maile hohono*	Nat	R	--	

Table 1 (continued).

Species listed by family	Common name	Status	Abundance VERGE/INTERIOR		Notes
ASTERACEAE (continued)					
Bidens alba (L.) DC	beggartick	Nat	--	--	<1>
Bidens pilosa L.	beggartick	Nat	C	--	
Crassocephalum crepidioides (Benth.) S. Moore	---	Nat	R	--	
Emilia fosbergii Nicolson	Flora's paintbrush	Nat	R	--	
Emilia sonchifolia (L.) DC	Flora's paintbrush	Nat	--	--	<1>
Pluchea carolinensis (Jacq.) G. Don	sourbush	Nat	--	U	
Pluchea indica (L.) Less.	Indian fleabane	Nat	--	--	<1>
Sphagneticola trilobata (L.) Pruski	wedelia	Nat	--	R2	<1>
Cyanthillium cinereum (L.) H. Rob.	little ironweed	Nat	C	--	
BALSAMINACEAE					
Impatiens walleriana J. D. Hooker	impatiens	Nat	--	R	
BEGONIACEAE					
Begonia hirtella Link	begonia	Nat	R	--	<1>
BIGNONIACEAE					
Spathodea campanulata P. Beauv.	African tulip tree	Nat	--	--	<1>
BRASSICAEAE					
Coronopus didymus (L.) Sm.	swinecress	Nat	O	--	
BUDDLEJACEAE					
Buddleja asiatica Lour.	dog tail	Nat	--	R	<1>
CAMPANULACEAE					
Hippobroma longiflora (L.) G. Don	star of Bethlehem	Nat	U	--	
CASURINACEAE					
Casuarina equisetifolia L.	ironwood	Nat	--	U	<1>
CAPRIFOLIACEAE					
Sambucus mexicana K. Presl. ex A. DC	Mexican elder	Nat	--	--	<1>
CECROPIACEAE					
Cecropia obtusifolia Bertol.	guarumo	Nat	--	C	<1>
CLUSIACEAE					
Clusia rosea Jacq.	autograph tree	Nat	--	--	<1>
CONVOLVULACEAE					
Ipomoea cairica (L.) Sweet.	*koali 'ai*	**Ind**	--	--	<1>
Ipomoea obscura (L.) Ker-Gawl.	morning glory	Nat	--	--	<1>
Ipomoea triloba L.	little bell	Nat	--	--	<1>
EUPHORBIACEAE					
Acalypha sp.	---	Orn	--	R	
Acalypha wilkesiana Müller	beefsteak plant	Orn	--	R	
Aleurites moluccana (L.) Willd.	*kukui*	**Pol**	--	--	<1>

Table 1 (continued).

Species listed by family	Common name	Status	Abundance VERGE/INTERIOR		Notes
EUPHORBIACEAE (continued)					
Chamaesyce hirta (L.) Millsap.	garden spurge	Nat	A	--	
Chamaesyce hypericifolia (L.) Millsp.	graceful spurge	Nat	U	--	
Chamaesyce prostrata (Aiton) Small	prostrate spurge	Nat	--	--	<1>
Euphorbia heterophylla L.	*kaliko*	Nat	R	--	
Phyllanthus debilis Klein ex Willd.	niuri	Nat	O	--	<1>
FABACEAE					
Bauhinia sp.	orchid tree	Orn	--	R	
Centrosema sp.	white butterfly pea	Nat	R	--	
Chamaecrista nictitans (L.) Moench	partridge pea	Nat	O	--	<1>
Crotalaria incana L.	fuzzy rattlepod	Nat	U	--	<1>
Crotalaria pallida Aiton	smooth rattlepod	Nat	U	--	
Crotalaria retusa L.	rattlepod	Nat	R	--	
Desmodium incanum DC	Spanish clover	Nat	--	U	
Desmodium triflorum (L.) DC	---	Nat	U	--	<1>
Desmodium tortuosum (Sw.) DC	Florida beggarweed	Nat.	R	--	
Erythrina crista-galli L.	cock's-spur coral tree	Orn	--	R	
Falcataria moluccana (Miq.) Barneby & Grimes	albizia (juv)	Nat	--	R	
Leucaena leucocephala (Lam.) de Wit	*koa haole*	Nat	--	U3	<1>
Macroptilium atropurpureum (DC) Urb.	---	Nat	R	--	
Mimosa pudica L.	sensitive plant	Nat	U	U	<1>
Senna alata (L.) Roxb.	candle bush	Nat	--	--	<1>
LAMIACEAE					
Hyptis pectinata (L.) Poit.	comb hyptis	Nat	O	--	<1>
LAURACEAE					
Persea americana Mill.	avocado	Nat	--	U	<1>
LYTHRACEAE					
Cuphea carthagenensis (Jacq.) Macbr.	tarweed	Nat	--	--	<1>
MALVACEAE					
Hibiscus furcellatus Desr.	*'akiohala*	**Ind**	--	R	
Hibiscus tiliaceus L.	*hau*	**Ind**	--	U	<1>
Sida rhombifolia L.	---	Nat	R	--	
MELASTOMATACEAE					
Clidemia hirta (L.) D. Don	Koster's curse	Nat	--	U	<1>
Dissotis rotundifolia (Sm.) Triana	---	Nat	U	U	<1>
Heterocentron subtriplinervium (Link & Otto) A. Braun & C. Bouché	pearl flower	Nat	--	R	
Melastomia candidum D. Don	---	Nat	--	--	<1>
Tibouchina herbacea (DC) Cogn.	glory bush	Nat	--	R	

Table 1 (continued).

Species listed by family	Common name	Status	Abundance VERGE/INTERIOR		Notes
MORACEAE					
Ficus elastic var. 'Rubra'	Indian rubber tree	Orn	--	R	
Ficus microcarpa L. fil.	Chinese banyan	Nat	--	U	<1>
Ficus pumila L.	climbing fig	Orn	--	R3	
Ficus sp.	banyan	Orn	--	--	<1>
MYRSINACEAE					
Ardisia elliptica Thunb.	shoebutton ardisia	Nat	R	C	
MYRTACEAE					
Metrosideros polymorpha Gaud.	*'ōhi'a*	**End**	--	C	<1>
Psidium cattleianum Sabine	strawberry guava	Nat	--	A	<1>
Psidium guajava L.	common guava	Nat	--	U	<1>
Syzygium jambos (L.) Alton	rose apple	Nat	--	--	<1>
NYCTAGINACEAE					
Bougainvillea cf. *spectabilis* Wildenow	bougainvillea	Orn	--	U	
ONAGRACEAE					
Ludwigia octovalvis (Jacq.) Raven	primrose willow	**Pol**	--	--	<1>
PASSIFLORACEAE					
Passiflora foetida L.	running pop	Nat	R	--	
POLYGALACEAE					
Polygala paniculata L.	---	Nat	A	--	<1>
ROSACEAE					
Eriobotrya japonica (Thunb.) Lindl.	loquat	Orn	--	--	<1>
RUBIACEAE					
Paederia foetida L.	*maile pilau*	Nat	U	--	<1>
Richardia brasiliensis Gomes	---	Nat	R	--	
Spermacoce assurgens Ruiz & Pav.	buttonweed	Nat	O	--	<1>
SOLANACEAE					
Solanum americanum Mill.	*pōpolo*	**Ind**?	R	--	<1>
STERCULIACEAE					
Melochia umbellata (Houtt.) Stapf	---	Nat	--	U	<1>
Waltheria indica L.	*'uhaloa*	**Ind**?	--	--	<1>
TURNERACEAE					
Turnera ulmifolia L.	yellow alder	Nat	R	--	
ULMACEAE					
Trema orientalis (L.) Blume	gunpowder tree	Nat	--	U	<1>
VERBENACEAE					
Stachytarpheta australis Moldenke	---	Nat	O	--	
Stachytarpheta cayennensis (Rich). Vahl.	---	Nat	--	U	<1>
Stachytarpheta jamaicensis (L.) Vahl	Jamaican vervain	Nat	--	--	<1>

Table 1 (continued).

Species listed by family	Common name	Status	Abundance VERGE/INTERIOR		Notes
FLOWERING PLANTS					
Monocotyledons					
AGAVACEAE					
Cordyline fruticosa (L.) A. Chev..	ti, *ki*	Nat	--	O	
Dracaena marginata Lam.	money tree	Orn	--	R	
Dracaena sanderiana M.T. Masters	sanderiana	Orn	--	R	
ARACEAE					
Caladium sp.	*green w/white blotches*	Orn	R	--	
Monstera delicosa Liebm.	monstera	Orn	--	R	
ARECACEAE					
Archontophoenix alaxandrae (F. v. Mueller) Wendl. & Drude	Alexandria palm	Nat	--	U	
Areca catechu L.	betel nut	Orn	--	--	<1>
Cocos nucifera L.	coconut	Nat	--	R	<1>
Dypsis lutescens (H. Wendl.) Beentje & Dransfield	golden-fruited palm	Orn	--	R	
Roystonia regia (Kunth) O.F. Cook	royal palm	Orn	--	R	
Veitchia merrillii (Becari) H.E. Moore	Manila palm	Orn	--	R	
COMMELINACEAE					
Commelina diffusa N. L. Burm.	day flower	Nat	U	--	<1>
CYPERACEAE					
Cyperus polystachyos Rottb.	---	**Ind**	O	--	<1>
HELICONIACEAE					
Heliconia psittacorum L.	rhizomatosa heliconia	Orn	--	R2	
ORCHIDACEAE					
Arundina graminifolia (D. Don) Hochr.	bamboo orchid	Nat	--	C	<1>
POACEAE					
Andropogon virginicus L.	broomsedge	Nat	--	U	<1>
Axonopus fissifolius (Raddi) Kuhlm.	narrow-lvd carpetgrass	Nat	U	--	<1>
Chloris divaricata R. Br.	---	Nat	U	--	<1>
Coix lacryma-jobi L.	Job's tears	Nat	--	R	
Cynodon dactylon (L.) Pers.	Bermuda grass	Nat	--	--	<1>
Dichanthium sp.	---	Nat	U	--	
Eleusine indica (L.) Gaertn.	wire grass	Nat	O	--	<1>
Eragrostis cilianensis (All.) Link	stinkgrass	Nat	R	--	
Eragrostis pectinacea (Michx.) Nees	Carolina lovegrass	Nat	O	--	
Melinus minutiflora P. Beauv.	molasses grass	Nat	A	A	<1>
Melinis repens (Willd.) Zizka	Natal redtop	Nat	A	--	<1>
Panicum repens L.	wainaku grass	Nat	--	U3	

Table 1 (continued).

Species listed by family	Common name	Status	Abundance VERGE/INTERIOR		Notes
POACEAE (continued)					
Paspalum conjugatum Bergius	Hilo grass	Nat	--	--	<1>
Paspalum urvillei Steud.	Vasey grass	Nat	R	--	<1>
Pennisetum purpureum Schumach.	elephant grass	Nat	--	U3	<1>
Saccharum officinarum L.	sugar cane	Orn	R	--	<1>
Sacciolepis indica (L.) Chase	Glenwood grass	Nat	A	--	
Setaria parviflora (Poir.) Kerguélen	yellow foxtail	Nat	C	--	<1>
Setaria palmifolia (J. König) Stapf	palmgrass	Nat	R	--	<1>
Sporobolus sp.	dropseed	Nat	O	--	<1>
Themeda villosa (Poir.) A. Camus	Lyon's grass	Nat	--	--	<1>
Urochloa maxima (Jacq.) R. Webster	Guinea grass	Nat	O	O	<1>
Urochloa mutica (Forssk.) T.Q. Nguyen	California grass	Nat	--	U3	
ZINGIBERACEAE					
Hedychium flavescens N. Carey ex Roscoe	yellow ginger	Nat	--	U3	<1>

Legend to Table 1

STATUS = distributional status for the Hawaiian Islands:

End = endemic; native to Hawaii and found naturally nowhere else.

Ind = indigenous; native to Hawaii, but not unique to the Hawaiian Islands.

Nat = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.

Orn = exotic, ornamental or cultivated; plant not naturalized (not well-established outside of cultivation).

Pol = Polynesian introduction before 1778.

ABUNDANCE = occurrence ratings for plants by area:

R – Rare	seen in only one or perhaps two locations.
U - Uncommon-	seen at most in several locations
O - Occasional	seen with some regularity
C - Common	observed numerous times during the survey
A - Abundant	found in large numbers; may be locally dominant.

Numbers following an occurrence rating indicate clusters within the survey area. The ratings above provide an estimate of the likelihood of encountering a species within the specified survey area; numbers modify this if abundance, where encountered, tends to be greater than the occurrence rating:

1 – several plants present
2 - many plants present
3 – abundant over a localized area

NOTES:

<1> – Previously recorded by Funk (2004).

Observed in this area were a total of 11 native plants (8% indigenous or endemic species), with only a minor disagreement between the two survey reports regarding identification of the common sword fern (*Nephrolepis*; both species given in Table 1 might well be present in this area). Characteristic of the open native forest that once dominated the lava flows in this area are *'ōhi'a* (*Metrosideros polymorpha*) and patches of *uluhe* or false staghorn fern (*Dicranopteris linearis*). None of the native species recorded is considered rare or unusual. Two additional species listed are early Polynesian introductions to the Hawaiian Islands: *kukui* (*Aleurites moluccana*) and *kamole* (*Ludwigia octovalvis*). Again, these are not species that would require special consideration.

Vegetation in the survey area consists mainly of mixed forested areas interspersed with maintained landscapes in the built up sections. Built up areas occur at the Kea'au end and at the southern end beginning a short distance south of the Waipāhoehoe Bridge and continuing south. Former agriculture areas occupied both sides of the highway for about mile from the project start. Another agriculture area is found around the unnamed stream (west side of highway). In these areas, not even remnants of an original forest are present. In the remainder of the project area, the forest varies with respect to degree of disturbance although nearly everywhere the *'Ōhi'a* (*Metrosideros*) Lowland Wet Forest (Gagne and Cuddihy, 1999) that once covered the area is heavily invaded by non-native shrubs and trees. In a number of areas, strawberry guava (*Psidium cattleianum*) forms nearly impenetrable stands.

The highway verge is maintained by mowing, and supports mostly ruderal herbaceous species. The timing of our survey was fortunate (in as much as mowed plants are difficult to identify) to coincided with maintenance activities that were just staring on the makai (east) side of the highway during the early part of the survey and moved to the mauka side shortly after the first walk through of the site was completed (Fig. 3). The roadway cuts across an undulating plain of *pāhoehoe* flows, creating cuts and fills on the mauka side particularly. Even the cut areas that rise well above the highway verge are maintained due to power lines in this area.

Discussion

The survey undertaken by Funk (2004) encompassed the east (makai) side of the highway from Kea'au town to Waipāhoehoe Stream, and both sides of the highway between Waipāhoehoe Stream and Shower Dr. (Pōhaku Dr.), a distance of about 2.2 miles. The present survey encompassed all of the west (mauka) side of the highway from Kea'au town to 1 mi south of Pōhaku Dr.; thus, the combined surveys fully cover the project area (Fig. 2).

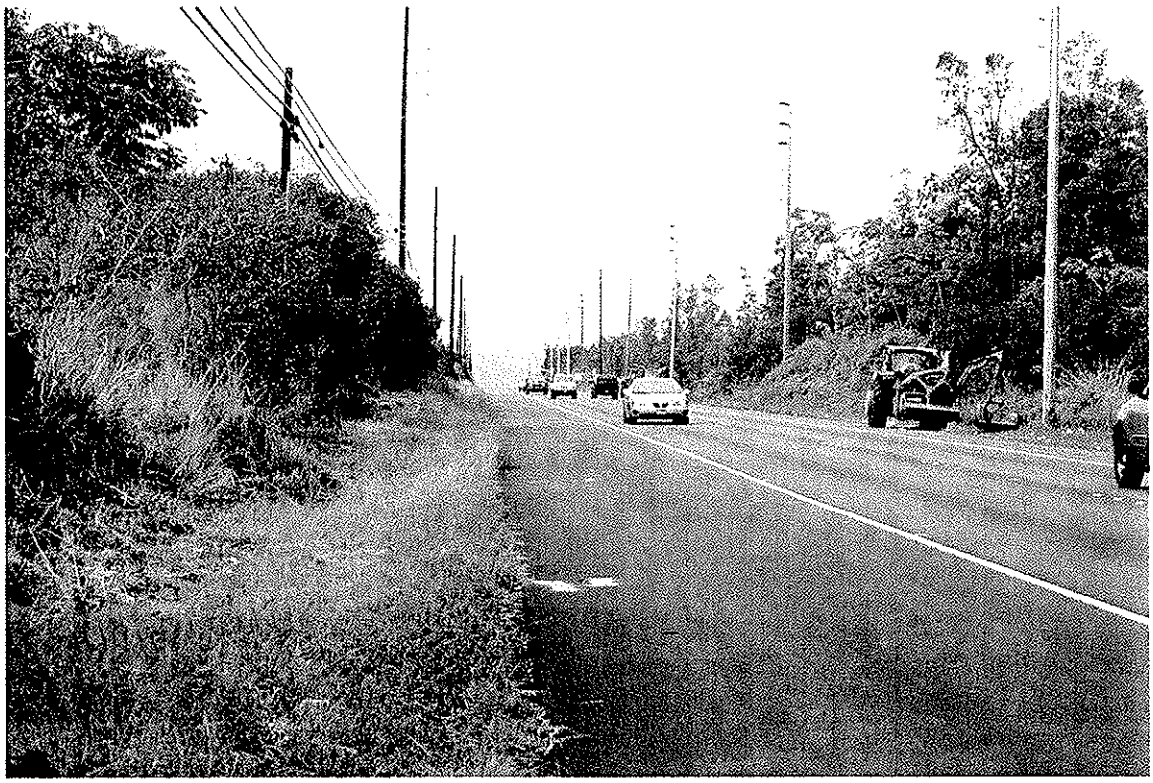


Figure 3. View looking north of survey area (typical highway verge and adjacent forest) along state Route 130 south of Kea'au.

No species of plants that are listed (USFWS, 2009a) or of concern have been identified from the Project area as surveyed on two separate occasions (2004 and 2008).

Federal Jurisdiction Assessment

The proposed project area between Kea'au Road/Kea'au Bypass intersection includes culverts and a bridge that carry a small tributary and the unnamed stream beneath the Highway 130. Both streams are intermittently flowing at the highway, but have well defined stream bed characteristics. This unnamed stream system appears not to be listed on the State of Hawai'i list of impaired waters (HDOH, 2008) or the Hawaii Stream Assessment (Hawaii Cooperative Park Service Unit., 1990) which only lists perennial streams in the state.

As noted in *AECOS* (2004), a few, isolated pools are present in the stream channels, but these appear to be ephemeral features that may support aquatic insect biota, perhaps including native species. These pools, however, are located some distance from the highway and are likely absent some or much of the time dependent upon rainfall and rainfall generated stream flow. Water, when flowing in these channels, appears not to reach the ocean, precluding recruitment of diadromous stream fauna, such as native *'o'opu* (gobiid fishes) or *'opae* (freshwater shrimp).

Field Survey

On December 9, 2008, *AECOS* biologists explored the area around Waipāhoehoe (site) via Railroad Avenue to assess whether the unnamed, intermittent stream present at the highway could be traced downslope into this area located 0.9 mi (1.4 km) downslope of the highway bridge and 3.5 mi (5.6 km) from the ocean. At Railroad Avenue there is no evidence of a stream or floodway of any kind. Isolated depressions (*kipuka*) are present. The ground is a very low-sloping, undulating surface of *pāhoehoe* lava flows. The dominant vegetation (Fig. 4) consists of grasses and ferns—mostly broom sedge (*Andropogon virginicus*), molasses grass (*Melinus minutiflora*), and *'ōali* or Cretan brake (*Pteris cretica*)—with scattered *'ōhi'a* and scrubby growth of melastomes (*Melastomia candidum*). Bamboo orchid (*Arundina graminifolia*), lichens (*Usnea* sp. and *Cladonia* sp.), and autograph trees (*Clusia rosea*) are common. This area of more open growth on relatively recent lava gives way to a dense scrub and mixed forest a short distance upslope, where strawberry guava (*Psidium cattleianum*), mango (*Mangifera indica*), Chinese banyan (*Ficus microcarpa*), and guarumo (*Cecropia obtusifolia*) are particularly common with an abundance of shoebutton ardisia (*Ardisia elliptica*) in the understory. Native *'ōhi'a* and *uluhe* are present. Most noticeable change moving upslope towards the stream is an increase in the relief of the undulating surface to 6 ft (2 m) or more. Depression areas are not clearly interconnected, but appear to serve as catchments for stormwater flows carried in by the unnamed stream: these freshet flows spread out across the lava field into small and large depressions that enhance infiltration via the multitude of fractures in the lava surface.

Discussion

A joint memorandum (USEPA/USACE, 2008; attached) addresses jurisdictional issues in light of recent Supreme Court decisions (*Rapanos vs. United States*). As a general rule, drainage ditches are not regarded as jurisdictional waters. While the relevant federal agencies under the Clean Water Act (USEPA and USACE) will assert jurisdiction over wetlands adjacent to more or less permanently flowing tributaries, and may assert jurisdiction over waters and "wetlands

adjacent to non-navigable tributaries that are not relatively permanent", the agencies "generally will not assert jurisdiction over... [d]itches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water" (USEPA/USACE, 2008, p. 1). Thus, drainage structures associated with the highway widening project would not qualify as waters of the U.S.—that is, these features are very likely not jurisdictional under federal statutes in the Clean Water Act or the Rivers and Harbors Act as implemented by the U.S. Army Corps of Engineers.

Figure 3. Vegetated pāhoehoe flow above Railroad Avenue downslope of the unnamed stream.

The two stream crossings (1.8 and 1.9 mi southeast of Kea'au) and a low area with a suspected "wetland" (see AECOS, 2009) between these streams are geographic features that might qualify as jurisdictional. In the case of the unnamed stream and its small tributary, all evidence indicates that this stream system is isolated from the ocean, is intermittent, and flow contributes only to the general groundwater aquifer of the Puna District. In federal parlance, this stream system is non-navigable and not relatively permanent (NRP). It does not contribute flow and is not connected to the nearest traditional navigable waters (TNW), which is the Pacific Ocean. Therefore, we would conclude that this

entire stream system is not jurisdictional under federal law. In the final analysis, however, federal jurisdiction over intermittent streams (and adjacent wetlands) rests on a "significant nexus" standard. While this standard includes whether non-permanent flow reaches a traditionally navigable waters, other "ecological factors" may be included, so the local office of the Department of the Army, Corps of Engineers (USACE) must make the final determination. Presumably, the stream crossings are subject to some state and county regulations concerned with flood hydrology and stream bed alterations.

An area between the two stream beds along the west side of the highway is a depression subject to flooding and overflowing onto the Kea'au-Pahoa Highway. The proposed project includes a drain running diagonally under the highway from the south end of the depression, to a discharge point on the left bank of the unnamed stream a short distance downstream from the highway bridge. The depressed area shows potential wetland characteristics (USACE, 1987): with positive vegetation (dominated by California grass, *Urochloa mutica*, a facultative wetland or FACW species) and hydrology indicators (occasional flooding), and suggestion of a hydric soil (*AECOS*, 2009). Further study would be needed to establish if this area does contain a wetland. No standing water or open water areas were observed at this location.

Although a nexus with the unnamed stream can probably be demonstrated, if the stream itself is declared isolated (not jurisdictional), then the wetland would not a jurisdictional, even should it prove to be a wetland by federal definition (USACE, 1987). Again, however, the subjective significant nexus consideration of ecologic factors precludes anyone other than the USACE and/or EPA from declaring an aquatic feature as not waters of the U.S. Although not a factor in establishing federal jurisdiction of wetland features, the National Wetlands Inventory map (USFWS, 2009) shows no wetlands in the project area.

References

AECOS, Inc. (*AECOS*). 2004. Biological and water quality reconnaissance survey of an un-named stream along Keaau-Pahoa Road, Puna District, Island of Hawai'i. Prep. for Wilson Okamoto and Associates. *AECOS* No. 1054A: 7 pp.

_____. 2009. Biological and water quality surveys for the Kea'au-Pahoa Road Improvements Project, Puna District, Hawai'i. Prep. for SSFM International. *AECOS* No. 1125: 12 pp.

Funk, E. J. 2004. Flora/fauna survey report for the proposed Keaau-Pahoa Road shoulder lane conversion project. 14 pp.

Hawaii Cooperative Park Service Unit. 1990. Hawaii stream assessment. A preliminary appraisal of Hawaii's stream resources. Prep. for State of Hawaii, C. o. W. R. M. R84: 294 pp.

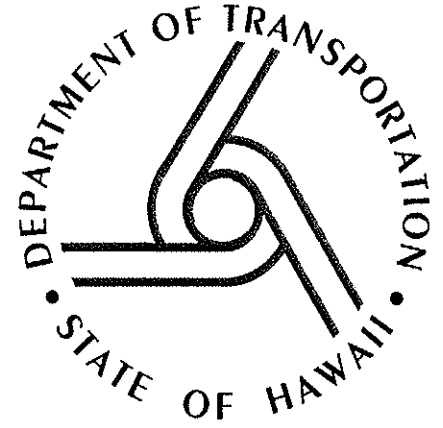
Hawai'i Department of Health (HDOH). 2008. 2006 State of Hawaii Water Quality Monitoring and Assessment Report: Integrated Report to the U.S. Environmental Protection Agency and the U.S. Congress Pursuant To Sections §303(D) and §305(B), Clean Water Act (P.L. 97-117). 279 pp.

U.S. Army Corps of Engineers (USACE). 1987. *Corps of Engineers Wetlands Delineation Manual.* Environmental Laboratory, Dept. of the Army, Waterways Experiment Station, Corps of Engineers.

U.S. Environmental Protection Agency and U.S. Army Corps of Engineers (USEPA/USACE). 2008. Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in *Rapanos v. United States & Carabell v. United States.* December 2, 2008 revisions to the EPA/Army Memorandum originally issued June 6, 2007. 13 pp. URL: http://www.epa.gov/owow/wetlands/pdf/CWA_Jurisdiction_Following_Rapanos120208.pdf; last visited June 11, 2009.

U.S. 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; last accessed on May 12, 2009.

_____. 2009b. National Wetlands Inventory. Wetlands Mapper. At URL: http://www.fws.gov/wetlands/Data/Mapper.html; last visited June 11, 2009.



APPENDIX C

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3/17/04

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8/11/09

FLORA/FAUNA SURVEY REPORT FOR THE PROPOSED KEAAU-PAHOA ROAD SHOULDER LANE CONVERSION PROJECT

FOR
WILSON OKAMOTO AND ASSOCIATES
1907 SOUTH BERITANIA STREET, SUITE 400
HONOLULU, HAWAII 96826

BY
EVANGELINE J. FUNK, PHD
BOTANICAL CONSULTANTS
HONOLULU, HAWAII

INTRODUCTION

The proposed Keaau-Pahoa Road Shoulder Lane Conversion Project site is located in the Puna District of the Island of Hawaii between Keaau Town and Shower Drive to the west, a distance of 2.2 miles. The state designation of this road is Highway 130. The survey area covered about twenty feet from the edge of the paved makai shoulder and area 200 feet wide from the centerline of the highway on both sides of the road from the Waipahoehoe Stream Bridge to Shower Drive.

A Flora/Fauna survey of this proposed project site was carried out on February 25, 26, and 27, 2004 by a two-person field team. The results of these surveys are presented below.

THE FLORA SURVEY

The walk through method of data collection was used during this survey and all parts of the site were visited. The purpose of the survey was to describe the vegetation in the project area, to prepare an inventory of all the plants in the area and most importantly to ascertain if any threatened or listed endangered species or species of concern are growing on the proposed lane conversion project site.

RESULTS

The vegetation of the study site is a changing mosaic of mostly introduced or alien trees, shrubs and grasses. Still there is some evidence that this area was once covered by an 'Ohi'a (Metrosideros) Lowland Wet Mesic Forest (Gagne' Chuddihy in Wagner, Herbst & Sohmer 1990). There are still 'Ohi'a trees to be found on both sides of the highway and intermittent enclaves of 'Ohi'a/Staghorn Fern scattered among the predominantly introduced vegetation.

Beginning at Shower Drive on both sides of Highway 130 for approximately one hundred feet the area has been developed and the yards have been landscaped. All along the north or mauka side of the highway from Shower Drive to Waipahoehoe Stream Bridge there is a remnant of the old highway. From the developed area to the bridge, between the old and new highways can be found a mix of ironwood (Casuarina equisetifolia), Banyan (Ficus microcarpa), Trumpet (Cecropia obtusifolia), Gun powder (Trema orientalis) and Melochia trees that are twenty to forty fee in height with an understory of mixed grasses, ferns and herbs.

Between the old and new bridges is a tangle of Koa haole (Leucaena leucocephala), yellow ginger (Hedychium flavescens), vervain (Stachytarpheta), tulip trees (Spathodea campanulata), Kukui trees (Aleurites moluccana), Melochia umbellata trees and big grasses such as Guinea grass (Panicum maximum) and Elephant grass (Pennisetum purpureum). Mauka or up hill of the old bridge is found similar vegetation and in addition there persists scattered sugar plants (Saccharum officinarum) which indicates that the area mauka side of Highway 130 was at one time used to grow sugar.

On the makai or downhill side of the highway from Shower Drive to the bridge, past the houses the tree cover is made up of both red and yellow guava trees (Psidium cattleianum, P. guajava), Scotch attorney tree (Clusia rosea), and some false staghorn fern (Dicranopteris linearis). The understory is made up of mixed grasses and herbs some of which have been treated with herbicide. Beginning just north of Waipahoehoe Stream Bridge on the makai side of Highway 130 is a tall dense stand of rose apple trees (Syzygium jambos) that extends inland for two to three hundred feet. The understory is

composed of elephant grass, yellow ginger, natal red top grass (Rhynchelytrum repens), and similar grasses and herbs.

Along this part of the roadway about fifteen feet from the verge of the highway is a deep narrow ditch that carries the water from several culverts to Waipahoehoe Stream.

Beyond the stand of rose apple trees is an equally dense stand of young, very close together strawberry guava trees forming an almost impenetrable pole forest. Most of the trees are fifteen to twenty feet in height. The understory is composed of sword fern (Nephrolepis exaltata), false staghorn fern, and big, coarse lion grass (Themeda villosa).

North of the guava trees there is an open area where native vegetation predominates. There are widely separated ''Ohi'a trees fifteen to twenty feet in height with an understory of false staghorn fern. The area in being invaded by the very aggressive shrub downy rose myrtle (Rhodomyrtus tomentosa)

There is a long stretch of highway where the roadbed has been built up and the resulting steep shoulder has been covered with flat lava rocks one to two feet in diameter. In addition there are several places along the right-of-way where the shoulder consists of dense pahoehoe lava outcroppings.

In the area near the waste transfer station driveway there are several garden escapees growing among the expected grasses and herbs. These include loquat trees (Eriobotrya japonica), some candle bush (Senna alata), elderberry bushes (Sambucus mexicana), and bamboo orchids (Arundina graminifolia).

From the Humane Society driveway to the Protea farm at the end of the project site the is broom grass (Andropogon virginicus), and Melochia trees.

SPECIES LIST OF THE PLANTS FOUND ON THE PROPOSEDKEAAU-PAHOA SHOULDER LANE CONVERSION PROJECT SITE

The plant families in the following species list have been alphabetically arranged within three groups, Ferns and Fern Allies, Monocotyledons, and Dicotyledons. The genera and species are arranged alphabetically within families. The taxonomy and Nomenclature follows that of Wagner, Herbst, and Sohmer (1990). For each taxon the Following information is provided:

1. An asterisk before the plant name indicates a plant introduced to the Hawaiian Islands since Cook or by the aborigines.
2. The scientific name of the plant.
3. The Hawaiian name or the most widely used common name of the Plant.
4. Abundance ratings are for this site only and they have the following Meanings:
   Uncommon = a plant that was found less than fine times.
   Occasional = a plant that was found between five and ten times.
   Common = a plant considered an important part of the vegetation.
   Locally abundant = plants found in large numbers over a limited area. For example the plants found in grassy patches.

This species list is the result of an extensive survey of this site during a very wet season (February 2004) and it reflects the vegetation composition of the flora during a single season. Minor changes in the vegetation will occur due to introductions and losses and a slightly different species list would result from a survey conducted during a different growing season.

Scientific Name	Common Name	Abundance
FERNS AND FERN ALLIES		
PSILOTACEAE – Psilotum Family		
Psilotum nudum (L.) Griseb.	Moa	Uncommon
GLEICHENIACEAE – Vine fern Family		
Dicranopteris linearis (Burm.) Underw.	False staghorn fern	Locally Abundant
POLYPODIACEAE - Common Fern Family		
**Nephrolepis exaltata* (L.) Schott	Sword fern	Common
**Polypodium scolopendrium* Burm. F.	Laua'e	Locally abundant
MONOCOTYLEDONS		
ARECACEAE - Palm Family		
**Areca catechu* L.	Betel nut palm	locally abundant
**Cocos nucifera* L.	Coconut palm	Uncommon
*		
COMMELINACEAE - Spiderwort Family		
**Commelina diffusa* N. L. Burm.	Honohono	Locally abundant
CYPERACEAE - Sedge Family		
**Cyperus rotundus* L.	Nut grass	Occasional
ORCHIDACEAE – Orchid Family		
**Arundina graminifolia* (D. Don) Hochr.	Bamboo orchid	Occasional
POACEAE - Grass Family		
**Andropogon virginicus* L	Broomsedge	Locally abundant
*Axonopus fissifolius (Raddi) Kuhim	Carpet grass	Locally abundant
**Chloris divaricata* R. Br.	Star grass	Locally abundant
**Cynodon dactylon* (L.) Pers.	Bermuda grass	Locally abundant
**Eleusine indica* (L.) Gaertn.	Wiregrass	Locally abundant
**Melinis minutiflora* P. Beauv.	Molasses grass	Locally abundant
**Panicum maximum* Jacq.	Guinea grass	Common

Scientific Name	Common Name	Abundance
POACEAE CON'T.		
*Paspalum conjugatum Bergius	Hilo grass	Locally abundant
*Paspalum Orville Steud.	Vaseygrass	Occasional
**Pennisetum purpureum* Schumach.	Elephant grass	Common
**Rhynchelytrum repens* (Willd.) Hubb.	Natal redtop	Common
**Saccharum officinarum* L.	Ko	Occasional
**Setaria gracilis* Kunth	Perennial foxtail	Locally abundant
**Setaria palmifolia* (J. Konig) Stapf	Palm grass	Common
**Sporobolus indicus* (L.) R. Br.	Smutgrass	Occasional
**Themeda villosa* (Poir.) A. Camus	Lyon's grass	Common
ZINGIBERACEAE – Ginger Family		
**Hedychium flavescens* Carey ex Roscoe	Yellow ginger	Locally abundant
DICOTYLEDONES		
ACANTHACEAE – Acanthus Family		
**Asystasia gangetica* (L.) T. Anderson	Chinese violet	Occasional
**Justicia betonica* L	White shrimp plant	Uncommon
**Thunbergia fragrans* Roxb.	White Thunbergia	Occasional
ANACARDIACEAE – Mango Family		
**Mangifera indica* L.	Mango	Occasional
APIACEAE – Parsley Family		
**Centella asiatica* (L.) Urb.	Asiatic pennywort	Uncommon
ASTERACEAE – Sunflower Family		
**Ageratum conyzoides* L.	Maile hohono	Locally abundant
**Bidens alba* (L.) DC		Occasional
**Bidens cynapiifolia* Kunth		Locally abundant
**Emilia sonchifolia* (L.) DC	Flora's paintbrush	Occasional
**Pluchea indica* (L.) Less.	Indian fleabane	Occasional
**Pluchea symphytifolia* (Mill.) Gillis	Sourbush	Common
**Wedelia trilobata* (L.) Hitchc.	Wedelia	Locally abundant

Scientific Name	Common Name	Abundance
BEGONIACEAE – Begonia Family		
**Begonia hirtella* Link		Locally abundant
BIGNONIACEAE – Bignonia Family		
**Spathodea campanulata* P. Beauv.	African tulip tree	Occasional
BUDDLEIACEAE – Butterfly bush Family		
**Buddleia asiatica* Lour.	Dog tail	Occasional
CASUARINACEAE – She-oak Family		
*Casuarina equisetifolia L.	Ironwood	Occasional
CAPRIFOLIACEAE – Honeysuckle Family		
*Sambucus mexicana K. Presl ex A. DC	Mexican elder	Rare
CECROPIACEAE – Cecropia Family		
**Cecropia obtusifolia* Bertol.	Trumpet tree	Occasional
CLUSIACEAE – Mangosteen Family		
**Clusia rosea* Jacq.	Autograph tree	Uncommon
CONVOLVULACEAE – Morning glory Family		
**Ipomoea cairica* (L.) Sweet	Koali 'ai	Uncommon
**Ipomoea obscura* (L.) Ker-Gawl.		Occasional
**Ipomoea triloba* L.	Little bell	Occasional
EUPHORBIACEAE – Spurge Family		
**Aleurites moluccana* (L.) Willd	Kukui	Occasional
**Chamaesyce prostrata* (Aiton) Small	Prostrate spurge	Occasional
**Phyllanthus debilis Klein ex Willd.*	Niruri	Occasional
FABACEAE – Bean Family		
**Chamaecrista nictitans* (L.) Moench	Partridge pea	Occasional
**Crotalaria incana* L.	Fuzzy rattlepod	Occasional

Scientific Name	Common Name	Abundance
FABACEAE – Bean Family con't.		
**Crotalaria micans* Link		Occasional
**Crotalaria spectabilis* Roth	Kolomona	Occasional
**Desmodium triflorum* (L.) DC		Occasional
**Leucaena leucocephala* (Lam.) de Wit	Koa haole	Common
**Mimosa pudica* L.	Sensitive plant	Common
**Senna alata* (L.) Roxb.	Candle bush	Uncommon
LAMIACEAE –Mint Family		
**Hyptis pectinata* (L.) Poit.	Comb hyptis	Occasional
LAURACEAE – Laurel Family		
**Persea americana* Mill.	Avocado	Occasional
LYTHRACEAE – Loosestrife Family		
**Cuphea carthagenensis* (Jacq.) Macbr.	Tarweed	Uncommon
MALVACEAE – Mallow Family		
Hibiscus tiliaceus L.	Hau	Locally abundant
MELASTOMATACEAE – Melastoma Family		
**Clidemia hirta* (L.) D. Don	Koster's curse	Occasional
**Dissotis rotundifolia* (Sm.) Triana		Common
**Melastoma candidum* D. Don		Occasional
MORACEAE – Fig Family		
**Ficus microcarpa* L.fil	Chinese banyan	Occasional
*Ficus *retusa* L.	Banyan	Occasional
MYRTACEAE – Myrtle Family		
Metrosideros polymorpha Gaud.	'Ohi'a	Common
**Psidium cattleianum* Sabine	Strawberry guava	locally abundant
**Psidium guajava* L.	Common guava	Common
**Rhodomyrtus tomentosa* (Aiton) Hassk.	Downy myrtle	Occasional
**Syzygium jambos* (L.) Alton	Rose apple	Locally abundant

Scientific Name	Common Name	Abundance
ONAGRACEAE – Evening Primrose Family		
**Ludwigia octovalvis* (Jacq.) Raven	Primrose willow	Uncommon
POLYGALACEAE – Milkwort Family		
**Polygala paniculata* L.		Locally abundant
ROSACEAE – Rose Family		
**Eriobotrya japonica* (Thunb.) Lindl.	Loquat	Occasional
RUBIACEAE – Coffee Family		
**Paederia scandens* (Lour.) Merr.	Maile pilau	Occasional
**Spermacoce assurgens* Ruiz & Pav.	Buttonweed	Locally abundant
SOLANACEAE – Nightshade Family		
**Solanum americanum* Mill.	Popolo berry	Occasional
STERCULIACEAE Cacao Family		
**Melochia umbellata* (Houtt.) Stapf.		Common
Waltheria indica L.	ʻUhaloa	Rare
ULMACEAE – Elm Family		
**Trema orientalis* (L.) Blume	Gunpowder tree	Occasional
VERBENACEAE – Verbena Family		
**Stachytarpheta jamaicensis* (L.) Vahl	Vervain	Occasional
**Stachytarpheta urticifolia* (Salisb.) Sims		Occasional

THE FAUNA.

INTRODUCTION AND METHODS

This report summarizes the results of a fauna survey of the proposed Keaau-Pahoa Shoulder Lane Conversion project site located between Keaau town and Shower Drive in the Puna district on the Island of Hawaii. This survey was carried out on February 25, 26,and 27, 2004 during the early daylight hours, to take advantage of the higher activity levels of both birds and mammals and to make observations while the weather was dry. Observations were made from two fixed stations along the old road near two public water stations where considerable household rubbish has been discarded. These rubbish heaps appeared to be very attractive to birds and homeless cats. In addition to fixed station observations, a walking tally was kept along the highway shoulder.

The study site is made up of approximately 2.2 miles of road right-of-way between Keaau town on the north and Shower Drive on the south. It consisted only the makai or western shoulder of the roadway and a much wider area on both sides of the highway between Waipahoehoe Stream Bridge and Shower Drive.

RESULTS

MAMMALS – Although no rats or mice were seen during this survey they can be assumed to be present on this site because of the household rubbish that has been discarded and the number of houses found near the Shower Drive end of the study site. The only mammals seen during this study were two feral cats (Felis domestica) that appeared to be living in one of the rubbish piles.

AVIFAUNA – Gallinaceous Birds

A large flock of twenty-five to thirty chickenlike birds appear to be living in and around the largest rubbish pile. The flock consists of domestic chickens, jungle fowl, and others that appear to be a cross between the two types

Family Zosteropidae: White-eyes

Zosterops japonicus (Japanese white eyes)

These small, active birds were seen around the public water sources and in the trees along the right-of-way.

Family Passeridae: Old World Sparrows

Passer domesticus (House sparrow)

These small streaky brown and gray house sparrows are a familiar commensal species. Several individuals were feeding near the rubbish dump and in the tall grasses.

Family – Emberizidae: Emberizine Finches

Cardinalis cardinalis (Northern cardinal)

A total of four northern cardinals were present near the public water fountains. The bright red males are easy to spot but the dull gray females are difficult to spot although both sexes have a similar call.

FAMILY – Fringillidae: Cardueline Finches

Carpodacus mexicanus (House finch)

Both male and female finches inhabit the area around the houses and near the water sources. These are small, gray birds. The males have red to yellow heads while the females are all gray.

Family Columbidae: Pigeons and Doves

Geopelia striata (Zebra Dove)

One of the most commonly seen and heard birds on this site. Birds are especially common near the houses.

Family Sturnidae: Starlings and Mynas

Acridotheres tristis (Common myna)

Mynas were seen along the old road and flying over the right-of way. They appeared to be a plentiful as the doves.

CONCLUSIONS

The flora of this site is composed largely of alien or introduced species. There are some common native species such as 'Ohi'a trees, false staghorn fern, and moa (Psilotum nudum). Because of its abundance on the study site only the false staghorn fern will probably be affected if this project goes forward. It is a very commonly found vine fern and will undoubtedly re-establish itself when the project is completed

This survey was carried out during rainy weather and although a survey during dry weather may have recorded a greater number of birds the species composition would probably be similar. The shoulder conversion will probably have little effect on the fauna of this site

ENDANGERED SPECIES

No candidate, proposed, or listed threatened or endangered species as set forth in the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1543) are known from this site and none were found during this survey.

BIBLIOGRAPHY

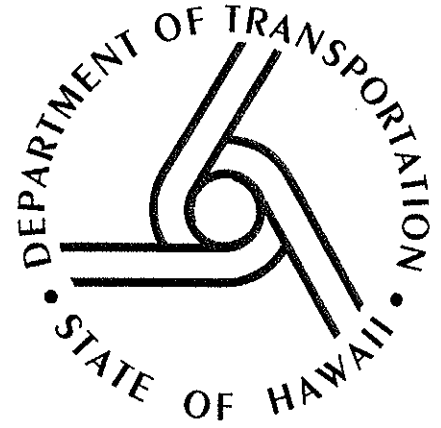
Berger, A. J. 1981. Hawaiian Birdlife. (2nd. Ed.) Univ. Press. Honolulu, Hawaii Hawaii Audubon Society. 1988. Hawaii's Birds. Hawaii Audubon Society.

Kramer, R. L. 1971. Hawaiian Land Mammals. Charles E. Tuttle Co. Japan

Neal, M. C. 1965. In Gardens of Hawaii. Bishop Museum Special Publication #65. Bis. Mus. Press.

Pratt, H.D., P.L. Bruner, & D.G. Bennett. 1987. The Birds of Hawaii and the Tropical Pacific. Princeton Univ. Press

Wagner, W. L., D. R. Herbst, & S. H. Sohmer. 1990. Manual of the Flowering Plants of Hawaii. Bishop Museum Special Publication #83. Univ. Of Hawaii Press. Vols 1 & 2.



APPENDIX D

ARCHAEOLOGICAL ASSESSMENT SURVEY

KEAAU-PAHOA ROAD SHOULDER LANE CONVERSION

LAND OF KEAAU, PUNA DISTRICT

ISLAND OF HAWAII

By:

Alan E. Haun, Ph.D.

and

Dave Henry, B.S.

Prepared for:

Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, Hawaii 96826

June 2004

Haun & Associates

Archaeological, Cultural, and Historical Resource Management Services
HCR 1 Box 4730, Keaau, Hawaii 96749 Phone: 982-7755 Fax: 982-6343

Introduction

At the request of Wilson Okamoto Corporation, Haun & Associates conducted an archaeological survey of the c. 2.2 mile (3.5 km) long Keaau-Pahoa Road Shoulder Lane Conversion project area located in the Land of Keaau, Puna District, Island of Hawaii (Portions of TMK: 1-5-036:117-122; 1-6-001:15, 21; 1-6-003:2, 65, 68, 74; 1-6-004:11, 45, 47-51, 53-56; and 1-6-064:269, 283-289; *Figure 1*). The objective of the survey was to satisfy historic preservation regulatory review requirements of the Department of Land and Natural Resources-Historic Preservation Division (DLNR-SHPD), as contained within Hawaii Administrative Rules, Title 13, DLNR, Subtitle 13, State Historic Preservation Rules (2003).

No archaeological sites or features were identified during the survey, therefore the project is documented as an archaeological assessment pursuant to Chapter 13-284-5(5A). As required, this report contains a description of the project area and field methods.

Project Area Description

The project area consists of a c. 2.0 m (3.2 km) long corridor that extends along the northeast and portions of the southwestern side of Highway 130 (*Figure* 2). The area examined varies in elevation from 290 to 350 ft. The northwest end of the project area is located 120.0 m northwest of the entrance to the Hawaii Island Humane Society facility and 20.0 m northwest of an unnamed paved road. The southeastern end is situated 26.0 m southeast of the Shower Drive/Pohaku Drive intersection. The entire northeast side of Highway 130 was examined, with only selected areas along the southwestern side subjected to investigation.

The majority of the project area consists of a 5.4 m (18.0 ft) wide strip on the seaward side of the road. Additional areas surveyed consist of a 185 m (607 ft) long (northwest by southeast) by 22.2 (70 ft) wide section located at the northwestern end of the project area, in the area of the Hawaii Island Humane Society; and areas adjoining culverts and several driveway and road intersections

A 2.0 to 3.0 m (6.6 to 9.8 ft) wide swath that parallels both sides of the highway has been altered during past road construction activity. Ornamental vegetation and planted coconut (*Cocos nuciferia* L.) are present adjacent to several of the driveways, although the majority of the vegetation consists of secondary vegetation including guava (*Psidium cattleianum* Sabine), and low *ohia* trees (*Metrosideros polymorphia*), with scattered java plum (*Eugenia cuminii* L), rose apple (*Eugenia jambos* L.), mango (*Mangifera indica* L.) and ferns and grasses. Examples of the project area vegetation are presented in *Figures 3* and *4*.

The soil within the project area consists predominately of Pahoehoe lava flows with isolated pockets of Hilo silty clay loam (0-10% slopes). According to Sato et al., the pahoehoe lava is characterized by a smooth, billowy surface with some areas of rough,

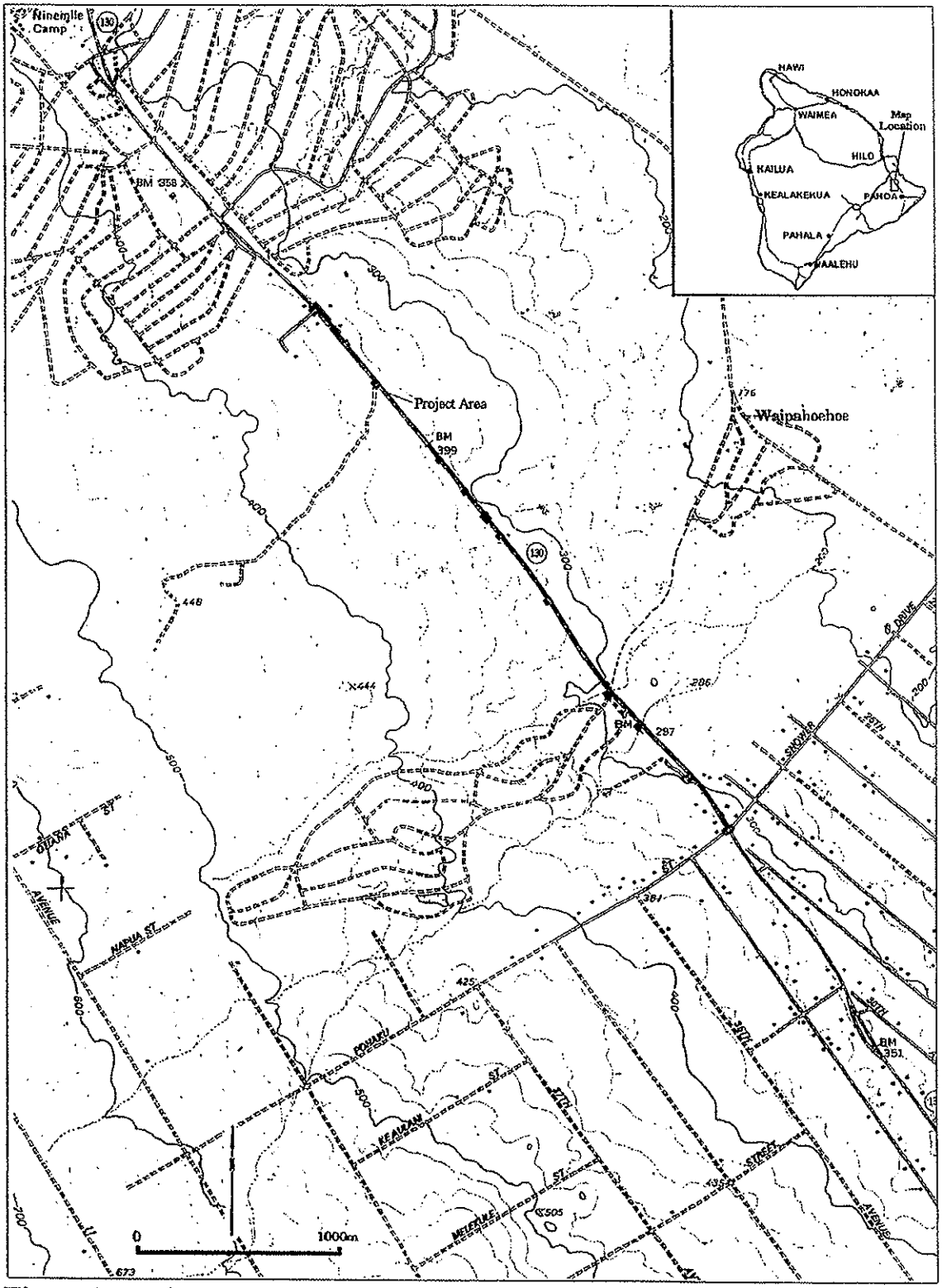


Figure 1. Portion of Mountain View Quadrangle showing Project Area

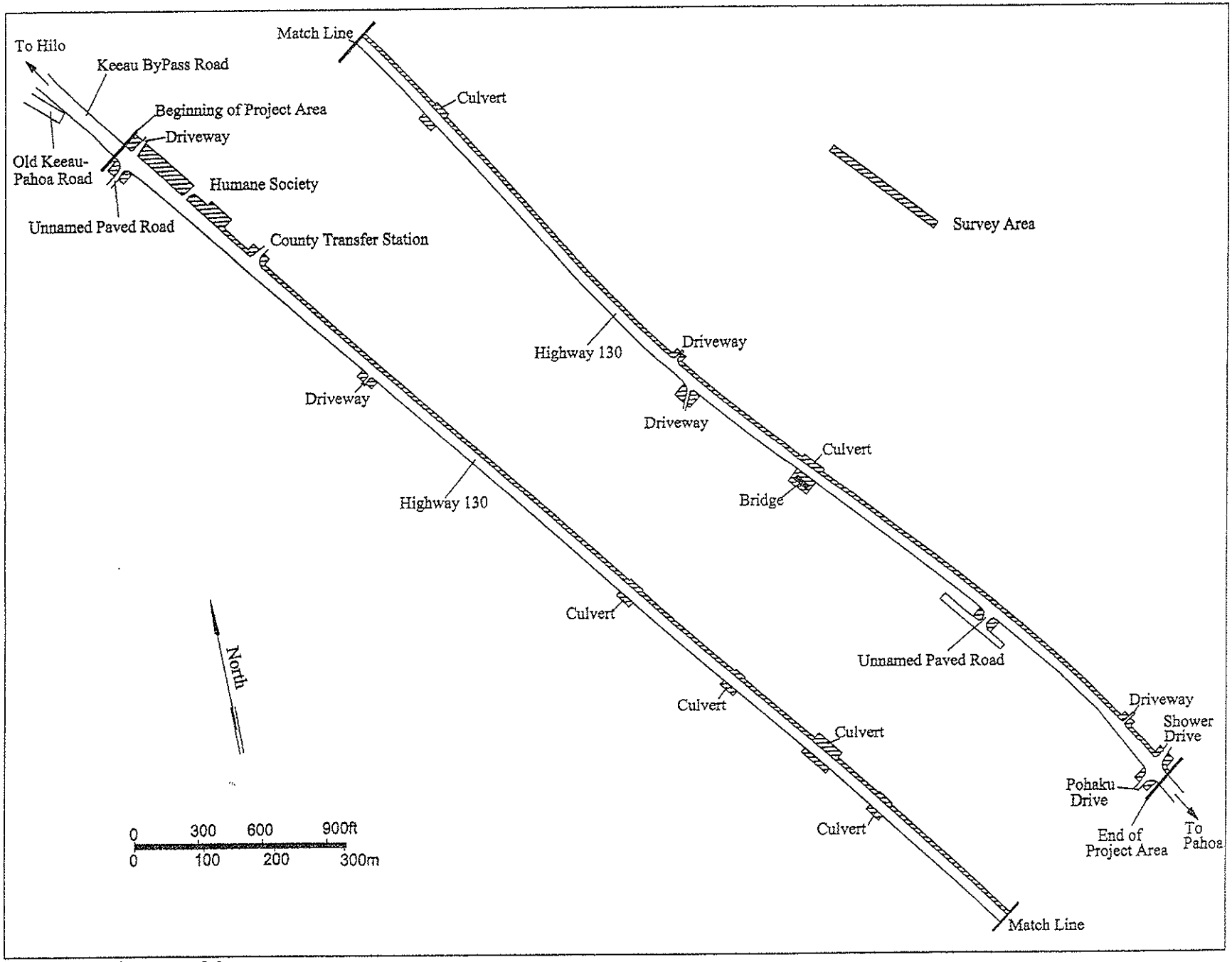


Figure 2. Project Area Map

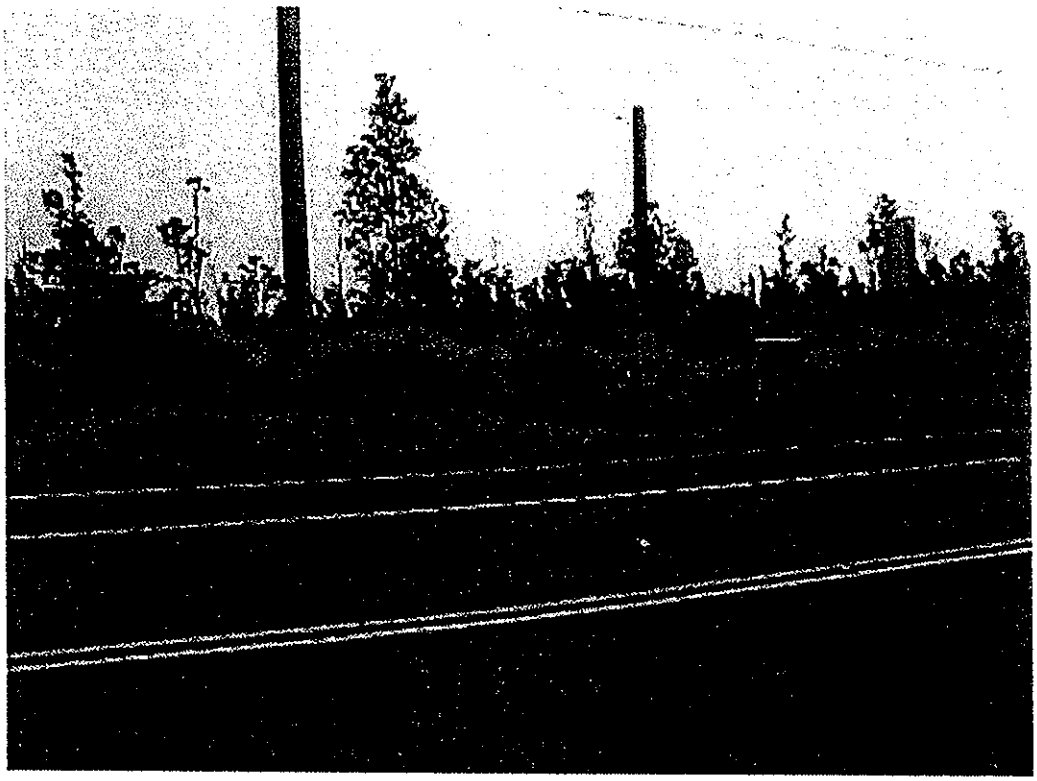


Figure 3. Project Area Overview, view to northeast

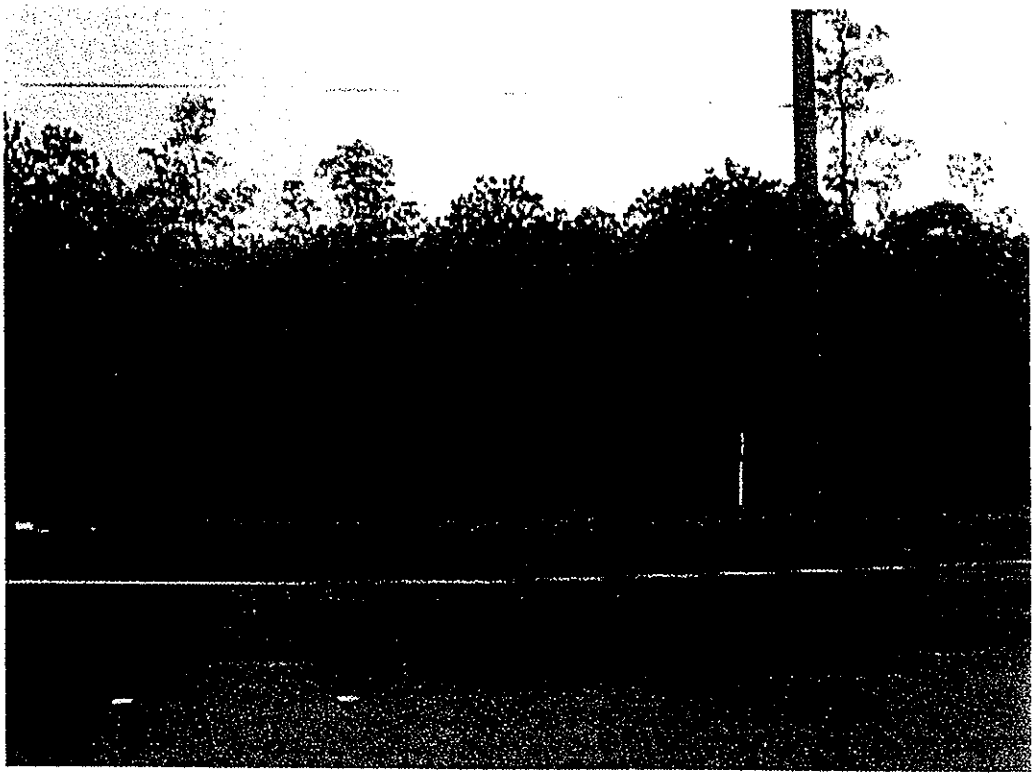


Figure 4. Project Area Overview, view to northeast

broken surface (1973:34). Little soil is present, although in wet areas (like the project area) vegetation has taken hold within the cracks and crevices. According to Juvik and Juvik 1998:57, rainfall in the area averages 160-180 inches per year. The Hilo silty clay soil (0-10% slopes) is characterized by a surface layer of dark brown silty clay loam, over a dark brown to very dark grayish brown silty clay loam subsoil, over pahoehoe bedrock (Sato et al. (1973:17). This soil evidences a rapid permeability, a slow runoff and a slight erosional hazard and is classified as suitable for sugarcane, orchard, truck crops and pasture (1973:18). According to Wolfe and Morris (2001), the lava flows in this area originated from Kilauea Volcano from 200 to 750 years ago.

Field Methods

The survey fieldwork was conducted by a crew of two on March 29, 2004, under the direction of Dr. Alan Haun. Approximately 16 labor-hours were required to complete the fieldwork portion of the project. The archaeological investigation of the project area consisted of a 100% surface examination with the surveyors walking transects at 3-meter intervals, oriented parallel to Highway 130. Ground surface visibility was fair to excellent.

Findings

No archaeological sites or features were identified during the survey, and there are no Land Commission Awards are present within the project area. Nearly half of the project area was altered by previous highway-related construction activity. Much of the remainder was probably modified by sugar cane cultivation because most of the land is owned by W.H. Shipman Ltd. and is dominated by secondary vegetation. No further archaeological work is recommended for the project based on the survey results.

References

DLNR (Department of Land and Natural Resources)
2003 Hawai'i Administrative Rules, Title 13. Department of Land and Natural Resources, Subtitle 13, State Historic Preservation Division Rules.

Juvik, Sonia P. and James O. Juvik, Editors
1998 *Atlas of Hawai`i.* University of Hawai`i Press, Honolulu.

Sato, H.H., E.W. Ikeda, R. Paeth, R. Smythe, and M. Takehiro Jr.
1973 *Soil Survey of the Island of Hawaii.* U.S. Dept. of Agriculture, Soil Conservation Service and University of Hawaii Agricultural Experiment Station. Washington D.C. Government Printing Office.

Wolfe, E., and J. Morris
2001 Geological Map of the Island of Hawaii. U.S. Department of the Interior. U.S Geological Survey

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ARCHAEOLOGICAL INVENTORY SURVEY

PORTIONS OF TMK: (3) 1-6-04: 11, 47-53, 55, 56

AND 1-6-64:266-269, 283-286

LAND OF KEA'AU

PUNA DISTRICT

ISLAND OF HAWAII

Haun & Associates

Archaeological, Cultural, and Historical Resource Management Services
HCR 1 Box 4730, Kea'au, Hawaii 96749 Phone: 982-7755 Fax: 982-6343

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LAND OF KEA'AU

PUNA DISTRICT, ISLAND OF HAWAII

By:

Alan E. Haun, Ph.D.

And

Dave Henry, B.S.

Prepared for:

Wilson Okamoto Corporation
1907 S. Beretania Street, Suite 400
Honolulu, Hawaii 96826

July 2008

Haun & Associates

Archaeological, Cultural, and Historical Resource Management Services
HCR 1 Box 4730, Kea'au, Hawaii 96749 Phone: 982-7755 Fax: 982-6343

SUMMARY

At the request of Wilson Okamoto Corporation, Haun & Associates conducted an archaeological inventory survey of portions of TMK: (3) 1-6-04:11, 47-53, 55, 56 and 1-6-64:266-269, 283-286 that comprise c. 8-acre strip of land (30 ft wide by 2.4 mi long) extending along the inland side of Keaau-Pahoa Road, located in the Land of Keaau, Puna District, Island of Hawai'i. The objective of the survey was to satisfy historic preservation regulatory review inventory requirements of the Department of Land and Natural Resources-Historic Preservation Division (DLNR-SHPD), as contained within Hawaii Administrative Rules, Title 13, DLNR, Subtitle 13, State Historic Preservation Rules.

The archaeological survey identified one site, an historic bridge spanning Waipahoehoe Stream. The bridge is constructed of mortared stone and formed concrete and was potentially constructed in the 1930s. The site is assessed as solely significant under Criterion "d". The site has yielded information important for understanding the historic land use in the project area. The mapping, written description and photography at this site adequately documented it and no further work or preservation is recommended.

CONTENTS

INTRODUCTION

At the request of Wilson Okamoto Corporation, Haun & Associates conducted an archaeological inventory survey of portions of TMK: (3) 1-6-04:11, 47-53, 55, 56 and 1-6-64:266-269, 283-286 that comprise c. 8-acre strip of land (30 ft wide by 2.4 mi long) extending along the inland side of Keaau-Pahoa Road, located in the Land of Keaau, Puna District, Island of Hawai'i (*Figures 1-3*). The objective of the survey was to satisfy historic preservation regulatory review requirements of the Department of Land and Natural Resources-Historic Preservation Division (DLNR-SHPD), as contained within Hawaii Administrative Rules, Title 13, DLNR, Subtitle 13, State Historic Preservation Rules (2003).

The survey fieldwork was conducted by a crew of two archaeologists on June 12 and July 14, 2009 under the direction of Dr. Alan Haun. Approximately four person days of labor were required to complete the field work portion of the project. Described in this final report are the project scope of work, field methods, background information, survey findings, and significance assessments of the sites with recommended further treatments.

Scope of Work

Based on DLNR-SHPD rules for inventory surveys, the following specific tasks were determined to constitute an appropriate scope of work for the project:

1. Conduct background review and research of existing archaeological and historical documentary literature relating to the project area and its immediate vicinity--including examination of Land Commission Awards, *ahupua'a* records, historic maps, archival materials, archaeological reports, and other historical sources;

2. Conduct a high intensity, 100% pedestrian survey coverage of the project area;

3. Conduct detailed recording of all potentially significant sites including scaled plan drawings, written descriptions, and photographs, as appropriate;

4. Conduct subsurface testing (manual excavation) at selected sites as necessary to determine site function;

5. Analyze background research and field data; and

6. Prepare and submit Final Report.

Project Area Description

The project area consists of a linear strip of land located along the inland side of the Keaau-Pahoa Road, measuring 30 feet wide (9.1 m) and 2.4 miles long (3.8 km). It originates at the southern end of the Keaau Bypass and extends to the southeast where it terminates approximately 1,200 ft southeast of the Pohaku Drive-Shower Drive intersection. It extends through the 18 Tax Map Key (TMK) parcels listed above as well as a County of Hawaii easement that parallels the Keaau-Pahoa Road (see F*igure 3*). The project area varies from c. 290 to 345 ft elevation with rainfall ranging from 160 to 200 inches per year (Juvik and Juvik 1998:57). The temperature in the area varies from 70 to 75 degrees (Armstrong 1983).

Two branches of the Waipahoehoe Stream extend through the southeastern end of the project area corridor (see *Figure 1*). A modern concrete culvert passes beneath the Keaau-Pahoa Road at the northernmost stream (*Figure 4)* and a modern concrete bridge is located at the southern stream. An historic bridge is located inland of the modern bridge on the southern stream drainage (Site 26874 discussed in Findings section).

The project area evidences areas of significant disturbance. The northern end of the corridor was recently bulldozed in conjunction with the construction of the Keaau Bypass road and is currently com-

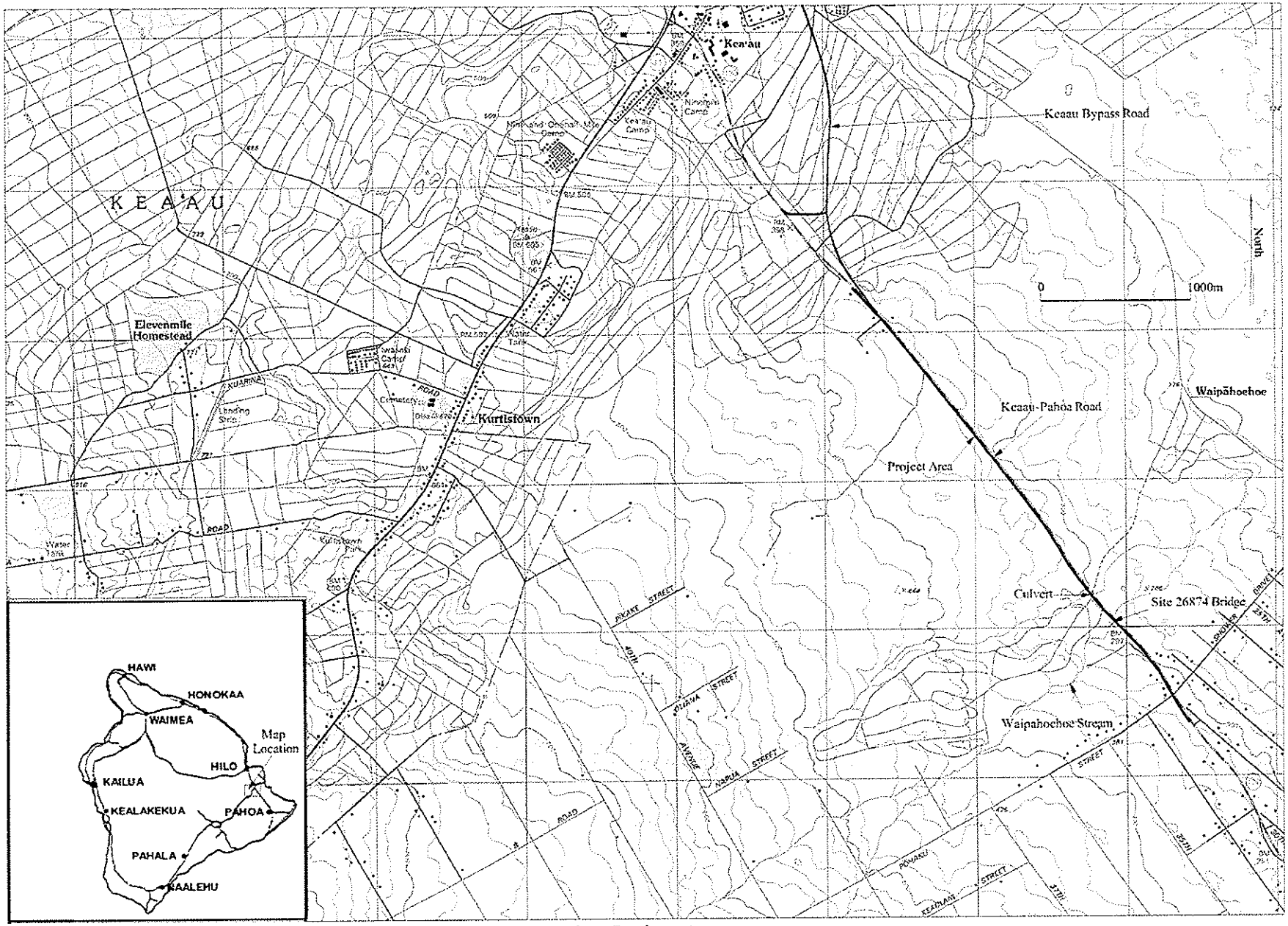


Figure 1. Portion of USGS Mountainview Quadrangle showing Project Area

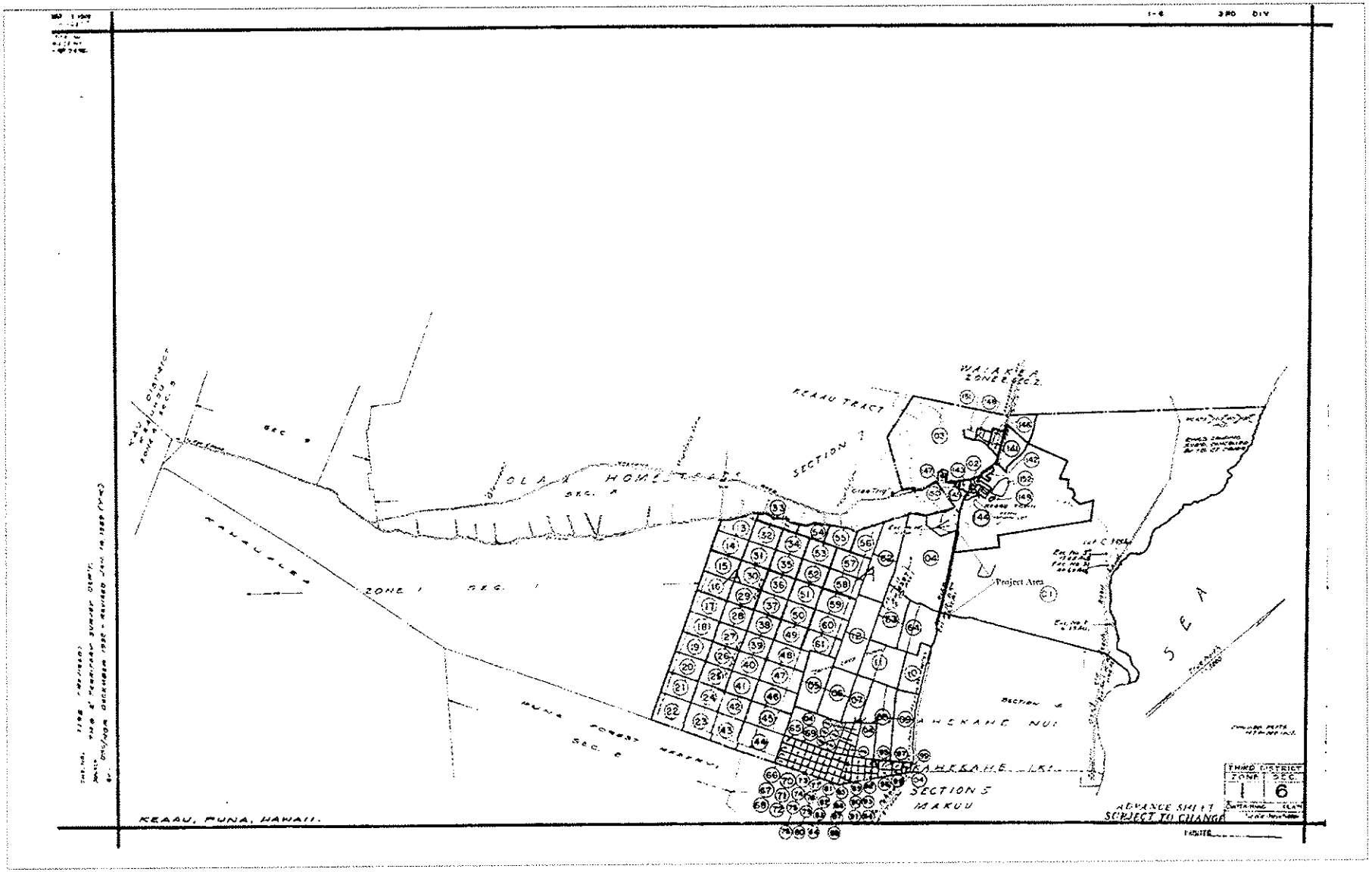
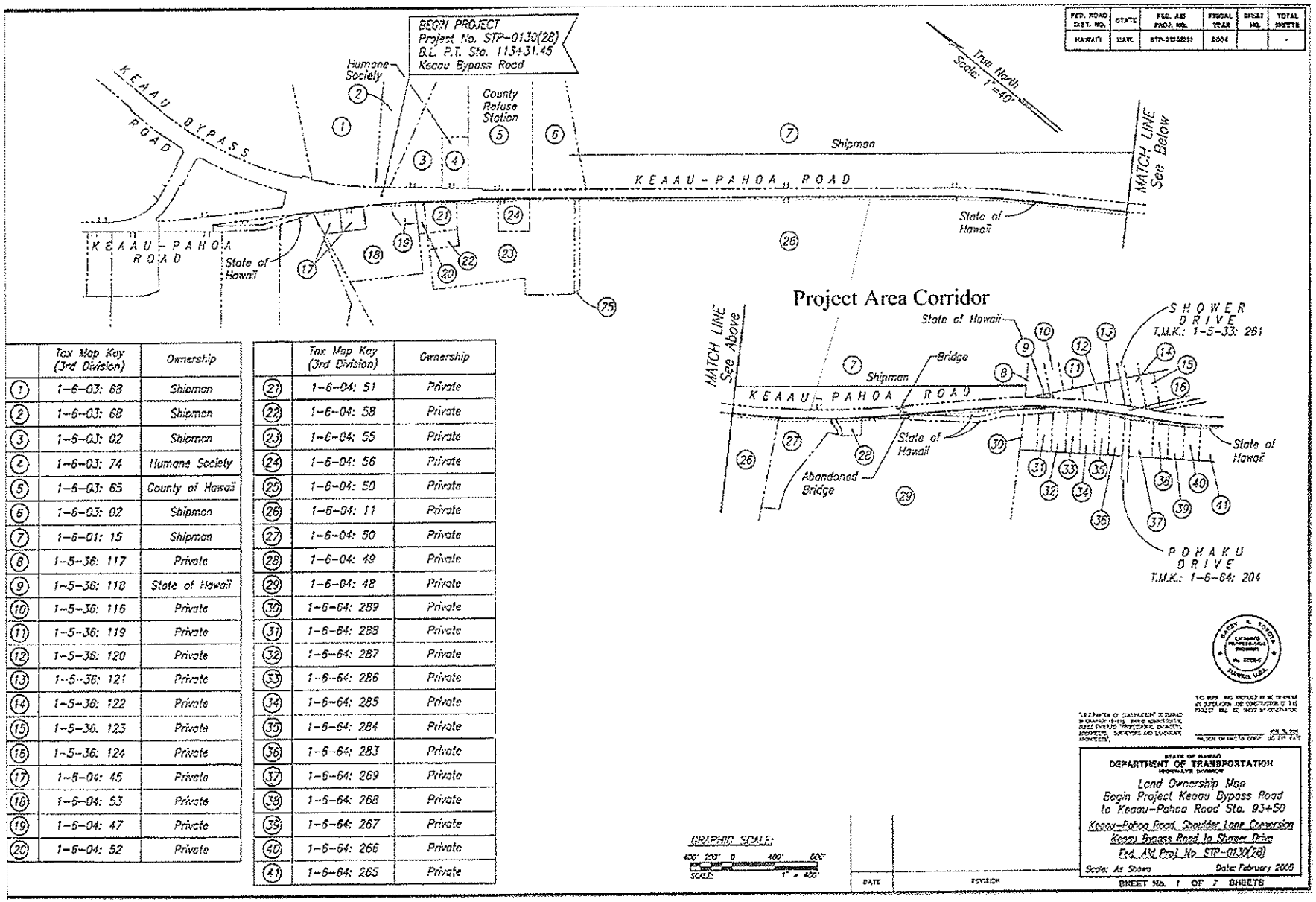


Figure 2. Tax Map Key 1-6 showing Project Area



	Tax Map Key (3rd Division)	Ownership
1	1-6-03: 68	Shipman
2	1-6-03: 68	Shipman
3	1-6-03: 02	Shipman
4	1-6-03: 74	Humane Society
5	1-6-03: 65	County of Hawaii
6	1-6-03: 02	Shipman
7	1-6-01: 15	Shipman
8	1-5-36: 117	Private
9	1-5-36: 118	State of Hawaii
10	1-5-36: 116	Private
11	1-5-36: 119	Private
12	1-5-36: 120	Private
13	1-5-36: 121	Private
14	1-5-36: 122	Private
15	1-5-36: 123	Private
16	1-5-36: 124	Private
17	1-6-04: 45	Private
18	1-6-04: 53	Private
19	1-6-04: 47	Private
20	1-6-04: 52	Private

	Tax Map Key (3rd Division)	Ownership
21	1-6-04: 51	Private
22	1-6-04: 58	Private
23	1-6-04: 55	Private
24	1-6-04: 56	Private
25	1-6-04: 50	Private
26	1-6-04: 11	Private
27	1-6-04: 50	Private
28	1-6-04: 49	Private
29	1-6-04: 48	Private
30	1-6-64: 289	Private
31	1-6-64: 288	Private
32	1-6-64: 287	Private
33	1-6-64: 286	Private
34	1-6-64: 285	Private
35	1-6-64: 284	Private
36	1-6-64: 283	Private
37	1-6-64: 269	Private
38	1-6-64: 268	Private
39	1-6-64: 267	Private
40	1-6-64: 266	Private
41	1-6-64: 265	Private

Figure 3. Land Ownership Map showing Project Area Corridor

Figure 4. Modern Culvert, view to northeast

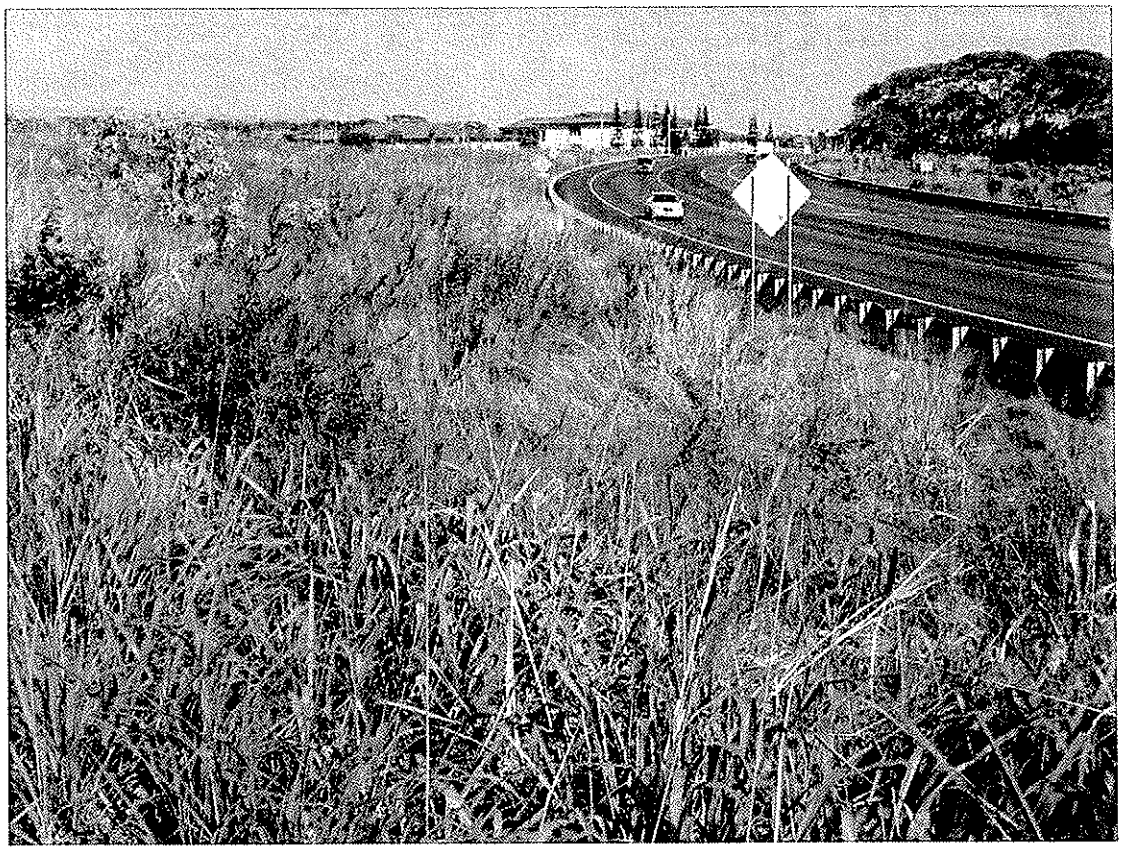


Figure 5. Bulldozed Area at North End of Project Area, view to north

prised of a grass-covered field (*Figure 5*). The remainder of the corridor is densely vegetated with secondary growth species including strawberry guava (*Psidium cattleianum* Sabine), Indian rhododendron (*Melastoma candidum),* ginger (*Zingiberaceae*), trumpet tree (*Cecropia obtusifolia*), and vines and ferns. Examples of this vegetation are depicted in *Figures 6* and *7.*

The soil throughout the majority of the project area is comprised of pahoehoe lava, which is defined by Sato et al. (1973:34) as "a billowy glassy surface that is relatively smooth". In many areas, pahoehoe lava has no soil covering with limited vegetation; however in areas with significant rainfall, like the project area, plant species become established and a humus layer of decaying vegetation can develop. Sato et al. (1973:34) indicates that in high rainfall areas, pahoehoe lava "contributes to the ground water supply".

There is an isolated area of Hilo silty clay loam (0-10% slopes) located in the southeastern portion of the project area corridor, north of the Pohaku Drive-Shower Drive intersection. This soil consists of a surface layer of dark brown silty clay loam (12 inches) over a thick (48 inches) subsoil of silty clays loams of various colors (Sato et al. 1973:17). This soil evidences a rapid permeability, a slow runoff and a slight erosional hazard and is classified as suitable for sugarcane with small areas used for truck crops, orchards and pastures. There are two underlying lava flows in the project area, both deposited from Kilauea volcano (Wolfe and Morris 2001:10). The flow in the northern half of the project area (Unit p4) was deposited from 200 to 750 years ago with the lava substrate in the southern half deposited more recently (Unit p40 – 400 to 750 years ago).

Field Methods

The project area was subjected a 100% surface examination with surveyors spaced at 5 m intervals. The survey transects were oriented in a northeast by southwest direction, parallel to the long axis of the parcel. The structures identified during the present project were subjected to detailed recording including the preparation of scaled plan maps, the completion of standardized site/feature forms, and photographic documentation. No cultural remains were recovered for analysis.

ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Historical Documentary Research

The project area is located within the *ahupua'a* of Kea'au in the Puna District, a district nearly as large as the entire island of Oahu (Juvik and Juvik 1998:22). Puna was once comprised of six chiefdoms created by the son of `Umi-a-Liloa. According to Orr, the district, "lies between Hilo to the north and Ka`u to the south; from Kapoho the most easterly point to the uplands that extend to the great central heights of Mauna Loa to the coastal shores of Kea'au (2004:46).

The Puna District was traditionally referenced as "Puna *paia`ala i ka hala*" or "Puna hedged with fragrant *hala*" (Handy and Handy 1978:200) and was considered an important place for the cultivation of *awa* (1978:192). According to Emerson (1915) as cited in Handy and Handy (1978):

> Manu`u-ke-eu was the name of a mythical *hala* tree that once grew in Puna. The seed was brought from Kahiki by Ka-moho-ali`i when he came to Hawaii with Pele. They ate the blossom with salt and sugar cane, and then Ka-moho-ali`i planted the seed. The tree thereafter was regarded as a *kupua* (nature spirit) (1978:199).

Figure 6. Secondary Growth Vegetation, view to north

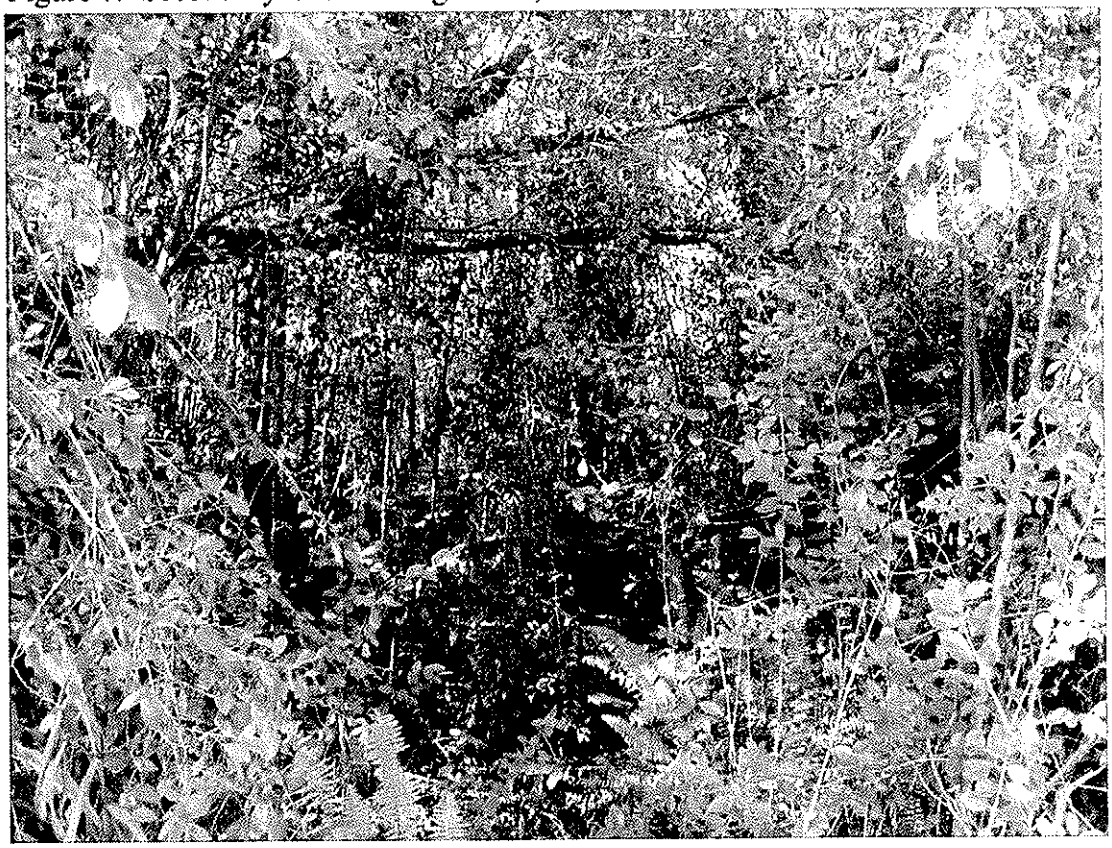


Figure 7. Secondary Growth Vegetation, view to west

A number of traditional sayings or proverbs (***'Ōlelo no'eau***) make specific mentions of Kea'au. These ***'Ōlelo no'eau*** were compiled by Pukui between 1910 and 1960 (Pukui, 1983:vii), and are presented in Orr (2004: 37). A selection of these ***'Ōlelo no'ea*** are presented below.

'Ōlelo no'eau:	*He iki hala au no Kea'au, `a`ohe pohaku `alā e nahā `ai.*
Translation:	I am a small *hala* fruit of Kea'au, but there is no rock hard enough to smash me.
Meaning:	The boast of a Puna man--I am small, perhaps, but mighty (#624, p 71).
'Ōlelo no'eau:	*Ka ua kāhiko hala o Kea'au.*
Translation:	The rain that adorns the pandanus trees of Kea'au.
Meaning:	Refers to the pandanus grove of Kea'au, Puna, Hawaii (#1560, p 168).
'Ōlelo no'eau:	*Mai ke kai kuwā e nū ana i ka ulu hala a Kea'au a ka `āina kā`ili lā o lalo o ka Waikū`auhoe.*
Translation:	From the noisy sea that moans to the *hala* groves of Kea'au, to the land that snatches away the sun, below Waikū`auhoe.
Meaning:	From Puna, Hawai`i, where the sun was said to rise, to Lehua, beyond Waikū`auhoe, where it vanishes out of sight (#2070, p 225).
'Ōlelo no'eau:	*Ka makani hali `ala o Puna.*
Translation:	The fragrance-bearing wind of Puna.
Meaning:	Puna, Hawai`i, was famed for the fragrance of *maile, lehua,* and *hala.* It was said that when the wind blew from the land, fishermen at sea could smell the fragrance of these leaves and flowers (#1458, p 158).
'Ōlelo no'eau:	*Ka ua moaniani lehua o Puna.*
Translation:	The rain that brings the fragrance of the *lehua* of Puna.
Meaning:	Puna is known as the land of fragrance (#1587, p 172).

The missionary, William Ellis (1963) described a visit to the Puna District. He describes Kea'au (or Kaau) as "the last village in the division of Puna. It was extensive and populous, abounding with well cultivated plantations of taro, sweet potatoes, and sugar cane, and probably owes its fertility to a fine, rapid stream, which, descending from the mountains, runs through it into the sea" (1963: 60).

During the Great Mahele, the *ahupua'a* of Kea'au was claimed by Charles Kanaina, on behalf of his son William C. Lunalilo. Lunalilo was also the grand nephew of Kamehameha I and he would eventually become King, though only reigning for one year (Orr 2004:48). This claim was awarded as LCA 8559B and Royal Patent 7223 (*Figure 8).*

A *kuleana* claim was made by Hewahewa for a 13.64-acre parcel in Kea'au (LCA 8081, Royal Patent 4360). The claim indicated that the land was unfenced with no house and coffee was being cultivated within it. (Hurst 1994). This parcel was reported sold to the Roman Catholic Church in 1865 (Masterson and Hammatt 1998). According to Orr (2004: 48), the parcel was situated in the *ili* of Halauloa and was bordered by:

On the west by the konohiki
On the north by Keawemakalio's land
On the east by the konohiki and
By Meaula's land on the south.

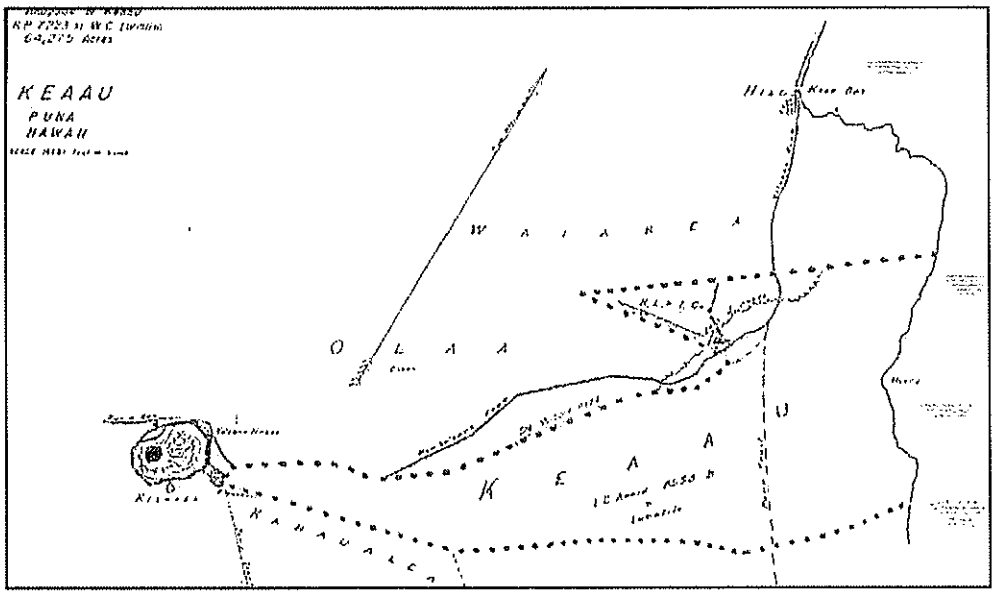


Figure 8. Royal Patent 7223 (Cahill 1996:166)

The first sugar plantation was established in the Hawaiian Islands on Kauai in 1836 (Kent 1983:22, 23, 29). However, sugar cane was cultivated on all the islands at the time of Cooks arrived in 1778. According to Orr (2004:14), the Chinese on Lanai are credited with first producing sugar as early as 1802. The commercial cultivation of sugarcane occurred in 1835 to replace the declining sandalwood industry (Kuykendall and Day 1976:92).

In the 1860's Kea'au Ahupua'a was mortgaged to Honolulu Banker Charles Bishop by the guardians of the Lunalilo estate (Hurst and Schilz 1994). In 1872, more than 60,000 acres of Kea'au were leased for ten years by O.B. Spencer. This lease was subsequently reassigned to Rufus Lyman in 1874. In 1882, the *ahupua'a* of Kea'au was sold by the estate of King Lunalilo to William H. Shipman, J. Eldarts and S. Damon. Two years layer, William Shipman had bought out his partners' and became the sole owner of the Lands of Kea'au. He constructed a house at Haena Beach in 1904 and expanded his family's ranching operations on his newly acquired land (WHSL 2000).

Maly (1999) cites additional changes that occurred in Kea'au in the 1890s:

> By the 1890s, most of the coastal portion of Kea'au had been abandoned. The few remaining native families of coastal Kea'au worked for and moved into housing provided by W.H. Shipman, or moved further inland. In the 1890s, the Government was also opening up large tracts of Homestead lands throughout Puna, which were sold for residential and agricultural use. Because the rich agricultural parcels were generally situated three or more miles inland, above the 400 foot elevation Homestead lands could be better accessed, and their produce better transported by a new and more direct inland route between Puna and Hilo. As a result, the basic alignment of the Kea'au-Pahoa Highway (now Highway 130) was established and construction underway in 1895.Though sugar plantations were established in the Hilo and Kohala Districts by the 1860s, it wasn't until 1899 that a plantation was established in Puna. This consisted of the Puna Sugar Company (*Figure 9* - #50) founded by Benjamin Dillingham, Lorrin Thurston and James Castle (Dorrance 2000:105-107) A year later they founded the Olaa [Kea'au] Sugar Company (#49) on lands owned by the Shipman family .

The following is an excerpt from Sugar Waters by Dorrance (2000:105-107):

The rocky, acidic Puna District south of Hilo had a much smaller number of plantations. In the 1890s the land was peppered with small homesteads, some devoted to coffee growing. After Hawai`i was annexed to the United States [1898], Benjamin Dillingham saw a sugar-growing opportunity in Puna. Along with investors that included Lorrin Thurston and James Castle, he incorporated Olaa Sugar Company to exploit the land. At the time Dillingham was building the Hilo Railroad Company and considered the new plantation a source of revenue for the railroad. By 1905 Olaa Sugar Company had a modern mill, and 7, 676 acres under cultivation serviced by the only gauge plantation railway in Hawai`i. Production increased when Olaa Sugar Company began milling Puna Sugar Company's harvest in and around Kapoho. But Olaa Sugar Company waxed and waned during the first 20 years of its life, paying dividends only twice in all that time. The land was rocky,

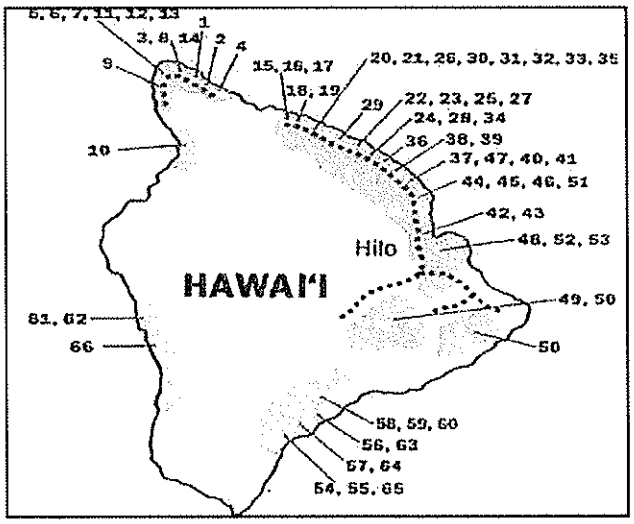


Figure 9. Sugar ventures after 1876: (Dorrance 2000:82)

sticky, acidic, and difficult to clear and cultivate. Not every acre received adequate rainfall, growth was stunted, and irrigation water was lacking. An infestation of leaf hoppers in 1916-1917 ruined 10,000 tons of sugar from the 1918 crop. In later years mechanical harvesting was limited because field equipment rusted and eroded too rapidly under the difficult conditions.

In the 1930s, cultivated acreage stabilized at slightly over 15,000 acres. The fields extended up to 23 miles from the mill. Harvests were delivered via the Glenwood branch of Hawaiian Consolidated Railway, which ran from Olaa toward Kilauea Volcano, and stopped seven miles short of it at the village of Glenwood. Harvests from the Pahoa region were delivered by the Kapoho branch of tracks that extended 17 miles southwest of the mill. Flumes and the plantation's railroad took care of about half of each harvest, while the Hawaiian Consolidated Railway hauled the rest, and also transported product to the Hilo docks.

In 1935 the plantation housed 5,648 workers and dependents in 1,086 company-supplied houses distributed among over 15 camps or villages. In addition, some 230 homesteaders lived and grew cane on family plots. Maximum production of the combined Olaa and Puna/Kapoho enterprises was 52,011 tons of sugar in 1937.

The tsunami of 1946 struck a serious blow when it caused the Hilo railroad to shut down. Then the 1955 volcanic eruption covered thousands of acres in the Kapoho

Division and isolated it. Despite all, the plantation company, renamed Puna Sugar Company in 1960 at the urging of landowner Herbert Shipman (1892-1976), struggled on.

By 1982, the Olaa mill generated over 40 million kilowatt hours of electric power that was sold to Hawai'i Electric Light Company. The end of sugar operations came when its owners, Amfac, Inc. closed the Puna Sugar Company in the same year. But the mill's generating capability was perpetuated and increased. Oil was burned in the furnaces instead of the former mixture of bagasse and oil, and fulfilled a dire need for electrical energy.

Shops in nearby Kea'au (Olaa) served the mill camps and homesteaders who supplied harvests to the Olaa mill. When it shut down in 1982, many small businesses were devastated. Highway 11 leading to Kilauea Volcano bypassed the town and further accentuated the demise of its prosperity.

Beginning in the 1930's and continuing through the 1960's the Hawaiian sugar industry noted a decline in business, due in large part to competing overseas markets (Kent 1983:107-108). More changes were soon to take place on the landscapes of Hawaii. Mechanization associated with the industry occurred between the 1950s to 1970s which resulted in the decline of plantation camp lifestyles (Vorfeld 2002:1 in Orr 2004). Due to increasing unfavorable sugar markets and high costs, by the 1990s the majority of the sugar plantations closed their operations.

Previous Archaeological Research

Limited archaeological research has been conducted within the Land of Kea'au. The earliest work was undertaken in 1906 and 1907 by Stokes (1991) who surveyed and mapped the *heiau* of Hawai'i Island. As indicated in *Figure 10,* he identified nine named and one unnamed *heiau* within the district of Puna, though none were situated within the Land of Kea'au. James (1995) confirmed the absence of *heiau* within Kea'au.

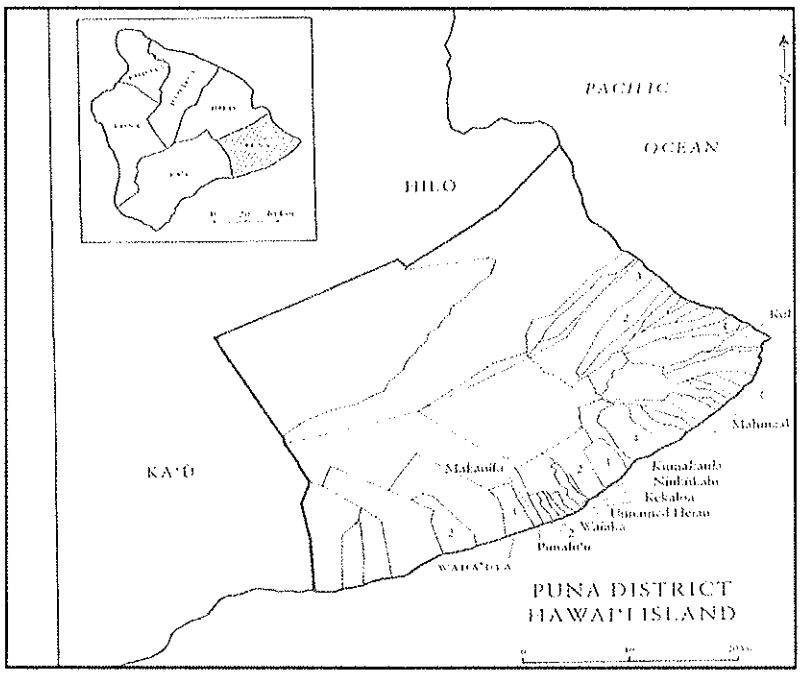


Figure 10. Map of Puna District Heiau (Stokes 1991:137)

In 1945, Emory, along with employees of Herbert Shipman explored a number of lava tubes and *kipuka* located on Shipman lands (Emory 1945). Two of the longest tubes were called Oleole-ana and Keakiu and two special cave areas were designated the Poi Pounder Cave and the Fish Hook Cave (due to the presence of those artifacts within the interiors. The Oleole-ana tube extended all the way to the ocean and had been utilized as a refuge cave. The Keakiu tube contained human remains.

Ewart and Luscomb (1974) undertook a reconnaissance survey of the proposed Kapoho-Keaukaha Highway that extended through a number of ahupua'a from Kea'au to Waiakahiula. A total of 118 sites were identified during this survey though only 30 sites were found in the Kea'au portion. These sites were comprised of coastal habitation complexes, livestock control walls and enclosures and a lava tube that contained human remains.

Hammatt (1978) conducted a reconnaissance survey of the proposed Kings Landings subdivision in Kea'au and Rosendahl (1982) undertook a reconnaissance study of portions of the Shipman Industrial Park. No sites were identified in either of these studies.

Hunt (1993) conducted an archaeological assessment of 600 acres Shipman Lands with Kea'au. This study was conducted by helicopter followed by extensive ground surface reconnaissance. This study identified a total of 50 sites which were interpreted as being associated with sugarcane clearing activity.

Hurst and Schilz (1994) undertook a survey of the Kea'au-Puna Road, Kea'au Town Section, and identified former sugarcane fields and plantation buildings, some of which were still in use. Masterson and Hammatt (1998) conducted an inventory survey of a c. 2.4-acre parcel in Kea'au town adjacent to the police station. No archaeological sites were encountered though a modern camp attributed to Filipino workers was documented.

McGerty and Spear (2000) conducted an archaeological inventory survey of the proposed 300-acre Kamehameha Schools Bishop Estates, East Hawaii Campus, located in inland Kea'au at the c. 600 ft elevation. The parcel had been disturbed by modern sugarcane cultivation and the only archaeological remains identified during the survey consisted of seven stone mounds interpreted as historic clearing piles. In 2004, Haun et al. (2004) conducted an assessment of the Kea'au-Pahoa Road, in conjunction with a shoulder conversion project. No sites were identified during this study.

Haun et al. (2004) conducted an archaeological assessment of a 2.2 mile long corridor on the seaward side of the Keaau-Pahoa road, opposite of the present project area corridor. This survey area originated 120.0 m northwest of the entrance to the Hawaii Island Humane Society facility and extended southeast to where it terminated 26.0 m southeast of the Shower Drive/Pohaku Drive Intersection. No archaeological sites or features were identified.

Haun and Henry (2008) conducted an archaeological inventory survey of a c. 10.6-acre parcel located south of Kea'au road. The survey identified a site comprised of seven historic buildings constructed and utilized by the Puna Sugar Company in the mid-1900's as a as a maintenance facility for the trucks and vehicles associated with the sugar cane industry. The facility was abandoned in 1982 when Puna Sugar Company was closed by its owners, Amfac, Inc.

McEldowney (1979) used site inventory and historic documentary evidence to develop a land use and settlement pattern model for the Hilo area that is applicable to the present project. The model consists of five elevationally-defined zones: Coastal Settlement, Upland Agricultural, Lower Forest, Rainforest, and Sub-Alpine or Montane. The Coastal Settlement Zone extended approximately 0.5 miles inland from the shoreline between sea level and 50 ft elevation. The zone was the most densely populated with both permanent and temporary habitations, high status chiefly residences, and *heiau*. Settlements were concentrated at Hilo Bay and sheltered bays and coves.

The Upland Agricultural Zone was situated between approximately 50 ft and 1,500 ft elevation. Settlement in the zone consisted of scattered residences among economically beneficial trees and agricul-

tural plots of dryland taro and bananas. Lava tubes were utilized for shelter. A pattern of shifting cultivation is believed to have converted the original forest cover to parkland of grass and scattered groves of trees. Wetland cultivation of taro occurred along streams.

The Lower Forest Zone ranged from 1,500 ft to 2,500 ft elevation. Timber and other forest resources such as medicinal plants, *olona*, and birds were gathered from the zone. Site types consisted of temporary habitations, trials, shrines, and minor agricultural features in forest clearings and along streams. Sites in the Rainforest Zone (2,500-5,000 ft elevation) and Subalpine or Montane Zone (5,000-9,000 ft) were limited to trails and associated temporary habitations. These zones were used for intra-island travel and gathering of valued resources including hardwoods, birds, and stone for tool making.

PROJECT EXPECTATIONS

The project area is situated in McEldowney's (1979) Upland Agricultural Zone where expected site types include agricultural plots, trails to the interior, and scattered dwellings. The study area is situated in an area that has been significantly impacted by historic agricultural activity and historic/modern road construction activity. Due to this disturbance, and the inland location of the project area it is unlikely that pre-contact habitation sites would be present. Walls designed to control cattle and trails or roads for horse and wagon traffic may potentially be present. It is possible that the remnants of the commercial sugarcane production infrastructure would be present within the project area.

FINDINGS

The inventory survey identified one site, an historic concrete bridge that spans Waipahoehoe Stream (SIHP 50-10-44-26874). The site is located inland of an existing modern concrete bridge and is situated c. 650 m northwest of the intersection of the Keaau-Pahoa Road and Shower Drive (see *Figure 1*). The bridge is comprised of a rectangular-shaped concrete slab that measures 22.3 m (73.1 ft) m long (northeast by southwest) and 6.7 m (22 ft) wide (*Figures 11* and *12*).

The bridge is supported along the northwest and southeast ends by vertical mortared stone retaining walls that are built into the sides of the Stream (*Figure 13*). These walls range in height from 2.1 (6.9 ft) to 2.2 (7.2 ft) m above the stream bed.

The span of the bridge is supported by a series of five formed concrete piers set into the stream bed. These piers are oriented parallel with the stream bed at a slight angle to the bridge surface (*Figure 14*). The marks from the form boards used to construct both the piers and bridge are also visible in *Figure 14*. The five piers are pointed on the upstream, southwestern side and are squared off on the downstream side, apparently constructed to facilitate water diversion around the piers. The piers are wider at the base that at the top. The northwest and southeastern-most piers are thicker than the central three, measuring 1.95 m (6.4 ft) wide at the base, tapering to 1.29 m (4.25 ft) wide at the top. The three central piers are 0.7 m (1.9 ft) wide at the base, taping to 0.45 m (16.5" thick) wide at the top. These piers average 2.43 m (8 ft) in height from the underside of the bridge to the stream bed.

A metal United States Geodetic Survey (USGS) bench mark is imbedded in the top of the southeastern-most pier on the upstream side of the bridge. The bench mark reads, " 207 feet above sea level" and "87YY". It also has a barely legible date of either 1952 or 1953.

The sides of the bridge surface are bordered by raised concrete curbs that are .3 m (1 ft) wide and 0.25 m (10" in height). Guard rails comprised of a framework of 2 ½" galvanized pipes joined together by threaded fittings are imbedded into the top of the raised curbs (*Figure 15*). An asphalt roadbed extends to the northwest and southeast from the bridge, representing the original Keaau-Pahoa Road.

Site 26874 is interpreted as an historic transportation feature constructed to allow vehicular traffic to pass over the Waipahoehoe Stream drainage. According to the client, the bridge was likely constructed in the 1930s. The bench mark noted on the surface of one of the piers confirms that it was built at least by the early 1950s. Site 26874 is unaltered and in good condition and is assessed as significant for its information content.

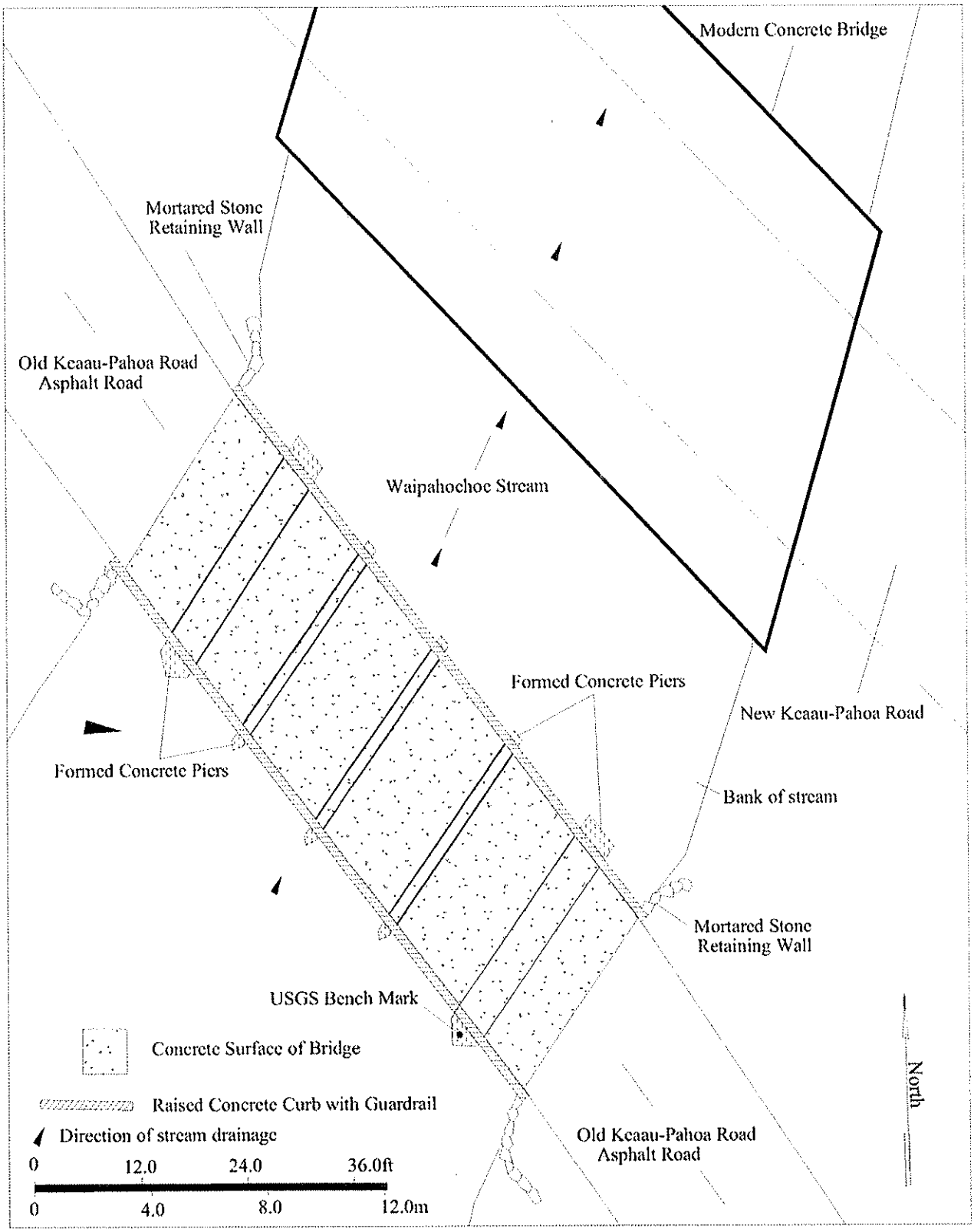


Figure 11. Plan Map of Site 26874

Figure 12. Site 26874 Bridge, view to northeast

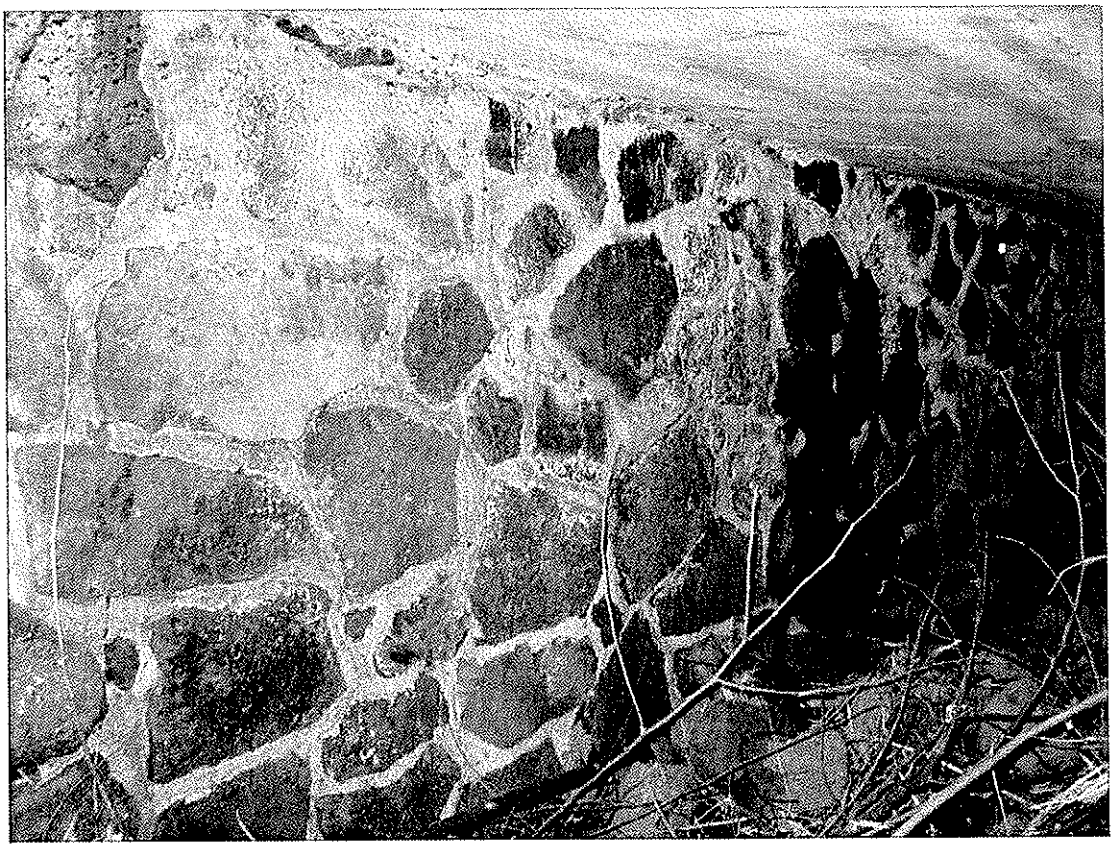


Figure 13. Stone Retaining Wall, view to northwest

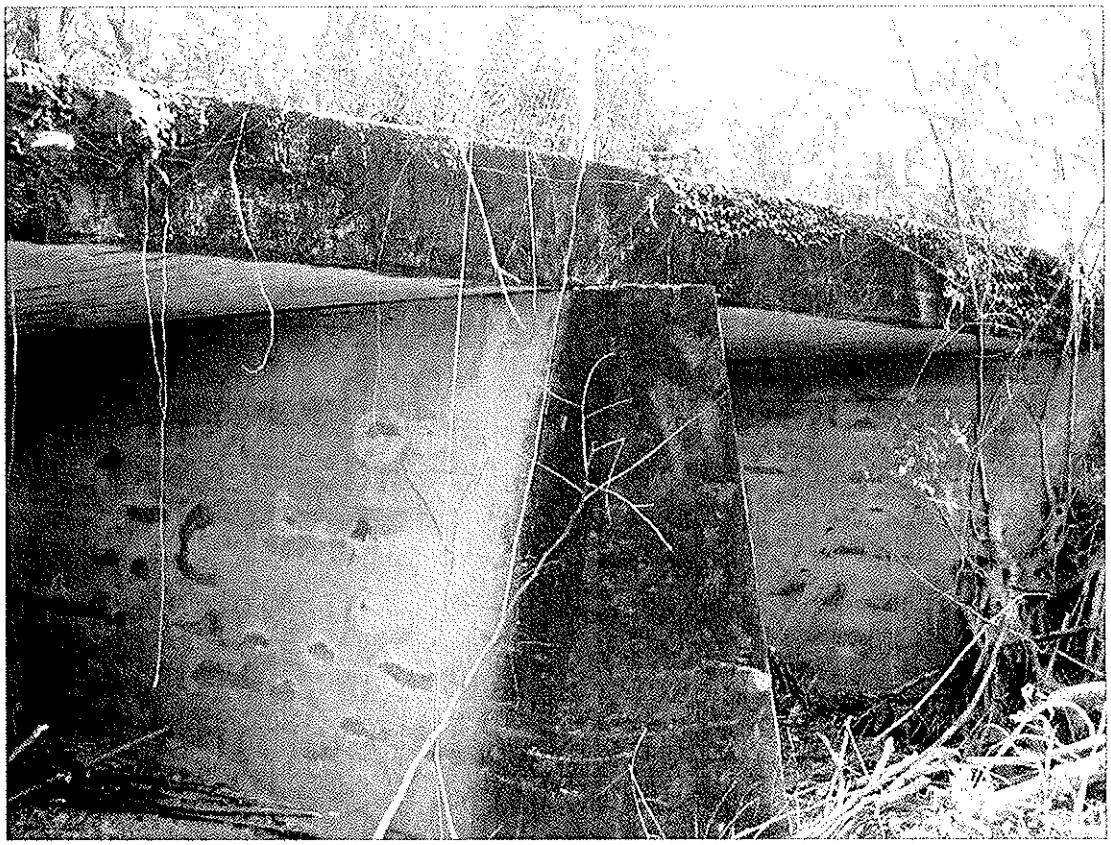


Figure 14. Formed Concrete Piers, view to east

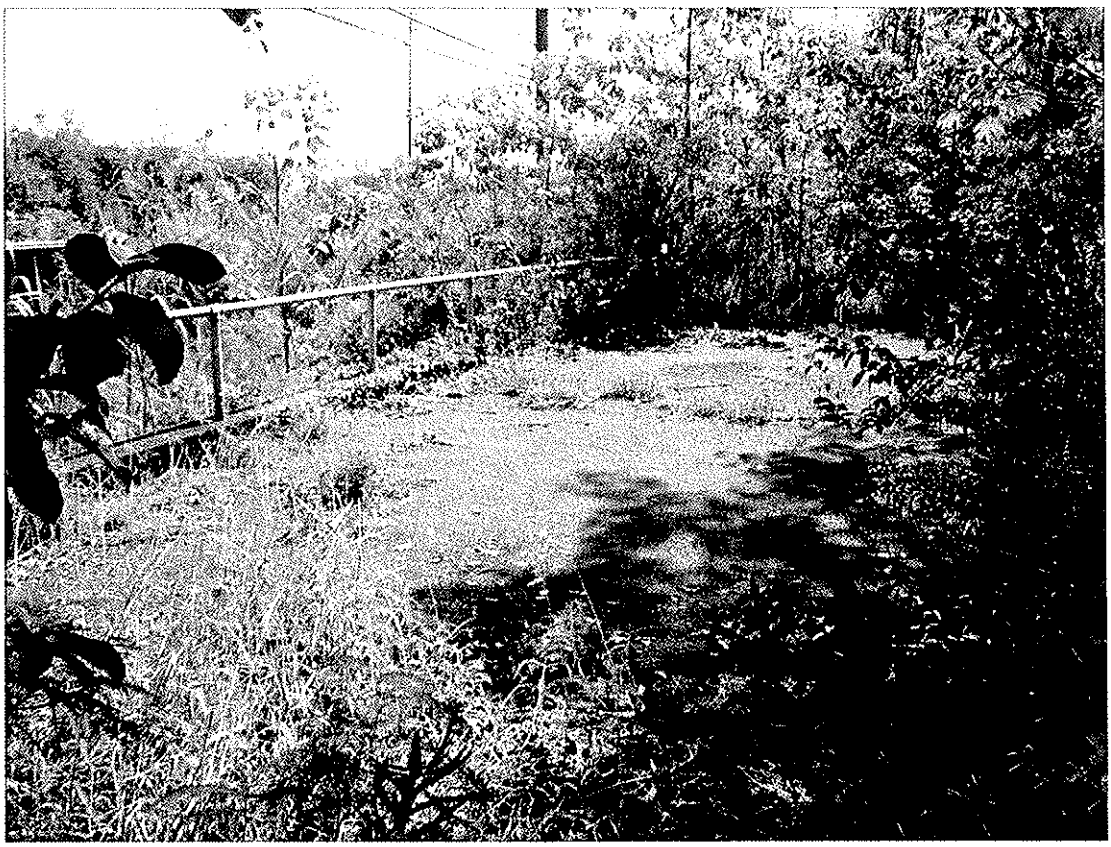


Figure 15. Surface of Bridge showing Guardrails, view to southeast

CONCLUSION

Discussion

As expected, no pre-contact archaeological remains were identified within the project area due to its inland location away from the coastal habitation areas. The absence of sites is also likely due to the extensive ground altering disturbance associated with the cultivation of sugar cane that occurred in the area and road construction activities. The Site 26874 bridge identified in the survey area functioned as a component of the primary transportation route between the towns of Keaau and Pahoa. Information provided by the client suggests that the structure may have been built as early as the 1930s.

Significance Assessments

Pursuant to DLNR (2003) Chapter 275-6 (d), the initial significance assessments provided herein are not final until concurrence from the DLNR has been obtained. Sites identified and relocated during the survey are assessed for significance based on the criteria outlined in the Rules Governing Procedures for Historic Preservation Review (DLNR 1998:Chap. 275). According to these rules, a site must possess integrity of location, design, setting, materials, workmanship, feeling, and association and shall meet one or more of the following criteria:

1. Criterion "a". Be associated with events that have made an important contribution to the broad patterns of our history;

2. Criterion "b". Be associated with the lives of persons important in our past;

3. Criterion "c". Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value;

4. Criterion "d". Have yielded, or is likely to yield, information important for research on prehistory or history; and

5. Criterion "e". Have an important traditional cultural value to the native Hawaiian people or to another ethnic group of the state due to associations with traditional 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.

Based on the above criteria, Site 26874 is assessed as solely significant under Criterion "d". The site has yielded information important for understanding the historic land use in the project area.

Recommended Treatments

The mapping, written descriptions and photography at Site 26874 adequately document it and no further work or preservation is recommended.

REFERENCES

Armstrong, R. (editor)
1983 *Atlas of Hawai'i.* Honolulu: University of Hawai'i Press (2nd Edition).

Cahill, Emmett
1996 *The Shipmans of East Hawai`i.* University of Hawai`i Press, Honolulu.

DLNR (Department of Land and Natural Resources)
2003 Hawai'i Administrative Rules, Title 13. Department of Land and Natural Resources, Subtitle 13, State Historic Preservation Division Rules.

Dorrance, W.
2000 *Sugar Islands: The 165-Year Story of Sugar in Hawai`i* . Mutual Publishing, Honolulu.

Ellis, W.
1963 *Journal of William Ellis: narrative of a tour of Hawaii, or Owhyhee.* Tuttle, Rutland

Emory, K.
1945 "Herbert C. Shipman Cave, Kea'au, Puna, Hawaii." On file in SHPD Library #H-2.

Ewart, N. and Luscomb, M
1974 "Archaeological Reconnaissance of Proposed Kapoho-Keaukaha Highway, District of Puna, Island of Hawaii." On file in SHPD Library H-822.

Hammatt, H.
1978 "Archaeological reconnaissance of proposed Kings Landing subdivision, Kea'au, Puna, island of Hawai`i." No sites found. On file at UHM-Hamilton Library, Hawai`i-Pacific Collections.

Handy, E. S. C., and E. G. Handy
1978 *Native Planters in Old Hawaii: Their Life, Lore, and Environment.* Bernice P. Bishop Museum Bulletin 233, Bishop Museum Press, Honolulu.

Haun, A., D. Henry and M. Orr
2004 Archaeological Assessment, WOA Project 6615-01 Kea'au-Pahoa Road, Shoulder Lane Conversion, Land of Kea'au, Puna District, Island of Hawaii (TMK: 3-1-6-01:15, 21; 1-6-04:26, 49). H&A Report 198-060804 prepared for Wilson Okamoto & Associates, Honolulu Hawaii.

Haun, A., and D. Henry
2008 Archaeological Inventory Survey, TMK: 3-1-6-03:18 and 23, Land of Keaau, Puna District, island of Hawaii. Haun & Associates Report 609 prepared for Mr. Khikwan Sung, Keaau, Hi.

Hunt, T.
1993 "Archaeological Assessment of Shipman Lands in Kea'au, Puna, Island of Hawai`i." On file at SHPD Library #H-1253.

Hurst, G. and A. Schilz
1994 "Archaeological Survey of the Kea'au Pahoa Road, Kea'au Town Section, Project No. 130B-01-92, Puna, Hawai`i (TMK 1-6-03). *Ogden*, Honolulu. For GK & Associates.

James, V.
1995 *Ancient Sites of Hawai`i: Archaeological Places of Interest on the Big Island.* Mutual Publishing, Honolulu.

Juvik, S. and Juvik, J.
1998 *Atlas of Hawaii* (Third Edition). University of Hawai`i Press, Honolulu.

Kent, N.
1983 *Hawaii: Islands Under the Influence.* Monthly Review Press, New York.

Kuykendall, R. and Day, A.
1976 *Hawaii: A History from Polynesian Kingdom to American State.* Prentice-Hall, Englewood.

Maly, K.
1999 "The Historic Puna Trail-Old Government Road (Kea'au Section), Archival-Historical Documentary Research, Oral History and Consultation Study, and Limited Site Preservation Plan: Ahupua`a of Kea'au, Puna District, Island of Hawai`i." (TMK: 1-6-01) [On file at SHPD Library #H-1599]. *Kumu Pono Associates.* For Na Ala Hele Program Manager-Hawai`i Island.

Masterson, I. And H. Hammatt
1998 Archaeological Inventory Survey for the Proposed Kea'au Elderly Housing Project, Kea'au, Puna District, Hawaii Island (TMK: 1-6-143:por. 18 & 39). Cultural Surveys Hawaii report prepared for Hawaii Island Community Development Corporation.

McEldowney, H.
1979 Archaeological and Historical Literature Search and Research Design: Lava Flow Control Study, Hilo, Hawaii. Prepared for the U.S. Army Engineer District, Honolulu. Department of Anthropology. Bishop Museum.

McGerty, L. and R. Spear
2000 An Archaeological Inventory Survey the Proposed K.S.B.E West Hawaii Campus, Kea'au Ahupua'a, Puna District, Island of Hawaii TMK: 1-6-03:por 12. SCS Project 193-2 prepared for PBR Hawaii.

Orr, M.
2004 Cultural Impact Study/Assessment, Kea'au By-Pass Road to Shower Drive Shoulder Land Conversion Project, Kea'au Ahupua'a, District of Puna, Island of Hawaii., Hawaii. Prepared for Haun & Associates, Wilson Okamoto & Associates.

Pukui, M.
1983 *`Ölelo No`eau: Hawaiian Proverbs and Poetical Sayings*
Bernice P. Bishop Museum Special Publication No. 71. Bishop Museum Press, Honolulu.

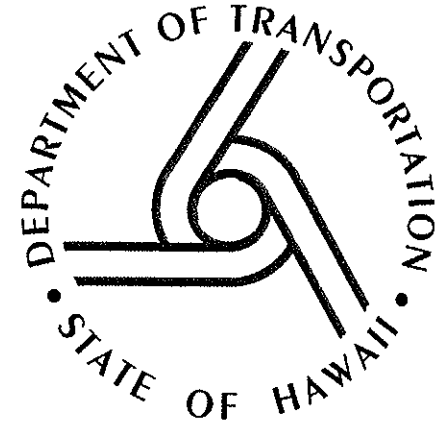
Rosendahl, M.
1982 "Archaeological reconnaissance survey, proposed W.H. Shipman Industrial Park TMK: 3-1-6-03: por 12. No sites found. On file at UHM-Hamilton Library, Hawai`i-Pacific Collections.

Sato, H.H., E.W. Ikeda, R. Paeth, R. Smythe, and M. Takehiro Jr.
1973 *Soil Survey of the Island of Hawaii.* U.S. Dept. of Agriculture, Soil Conservation Service and University of Hawaii Agricultural Experiment Station. Washington D.C. Government Printing Office.

Stokes, J.F. G.
1991 *Heiau of the Island of Hawai`i: A Historic Survey of native Hawaiian Temple Sites.* Bishop Museum Press, Honolulu

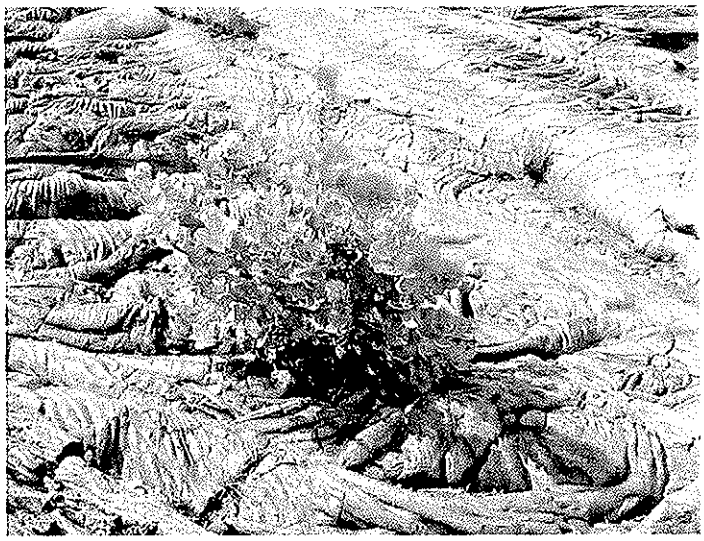
WHSL - W. H. Shipman, Limited
2000 Shipman History. http://www.whshipman.com/history.html

Wolfe, E., and J. Morris
2001 Geological Map of the Island of Hawaii. U.S. Department of the Interior. U.S Geological Survey



APPENDIX E

Cultural Impact Study/Assessment
Keaau By-Pass Road to Shower Drive Shoulder Lane Conversion Project
Kea`au Ahupua`a,
District of Puna, Hawai`i Island, Hawai`i



Prepared for
Haun & Associates
Wilson Okamoto Corp

The complete Cultural Impact Study/Assessment has been filed with the State of Hawaii Department of Land and Natural Resources Historic Preservation Division and the State of Hawaii Office of Environmental Quality Control. A copy is also on file with Department of Transportation Highways Division.

By Maria E. Ka`imipono Orr
July 5, 2004

CULTURAL IMPACT STUDY/ASSESSMENT

This cultural impact study is based on two guiding documents, Act 50 and OEQC Guidelines [see Appendices A & C], as well as the *Criteria for Historic Preservation* cited below.

Act 50 [State of Hawai`i 2000]. H.B. NO. 2895 H.D.1 was passed by the 20th Legislature and approved by the Governor on April 26, 2000 as *Act 50*. The following excerpts illustrate the intent and mandates of this Act:

> The legislature also finds that native Hawaiian culture plays a vital role in preserving and advancing the unique quality of life and the "aloha spirit' in Hawai`i. Articles IX and XII of the state constitution, other state laws, and the courts of the State impose on government agencies a duty to promote and protect cultural beliefs, practices, and resources of native Hawaiians as well as other ethnic groups.
>
> Moreover, the past failure to require native Hawaiian cultural impact assessments has resulted in the loss and destruction of many important cultural resources and has interfered with the exercise of native Hawaiian culture. The legislature further finds that due consideration of the effects of human activities on native Hawaiian culture and the exercise thereof is necessary to ensure the continued existence, development, and exercise of native Hawaiian culture.
>
> The purpose of this Act is to: (1) Require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and (2) Amend the definition of "significant effect" to include adverse effects on cultural practices.
>
> SECTION 2. Section 343-2, Hawai`i Revised Statutes, is amended by amending the definitions of "environmental impact statement' or "statement" and "significant effect", to read as follows:
>
> > "'Environmental impact statement" or "statement" means an informational document prepared in compliance with the rules adopted under section 343-6 and which discloses the environmental effects of a proposed action, effects of a proposed action on the economic [and] welfare, social welfare, and cultural practices of the community and State, effects of the economic activities arising out of the proposed action, measures proposed to minimize adverse effects, and alternatives to the action and their environmental effects....

State Historic Preservation Division Draft Rules (1989)
Criteria for Historic Preservation. The "significance" of a site is determined by a set of criteria. The following is the State of Hawai`i criteria for historic preservation:

Criterion A:	Be associated with events that have made an important contribution to the broad patterns of our history.
Criterion B:	Be associated with the lives of persons important in our past.
Criterion C:	Embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic value.
Criterion D:	Have yielded, or be likely to yield, information important for research on prehistory or history.
Criterion E:	Have an important historical cultural value to an ethnic group of the state.

SUMMARY OF FINDINGS.

The following summaries are based on the information presented in the previous sections: the traditional and historical literature review in Part III and the ethnographic data and analyses in Part IV. References are not cited here unless it is new information and not already cited in the text above. These summaries condense the information above, but also serve to focus on a few significant individuals and events in Puna history in relation to the *ahupua`a* of Kea`au (and indirectly, the project area), as well as give a broad overview of land, water and marine resources and uses in the general area, as they reflect cultural properties and practices and access to them.

William H. Shipman (known to everyone as Willie) purchased the *ahupua`a* of Kea`au at a public auction in 1882. A village area just *mauka* of the coast was called Kea`au. The uplands, according to Mary Shipman and other Hawaiians familiar with Kea`au Ahupua`a, used to be generally referred to as `Ōla`a, the forests where bird feathers were collected for the *ali`inui* and more importantly a sacred place and domain of the *kahuna*. When the lands in the vicinity of Kea`au Town were leased to Olaa and Puna Sugar Companies in the 1890s, they were given permission to clear the forests, but leave any breadfruit, coconut, or mango trees. Mary Shipman, matriarch of the W.H. Shipman company had expressed that nothing commercial should be called `Ōla`a as it was very sacred. But it wasn't until the 1950s that her youngest son Herbert Shipman had the name of `Ōla`a township, post office, etc. officially changed to Kea`au (Town, Post Office, etc.).

Summary of Significant People and Events.

According to traditional and historical archival material, the Puna District, and specifically the lands of Kea`au Ahupua`a have gone through a number of significant changes over time and witnessed the comings and goings of many significant people and events. Some of these people contributed substantially not only to the history of Puna, but of Hawai`i Island and the rest of the Hawaiian Islands as well. There were several people and events noted in the oral histories and later recorded by explorers, missionaries, native Hawaiian scholars and ethno-historians, from the time of Pele to Pa`ao to Kamehameha I who waged war and conquered the various district chiefs and island kingdoms and brought them under one realm, with the exception of Kaua`i. Some of these significant people lived in the Puna and/or neighboring districts, were responsible for land modifications, shifts in polity and commerce, and the gene pool of Hawai`i's *ali`i*, monarchs and people. Some of these people and events are noted below.

Mythical Entities.

The most significant mythical entity to impact the Puna District, the lands of Kea`au, as well as greater Hawai`i Island, was the volcano or fire goddess Pele, who left evidence of her visits in the form of *pu`u* which dot the landscape, but especially the residuals of her monumental lava flows. In her wake she annihilated villages, shelters, trails, temples, shrines, water sources, fishponds, pools, holua slides, and countless other structures and features, forever changing the lives of those affected by the destruction. Even those outside of the direct flows of lava were affected as resources on the land and in the marine environment were forever obliterated. Through time here in the Puna lands, the people have had to alter their lifestyle, look for other resources and start all over again due to lava flows. Often, though time has passed, archaeologists with the help of oral histories are able to reconstruct the life of the ancient ones through the clues left by their abandoned shelters, house sites, sacred places and remains of the food they ate. This however, cannot be done in the places visited by Pele; the few stories left will have to suffice. However, the flows of Pele created more land mass, and more possible lava tube shelters should they be needed again someday.

Two other legendary entities in the Puna lands and specifically Kea`au, were Hōpoe and Hi`iaka. Hi`iaka was the younger sister of Pele, and Hōpoe was a special friend of Hi`iaka who taught Hi`iaka the ancient dances and how to make *lei*. Pele and her family resided in Puna (her latest home is Kīlauea, Puna). During one period Pele went to sleep and asked her sister Hi`iaka to watch over her and wake her at a pre-set time. During her long sleep, Pele's dream body found Lohi`au and fell in love with him. When she woke, Pele sent Hi`iaka to Kauai to fetch Lohi`au for her. As she left, Hi`iaka asked Pele to take particular care of her friend Hōpoe from Kea`au. But when Hi`iaka failed to return in a timely manner, Pele sent her destructive forces to Kea`au. Hi`iaka sensed the tragedy and said (Westervelt 1916):

> Puna is shaking in the wind,
> Shaking is the hala grove of Keaau,
> Tumbling are Haena and Hopoe,
> Moving is the land--moving is the sea.

Hōpoe and Hi`iaka's beloved *`ohia* and *hala* forests of Kea`au were destroyed by Pele and Hōpoe was turned into a "dancing rock" at Hā`ena, Kea`au. According to residents of Kea`au the top of the dancing rock was knocked away by the 1946 tidal wave, however, Westervelt's (1916) story of Hōpoe said it was destroyed by an earthquake.

Ali`i nui.

One of the first legendary people or families who impacted the history of Hawai`i was the Nanaula family who came from the southern islands around the 6th century along with other families from Tahiti or Samoa and brought their Polynesian traditions. They peopled all the islands for thirteen or fourteen generations. During the 10th century the Paumakua family arrived from Tahiti. They too are the ancestors of many of the families of the islands. During the 11th century the Nanamaoa family from the Society Islands established families on the islands of Hawai`i, Maui and O`ahu. During this period the descendants of Paumakua: Haho (who started the *Aha-ali`i*), Palena, Hua, Hanala`anui, Hanala`aiki (twins and progenitors of Maui and Hawai`i Island *ali`i nui*), and Mauiloa, were well established on Maui and Hawai`i Island. The Nanamaoa families were shortly followed by Pa`ao and Pili who came (some say Society Islands, other say Samoa) during the reign of La`au-ali`i and Kapawa, grandson of Nanamaoa, and changed the religious and social structures of the island chiefdoms, bringing with them the Kū cult and the concept of human sacrifice and supplanting the Kāne and `I`o belief systems. Around the beginning of the 12th century great voyages took place to and from the southern islands, but stopped abruptly around the end of that century, during the time of Wakalana around AD 1175, right after the arrival of white foreigners, possibly from Japan.

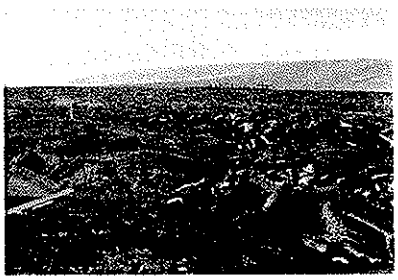


Photo 9. Waha`ula (Glidden 1997)

Most of the islands were ruled by the southern families with the exception of Molokai (Kamauaua family) and parts of O`ahu (Maweke family) who were descendants of the ancient Nanaula line. One of the first legendary *ali`i nui* was the priest Pa`ao who is said to have arrived on Hawai`i Island between AD 1100-1200. Pa`ao built the *heiau* of `Aha`ula (Waha`ula) when he landed to honor his gods. In the oral histories, he is credited with constructing at least three *heiau*, specially *luakini* or temples of human sacrifice, thereby radically changing the religious system and political structure of the people of Hawai`i. Pa`ao not only brought about a significant change in religious practices (i.e., the Ku cult, human sacrifices), he brought high chief Pili to rule in place of chief's he believed had lost their *mana* or power due to too many intermarriages with commoners and/or ineffective rule. His new system introduced the concept of hierarchical or *ali`i* rule to the islands and a new order of *kahuna* or priests. Waha`ula was said to have been reconstructed (ca. 1500

AD) by *ali`inui* `Imaikalani of Ka`ū; and again by Kalani`opu`u (ca. 1770 AD) and Kamehameha I (ca. early 1800s) (James 1995:71-71). Waha`ula was permanently destroyed by lava flows on August 12, 1997 (VW 2004).

Cape Kumakahi (past Pāhoa and Kapoho) was named after a "migratory hero" Kumakahi, who is said to have incurred the wrath of Pele; she sent a lava flow that created the cape. It is considered the most eastern point of Hawai`i (James 1995:64-65). There are countless places in Puna that were connected with past *ali`inui* and ancient villages that are now destroyed by lava flows (Kalapana/Kaimū, Kamoamoa, Lae`apuki, Pu`uloa, Queen's Bath, Ka`ili`ili, Poupou and Kauka) (James 1995:66-73).

The area between Kumukahi and Pāpa`i is an old volcanic mound where Kūkui Heiau was constructed, measuring more than thirty by fifty feet. It was traditionally connected to astronomical observations and said to have been built by `Umi-a-Liloa in the sixteenth century or a generation later by Paka`a (James 1995:65), an advisor (steward) of Keawe-nui-a-Umi. Later, Kalākaua felt the *heiau* significant and brought some of the stones from it for the foundation of `Iolani Palace (James 1995:65).

Many battles took place across this landscape as relative fought relative for supreme rule. A couple relatively recent names that stand out are Kalani`opu`u and his nephew Kamehameha I who not only successfully conquered the local island polities, he went on to conquer those on the neighbor islands as well, situating himself in a position that only Kuali`i was said to have done, to have all the island polities under one rule. Kamehameha's advantage was foreign weapons and foreign advisors who knew how to use the weapons skillfully and strategically, as well as powerful *kahuna* or priests who were also knowledgeable in their own right. Although the common translation for "kahuna" is priest, they are actually masters who studied all their lives in their particular craft and arts. Some were astronomers, others water managers, and some were architects in the building of temples or fishponds. . Two of these *kahuna nui* were Pu`ou and his son Hewahewa. Pu`ou and Hewahewa were masters of many arts, and were considered *kahuna nui*, the highest rank of a *kahuna.* In 1848 the *ili* lands Halauloa, Kea`au were awarded to Hewahewa who later deeded it to Catholic Bishop Maigret.

After Kamehameha died in 1819, his son Liholiho, chose to capitulate to his mother, Queen Ke`ōpūolani and his *Kuhina Nui* (co-ruler in this case) Queen Ka`ahumanu, and break the *`ai kapu.* This signaled the end of the old way, the religion of Pa`ao. Hewahewa, who had been given the role of guardian and priest for Liholiho, resigned his position and helped the missionaries. He eventually left Hawai`i Island and moved to Waimea, Oahu where he was buried.

The entire *ahupua`a* of Kea`au was awarded to William Charles Lunalilo, son of Charles Kanaina and Kekauluohi (who was the daughter of Hoapili & Kalakua; widow of Liholiho-Kamehameha II; sister of Queen Kamamalu and Kinau; granddaughter of Ke`eaumoku & Namahana; and niece of Ka`ahumanu). His will dictated that the proceeds of his lands were to go into constructing and maintaining a home for elderly Hawaiians, today known as Lunalilo Home in Hawaii Kai, O`ahu.

Historic People

During the Mahele period (ca. AD 1846-1856) lesser chiefs and *konohiki* were claiming or being assigned lands. As stated above the *ahupua`a* of Kea`au was awarded to William Charles Lunalilo when he was only fifteen; his father Charles Kanaina became his *konohiki* or land guardian. Lunalilo was elected king of the Hawaiian Kingdom in 1873, however his reign only lasted a year. He was plagued by poor health and died of tuberculosis on February 3, 1874 on O`ahu. As per the instruction of his will, Kea`au was sold at a public auction in 1882 and bought by partners William H. Shipman (Willie--son of missionaries Rev William Cornelius Shipman and Jane Stobie Shipman), retired German sea captain Johannes Emil Elderts, and another son of missionaries, Samuel Damon. The following year Willie bought out his two

partners and Kea`au became the property of Willie and Mary Shipman. Willie stuck with ranching with which he was most familiar, and the family built their homes near the coastal part of Kea`au.

Significant Events.

The most significant ancient events in Kea`au and Puna would have been the construction of *heiau* and villages in ancient times; to lava flows both ancient and historic which destroyed many cultural sites and villages; to scenes of battles, also both ancient and early historic. The construction of the Volcano Road/Highway was significant in the it not only went right through Kea`au, but it connected Hilo to the high uplands of Puna--Kīlauea Volcano on the flanks of Mauna Loa. It also allowed for other communities to be established along the way. The place called Pāpa`ì (crab) is the old Hawaiian name for King's Landing the place where Kamehameha I was hit on the head with a paddle by a Hawaiian fisherman (James 1995:65). It was from this experience that Kamehameha came up with what is today called the *Splintered Paddle* law.

Summary of Land, Water and Marine Resources and Use

Various land use patterns are physically evident as well as recounted in the literature, legends, maps and legal documents, but are not always physically evident on the landscape. The physical evidence is usually in the form of stone ruins that are fortunate to have been preserved relatively intact. Clues regarding function and use can sometimes be extrapolated from the stories, songs, chants and ethno-historical observations that were also fortunately recorded, as well as from the cultural remains identified during surface and sub-surface studies (artifacts, midden, charcoal for dating). Several of these stone cultural remains were recorded during studies of Kea`au coastal lands and also mentioned by a couple of Maly's consultants (i.e., *heiau*, caves, platforms, mounds, walls, enclosures, and burials). These are all evidence of both permanent and/or temporary use of the land and it's diverse natural resources.

Ancient Land, Water and Marine Resources and Use

While the traditional literature is somewhat silent of the subject of Kea`au and vicinity, the cultural resources found on the landscape speak volumes. The permanent and temporary shelters, the midden clues at those sites, and in the caves, the extended use of the lava tube systems, the habitation and agricultural complexes, and especially the burials and the heiau tell a story of ancient use of the land. People lived and died here. People worked and worshipped here. People cultivated the diverse natural resources (endemic/indigenous plants; bountiful marine resources; bountiful aquaculture), as well as cultivated their own Polynesian-introduced cultigens; their staples and their medicine and ritual plants.

The traditional literature has a sparse amount of information about Kea`au; the goings and comings of various *ali`i nui*, their families and their adventures and the *maka`āinana*, the people who cared for the land. Archaeological studies have revealed that fishing villages or settlements were along the coastal lands of the Puna District. In the early 1800s several ancient villages and cultural sites were noted by the first missionaries in that district and later surveyors. Some of the earliest records noted that taro, sweet potato, and sugar cane were grown in large scale "plantations" in these villages. It was estimated that several thousand people once lived in this district. Kea`au also had an inland ancient village as well as coastal. There were at least a couple of *heiau* (structure of worship), alluding to organized and complex social and religious systems, above the ordinary scope of the personal and occupational *ko`a* (shrines) and shrines associated with Kea`au, as well as legendary people noted above. According to the *mo`ōlelo* the coastal area was especially known for its fragrant *hala* groves and its upland forests of *`ohia* and ferns. However many of these ancient villages and sites were destroyed by various lava flows, earthquakes, and tidal waves; or extensively modified by ranching, sugar, coffee, and other industry activities.

There was only one recorded fishponds in the Kea`au, along with a few other smaller ponds. The fishpond had mullet, *moi*, *`o`opu* and *`opae*. The fishpond was fed partly by underground springs. The only flowing stream in the Puna district went through Kea`au and was noted by missionary Ellis in 1823. However, by the time the Shipmans acquired the property in 1882 the stream was not noted as flowing. It may have been an intermittent stream or the source of the stream may have been altered by lava flows or earthquakes. Fishing off the coastal lands of Kea`au was very good according to people who grew up in the area.

Historic Land, Water & Marine Resources and Use (Post 1823).

In the late 1890s Willie Shipman leased large tracts of the Kea`au uplands to the Olaa Sugar Company and the Puna Sugar Company. The project area went from upland forests to partly sugar cane fields and partly ranching grazing lands.

Drinking water in coastal Kea`au came from a couple of springs and wells however the stream was no longer flowing. Brackish water filled the fishpond that Shipman gave the local people permission to fish in, in exchange for them constructing a stone wall around the fishpond. Coastal Kea`au has a long history of prolific marine resources (fish, turtles, crabs, *`opihi* and seaweed). The area has been protected by it's purposeful isolation by generations of the Shipman family and employees.

There are a couple of streams that flow under the Keaau By-Pass Road, closer to the Shower Drive end of the project area. According to one of the landowners and a couple of Maly's consultants, nearby Waipāhoehoe is "land of flood waters."

Summary of Survey Findings (Cultural Sites & Practices)

It is evident that at one time the lands of Kea`au, were part of an ancient Hawaiian life system. However, whatever was once on the landscape between Keau By-Pass Road and Shower are no longer evident, as this area was heavily modified during the sugar plantation era of the late 1800s/early 1900s, as well as during the construction of the current road.

Summary of Consultants Concerns

While it hasn't been made clear to the landowners as to the extent of construction activity for the proposed Keaau By-Pass to Shower Drive Shoulder Lane Conversion, several landowners are concerned that the front portions of their property may be affected by the proposed activity. One landowner, `Aha Pūnana Leo is a traditional cultural immersion school where cultural practices are taught on that property every day.

Cultural Resources. This category entails sites or places associated with significant events and/or people important to the native Hawaiian patterns of prehistory; embody distinctive characteristics; or are likely to yield information important for research on the prehistory of Hawai`i. It also includes sites that yield resources important for native Hawaiian Cultural Practices, past and present; and items that are part of a cultural context. *Wahi Pana* or sacred places are important cultural resources to native Hawaiians regardless that the original sites that may have been there no longer exist. Often it is not the lack of interest but the lack of knowledge of whereabouts or more likely, lack of access that prevent native Hawaiians from visiting these sites. Other than the *`ohia* trees along the highway adjacent to the project area, there are no cultural resources located on project lands.

Cultural Practices. This category includes items that are essential to the gathering practices that have cultural value to either native Hawaiians or other ethnic groups. This category also includes the teaching of cultural practices (*halau -- hula* schools, places where traditional crafts are taught, and conceivably where the Hawaiian language is taught.)

Historic Resources. This category entails sites associated with significant events and/or people important to the broad patterns of history [post Western contact], which includes other ethnic groups; embodies distinctive characteristics of an historic era or master; or are likely to yield information important for research on the history of Hawai`i. There are no structural remains of the historic sugar, coffee or ranching industries in the project area. However, people who worked in former camps located in the vicinity now live in homes located along portions of the proposed project area.

CULTURAL IMPACT ASSESSMENT

- **Cultural Resources (Land) Impact.** The lands within the project area were heavily impacted by the historic activities of the 19th and 20th centuries. Any cultural sites and/or resources would have been destroyed or buried by ranching, sugar and coffee plantation activities; therefore there will be no adverse impact to any cultural resources on Keaau By-Pass to Shower Drive lands.

- **Cultural Practices/Access (Land) Impact.** Since there are no resources on Keaau By-Pass to Shower Drive lands, there will be no adverse effects to cultural practices on Pulelehua lands.

- **Cultural Practices: Indirect Adverse Impact.** There is one condition that has the potential to create an adverse effect or impact on cultural practices in the project area. There are cultural practices being taught at `Aha Pūnana Leo, one of the affected landowners, and they are concerned that their property may be adversely impacted by the Keaau By-Pass to Shower Drive Shoulder Lane Conversion project.

- **General Concerns**. While many of the concerns of the consultants do not involve traditional cultural resources or practices, they are never-the-less concerned that their properties may be adversely affected by the proposed project warrant some consideration. They all should be notified as soon as possible and given an explanation of the project and the extent that it may or may not affect their properties.

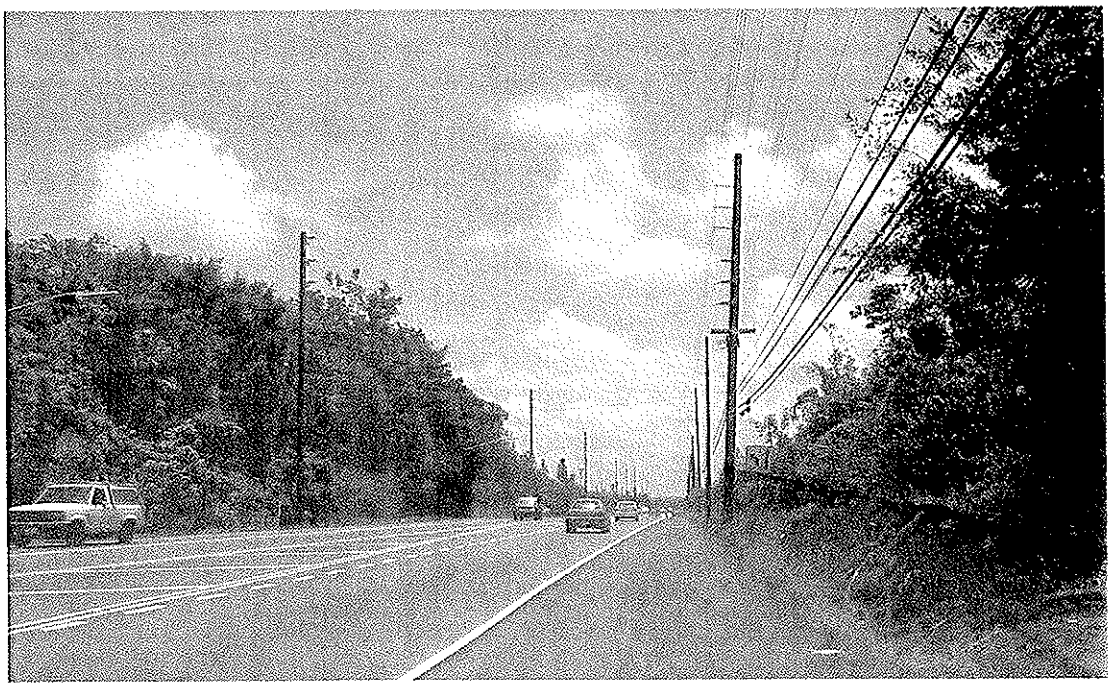


Photo 10. View of Keaau By-Pass Road

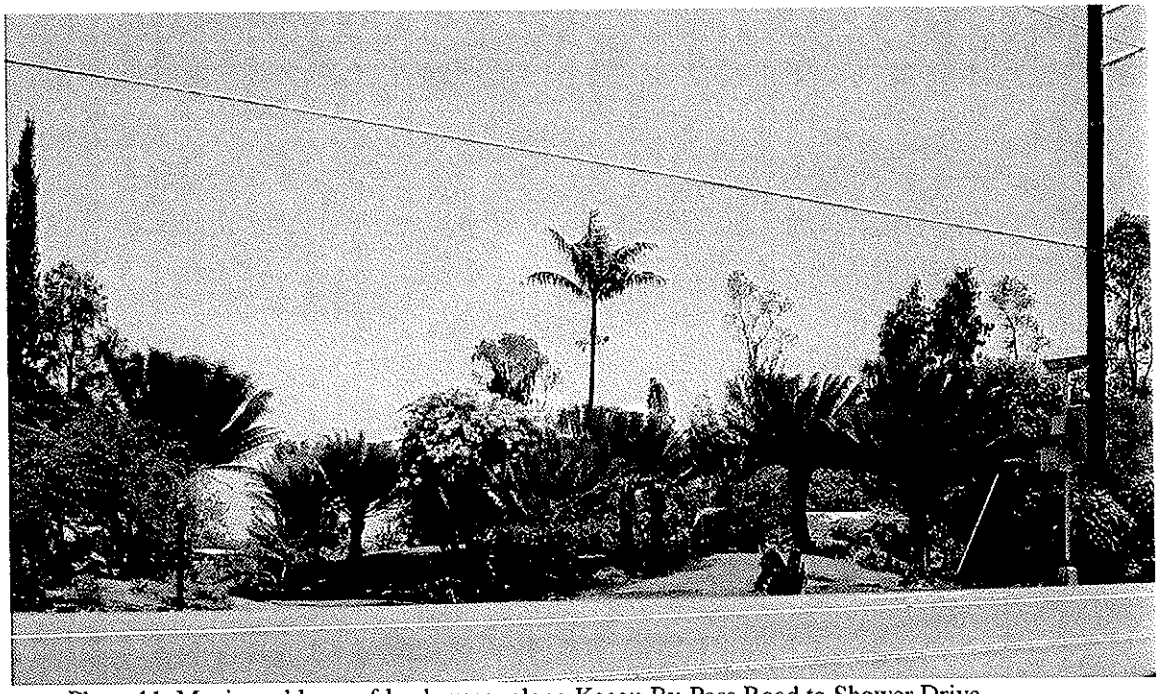


Photo 11 Manicured lawn of land owner along Keaau By-Pass Road to Shower Drive.

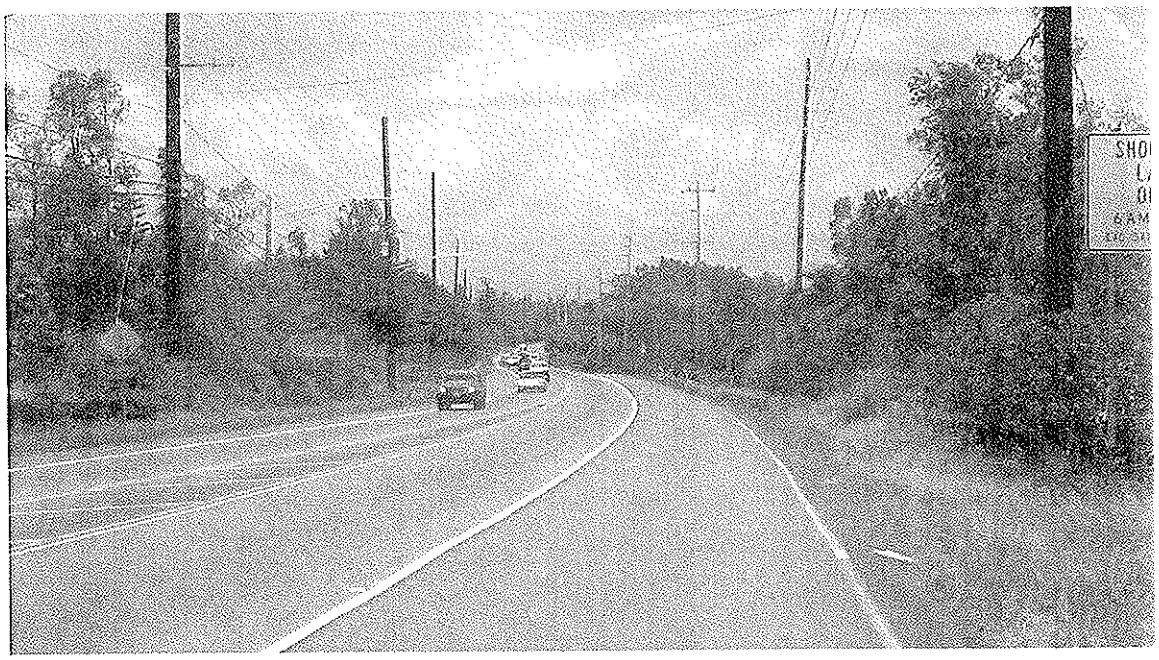


Photo 12. Another View of Keaau By-Pass Road to Shower Drive.