Appendix J: Archaeological Inventory Survey

Appendix J-1: Addendum to Draft EA Archaeological Inventory Survey

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Draft
Addendum Archaeological Inventory Survey Report for the Kea‘au-Pāhoa Road Widening Project Kea‘au Ahupua‘a to Waiakahiula Ahupua‘a, Puna District, Hawai‘i Island TMK: [3] 1-5 (various plats and parcels); 1-6 (various plats and parcels)

Prepared for

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(Job Code: KEAAU 2)

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Management Summary

Reference	Draft Addendum Archaeological Inventory Survey Report for the Kea‘au-Pāhoa Road Widening Project; Kea‘au Ahupua‘a to Waiakahiula Ahupua‘a, Puna District, Hawai‘i Island TMK: [3] 1-5 (various plats and parcels); 1-6 (various plats and parcels) (Wilkinson et al. 2011)
Date	March 2011
Project Number (s)	Hawaii State Department of Transportation (HDOT) Project No. STP-0130(27). Cultural Surveys Hawai‘i Inc. (CSH) Project Number: KEAAU 2
Investigation Permit Number	The fieldwork component of the addendum Archaeological Inventory Survey (AIS) was carried out under archaeological permit # 11-17 issued by the Hawai‘i State Preservation Division/Department of Land and Natural Resources (SHPD/DLNR), per Hawai‘i Administrative Rules (HAR) Chapter 13-282
Project Location	The overall project corridor is located along approximately 9.5 miles (15.29 km.) of Kea‘au-Pāhoa Road (State Route 130), from the terminus of the existing 4-lane Kea‘au Bypass to its intersection with Pāhoa-Kapoho Road, Kea‘au Ahupua‘a to Waiakahiula Ahupua‘a, Puna District, Island of Hawai‘i TMK [3] 1-5 (various plats and parcels); 1-6 (various plats and parcels). The current addendum survey consists of several proposed Access Management Roadways areas, which are located just outside of the previously-surveyed corridor between Pohaku Place and Ilima Street (see Figure 1).
Land Jurisdiction	State Department of Transportation and private
Agencies	Federal: Federal Highway Administration (FHWA) State: Hawai‘i Department of Transportation (HDOT) Hawai‘i Department of Land and Natural Resources/State Historic Preservation Division (DLNR/SHPD)

Project Description	The State of Hawai‘i, Department of Transportation (HDOT) is proposing the Kea‘au-Pāhoa Road Improvements Project, Project No. STP-0130(27) and has initiated an Environmental Assessment (EA). The project proposes to implement various improvements along a portion of Kea‘au-Pāhoa Road (State Route 130), from the terminus of the existing 4-lane Kea‘au Bypass to its intersection with Pāhoa-Kapoho Road. State Route 130 is the only roadway that connects lower Puna with the Hilo area and is the primary conduit for emergency services to access local properties. The project purpose is to improve road safety, increase roadway capacity, and modernize State Route 130 between Kea‘au and Pāhoa. The findings of the initial archaeological survey of the project corridor were presented in the *Archaeological Inventory Survey Report for the Kea‘au-Pāhoa Road Widening Project Kea‘au Ahupua‘a to Waiakahiula Ahupua‘a, Puna District, Hawai‘i Island TMK: [3] 1-5 (various plats and parcels); 1-6 (various plats and parcels)* (Wilkinson et al. 2010), which was included in the project’s Draft Environmental Assessment (EA). One of the improvement alternatives presented in the Draft EA was the Transportation Systems Management (TSM) alternative, which was designed to consider low-cost and low-impact improvements that could be implemented easily with minimal levels of construction. This alternative included proposed Access Management Roadways, some of which lie outside of the 256-acre project corridor initially surveyed. The improvements to the Access Management Roadways have since been incorporated into the Preferred Alternative. Upon SHPD review of the Draft EA, it was determined that an AIS was necessary for all of the lands included in the proposed Access Management Roadways areas.
Area of Potential Effect (APE) and Survey Acreage	The archaeological inventory survey area (covered by the initial study) extends 100 feet (ft) to either side of the existing centerline of Highway 130, therefore consisting of a 200 ft (61 m) wide corridor, approximately 9.5 miles (15.29 km) long, totaling approximately 104 hectares (256 acres). In order to account for maximum potential areas of cut and fill, the Area of Potential Effect (APE) and the archaeological inventory survey area were regarded as one and the same. Some of the proposed Access Management Roadways fall outside of the 200 ft corridor described above, necessitating an addendum inventory survey of those areas. As with the initial project survey, the APE of the proposed Access Management Roadways areas and the addendum archaeological inventory survey areas were regarded as one and the same. These areas include the following, which can be seen on Figure 1 and Figure 2:

	1. Improvement of Pōhaku Circle: Approximately 2,600 feet (half mile) of existing paved road, right of way approximately 40 feet wide, needs to be improved to County Standards for a minor street (50 foot right of way). Road is generally developed with houses and yards. 2. Connector between Uala (31st Ave.) and Puakalo (30th Ave.): Approximately 750 feet of new paved roadway, 50 foot right of way to county standards for minor streets through vacant property. 3. Cul-de-sac on Uala (31st Ave.): New cul-de-sac at end of road, approximately 90 feet in diameter. New portion of cul-de-sac appears to be open space. 4. Extension of Kaloli Drive to Pōhaku Circle: Approximately 650 feet of new paved roadway, 60 feet in right of way width, following a somewhat curvilinear alignment, across two vacant properties. 5. Improvement of 34th Avenue: Existing unpaved road between Auli‘i Street and Ilima Street needs to be improved for a distance of about 0.8 miles to 50 feet in right of way width to serve access changes at Auli‘i Street and Ilima Street (which includes a conversion to right-in-right-out access at the intersection of Auli‘i Street and Kea‘au-Pāhoa Road). 6. Extension of Maku‘u Drive to 34th Avenue: New paved roadway built to 60-foot right of way width for length of approximately 1,050 feet, crossing portions of three vacant parcels. 7. Extension of Orchidland Drive to Uhaloa (32nd Ave.): New paved roadway built to 60-foot right of way width for length of approximately 350 feet through a vacant parcel. 8. Cul-de-sac on Ilima Street: New cul-de-sac just by Kea‘au-Pāhoa Road, approximately 90 feet in diameter. New portion of cul-de-sac appears to be open space. 9. Improvement of Uhaloa (32nd Avenue): Existing gravel road between the extension of Orchidland Drive (#7 above) and Paradise Drive to be improved to County Standards (60-foot right-of-way) for distance of approximately 0.3 miles. It should be noted that the actual area of effect may not include the presently posited APE, which, together with the APE covered by the initial survey, has been designed to address all of the alternatives presently considered.

Historic Preservation Regulatory Context	Due to possible FHWA funding, this project is regarded as a federal undertaking requiring compliance with Section 106 of the National Historic Preservation Act (NHPA), the National Environmental Policy Act (NEPA), and the Department of Transportation Act (DTA). As an HDOT project within state ROW, the project is subject to Hawai‘i State environmental and historic preservation review legislation [Hawai‘i Revised Statutes (HRS) Chapter 343 and HRS 6E-8 / HAR Chapter 13-275, respectively]. This document was prepared to support the proposed project’s federal historic preservation review as well as historic preservation review under HRS Chapter 6E-8 and HAR Chapter 13-275. This study was prepared to fulfill the requirements of HAR Chapter 13-276 governing standards for archaeological inventory surveys.
Document Purpose	At the request of SSFM International Inc., HDOT’s consultant for the project, CSH completed this addendum archaeological inventory survey investigation. It was prepared in consideration of the Secretary of the Interior’s Standards and Guidelines for Archaeology and Historic Preservation and was conducted to identify, document, and make National Register of Historic Places (National Register) and Hawai‘i Register of Historic Places (Hawai‘i Register) eligibility recommendations for the subject parcel’s cultural resources[1]. The investigation also fulfills Hawai‘i State archaeological inventory survey requirements (per HAR Chapter 13-276). The investigation includes an undertaking-specific effect recommendation and treatment/mitigation recommendations for the cultural resources recommended National/Hawai‘i Register eligible. This document is intended to support project-related historic preservation consultation among stake-holding federal and state agencies and interested Native Hawaiian and community groups.
Fieldwork Effort	The fieldwork component of this addendum archaeological inventory survey was accomplished between January 17, 2011 and January 19, 2011 and on February 3, 2011 by CSH archaeologists: Aulii Mitchell, B.A., Olivier M. Bautista, B.A., and Hallett H. Hammett, Ph.D. All fieldwork was conducted under the general supervision of Dr. Hammatt (principal investigator). The fieldwork required approximately 7 person-days to complete.
Number of Historic Properties[2] Identified	No new historic properties were identified during the addendum study.

Effect Recommendation	At this time, this project has an effect determination of “no effect,” based on the lack of findings during the addendum survey. However, the proposed project has the potential to adversely affect subsurface cultural resources presently unidentified, particularly resources that might be found within lava tubes. The Kazumura Cave (SIHP 50-10-46-10001) underlies the current project area in the immediate vicinity of the intersection with Orchidland Drive (see Figure 8). It is asserted that: “Prehistoric use of the [Kazumura] cave by humans was heavy in the downstream nine kilometers nearest the ocean” (Allred and Allred 1997:67) – which would appear to include the vicinity of the portion of the lava tube underlying the present project area. A current survey conducted by Imata and Associates, Inc. did not identify any openings to this lava tube within the proposed Orchidland Drive Extension APE, and established that the ceiling of the cave lies between 16.5 and 30 feet below the Keaa‘au-Pāhoa Road surface (see Figure 9). Therefore, it is highly unlikely that the current project will have any effect on this particular lava tube.
Mitigation Recommendation	Background research and the present addendum survey have indicated that there are lava tubes in the vicinity of the overall project corridor and within the current APE. Past findings in one of the lava tubes indicated this area was utilized by pre-contact Hawaiians. Thus it is possible that subsurface historic properties, associated with pre- and possibly post-contact land use, are present within both the original and addendum project areas. In order to mitigate the potential damage to these potential historic properties, it is recommended that project construction proceed under an archaeological monitoring program. Specifics of the archaeological monitoring would be addressed in the archaeological monitoring plan to be reviewed and approved by the SHPD. This monitoring program would facilitate the identification and proper treatment of any burials that might be discovered during project construction, and would gather information regarding the project’s non-burial archaeological deposits, should any be discovered.

[1]In historic preservation parlance, cultural resources are the physical remains and/or geographic locations that reflect the activity, heritage, and/or beliefs of ethnic groups, local communities, states, and/or nations. Generally, they are at least 50 years old, although there are exceptions, and include: buildings and structures; groupings of buildings or structures (historic districts); certain objects; archaeological artifacts, features, sites, and/or deposits; groupings of archaeological sites (archaeological districts); and, in some instances, natural landscape features and/or geographic locations of cultural significance.

[2]Historic properties, as defined under federal historic preservation legislation, are cultural resources that are at least 50 years old (with exceptions) and have been determined eligible for inclusion in the National Register of Historic Places based on their integrity and historic/cultural significance in terms of established significance criteria. Determinations of eligibility are generally made by a federal agency official in consultation with SHPD. Under federal legislation, a project’s (undertaking’s) potential effect on historic properties must be evaluated and potentially mitigated. Under Hawai‘i State historic preservation legislation, historic properties are defined as any

cultural resources that are 50 years old, regardless of their historic/cultural significance under state law, and a project’s effect and potential mitigation measures are evaluated based on the project’s potential impact to “significant” historic properties (those historic properties determined eligible, based on their integrity and historic/cultural significance in terms of established significance criteria, for inclusion in the Hawai‘i Register of Historic Places). Determinations of eligibility to the Hawai‘i Register result when a state agency official’s historic property “significance assessment” is approved by SHPD, or when SHPD itself makes an eligibility determination for a historic property.

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Section 1 Introduction

1.1 Project Background

The State of Hawai‘i, Department of Transportation (HDOT) is proposing the Kea‘au-Pāhoa Road Improvements Project, Project No. STP-0130(27) and has initiated an Environmental Assessment (EA). The project proposes to implement various improvements along a portion of Kea‘au-Pāhoa Road (State Route 130), from the terminus of the existing 4-lane Kea‘au Bypass to its intersection with Pāhoa-Kapoho Road. State Route 130 is the only roadway that connects lower Puna with the Hilo area and is the primary conduit for emergency services to access local properties. The project purpose is to improve road safety, increase roadway capacity, and modernize State Route 130 between Kea‘au and Pāhoa.

The findings of the initial archaeological survey of the project corridor were presented in the *Archaeological Inventory Survey Report for the Kea‘au-Pāhoa Road Widening Project Kea‘au Ahupua‘a to Waiakahiula Ahupua‘a, Puna District, Hawai‘i Island TMK: [3] 1-5 (various plats and parcels); 1-6 (various plats and parcels)* (Wilkinson et al. 2010), which was included in the project’s Draft Environmental Assessment (EA). One of the improvement alternatives presented in the Draft EA was the Transportation Systems Management (TSM) alternative, which was designed to consider low-cost and low-impact improvements that could be implemented easily with minimal levels of construction. This alternative includes proposed Access Management Roadways, some of which lie outside of the 256-acre project corridor initially surveyed (see Figure 1). The improvements to the Access Management Roadways have since been incorporated into the Preferred Alternative. Upon SHPD review of the Draft EA, it was determined that an AIS was necessary for all of the lands included in the proposed Access Management Roadways areas. A complete listing of the TMKs partially or wholly within the addendum Area of Potential Effect (APE) is provided in Appendix A.

Due to FHWA funding, this project is a federal undertaking requiring compliance with Section 106 of the National Historic Preservation Act (NHPA) (under the Code of Federal Regulations Title 36 CFR Part 800), the National Environmental Policy Act (NEPA), and the Department of Transportation Act (DTA). As an HDOT project within state ROW, the project is subject to Hawai‘i State environmental and historic preservation review legislation [Hawai‘i Revised Statutes (HRS) Chapter 343 and HRS 6E-8 / Hawai‘i Administrative Rules (HAR) Chapter 13-275, respectively]. This document was prepared to support the proposed project’s historic preservation review under Hawai‘i Revised Statutes (HRS) Chapter 6E-48, HAR Chapter 13-275 and relevant Federal acts.

At the request of SSFM International Inc., HDOT’s consultant for the project, CSH completed this addendum AIS investigation. It was prepared in consideration of the Secretary of the Interior’s Standards and Guidelines for Archaeology and Historic Preservation and was conducted to identify, document, and make National Register of Historic Places (National Register) and Hawai‘i Register of Historic Places (Hawai‘i Register) eligibility recommendations for the subject parcel’s cultural resources. The investigation also fulfills Hawai‘i State archaeological inventory survey requirements (per HAR Chapter 13-276). The investigation includes an undertaking-specific effect recommendation and treatment/mitigation

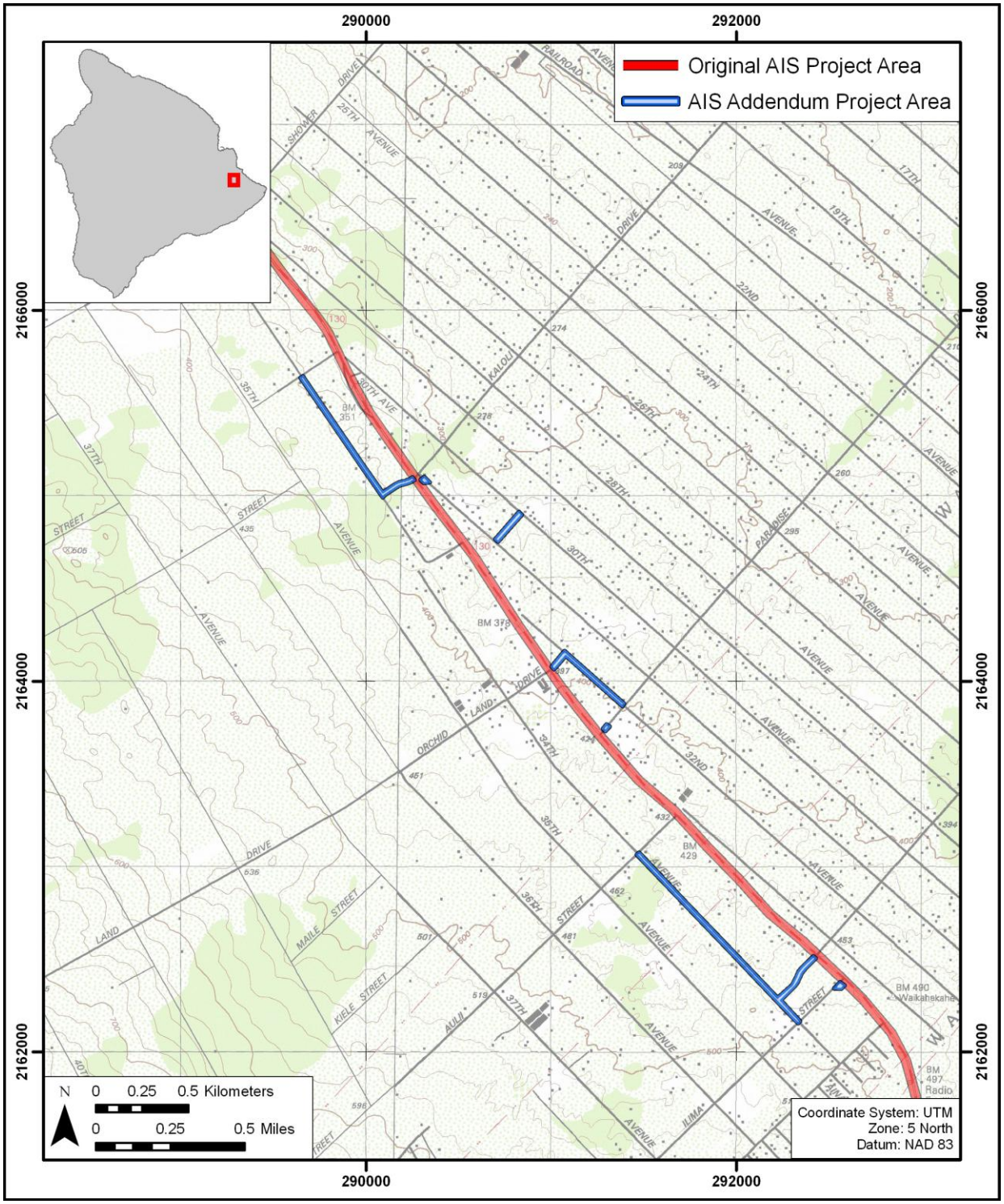

Figure 1. Portions of the Mountain View (1994) and Pāhoa North (1997) USGS 7.5-minute topographic quadrangle maps, showing the location of the addendum project area along the initial project corridor

recommendations for the cultural resources recommended National/Hawai‘i Register eligible.

The archaeological inventory survey area (covered by the initial survey) extends 100 feet (ft) to either side of the existing centerline of Highway 130, therefore consisting of a 200 ft (61 m) wide corridor, approximately 9.5 miles (15.29 km) long, totaling approximately 104 hectares (256 acres). In order to account for maximum potential areas of cut and fill, the APE and the archaeological inventory survey area were regarded as one and the same.

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1. Improvement of Pōhaku Circle (Figure 3): Approximately 2,600 feet (half mile) of existing paved road, right of way approximately 40 feet wide, needs to be improved to County Standards for a minor street (50 foot right of way). Road is generally developed with houses and yards.
2. Connector between Uala (31st Ave.) and Puakalo (30th Ave.) (Figure 3): Approximately 750 feet of new paved roadway, 50 foot right of way to county standards for minor streets through vacant property.
3. Cul-de-sac on Uala (31st Ave.) (Figure 3): New cul-de-sac at end of road, approximately 90 feet in diameter. New portion of cul-de-sac appears to be open space.
4. Extension of Kaloli Drive to Pōhaku Circle (Figure 3): Approximately 650 feet of new paved roadway, 60 feet in right of way width, following a somewhat curvilinear alignment, across two vacant properties.
5. Improvement of 34th Avenue (Figure 4 and Figure 5): Existing unpaved road between Auli‘i Street and Ilima Street needs to be improved for a distance of about 0.8 miles to 50 feet in right of way width to serve access changes at Auli‘i Street and Ilima Street (which includes a conversion to right-in-right-out access at the intersection of Auli‘i Street and Kea‘au-Pāhoa Road).
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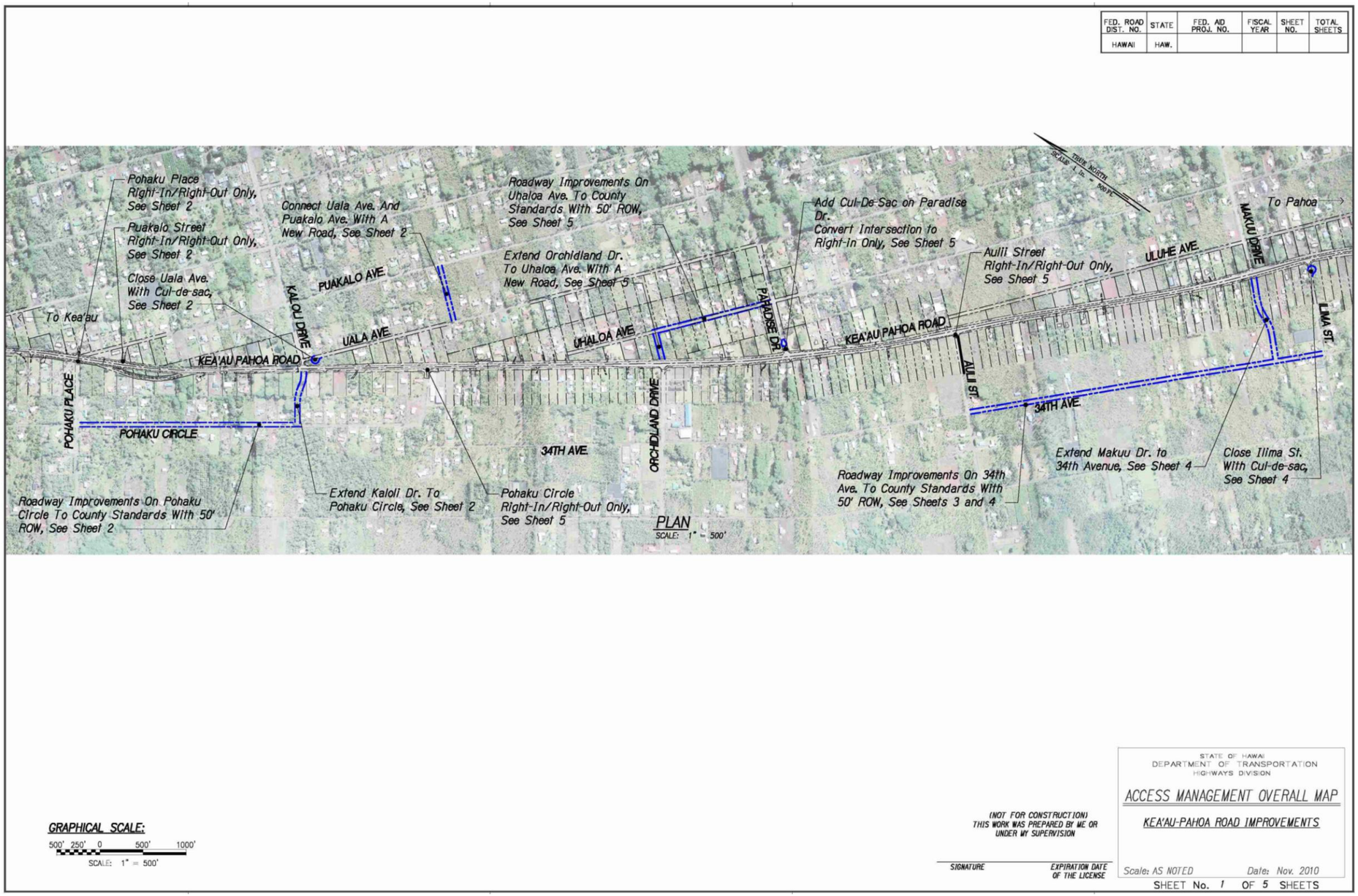

Figure 2. Client provided map showing the locations of the proposed Access Management Roadways work areas along the Kea‘au-Pāhoa Road

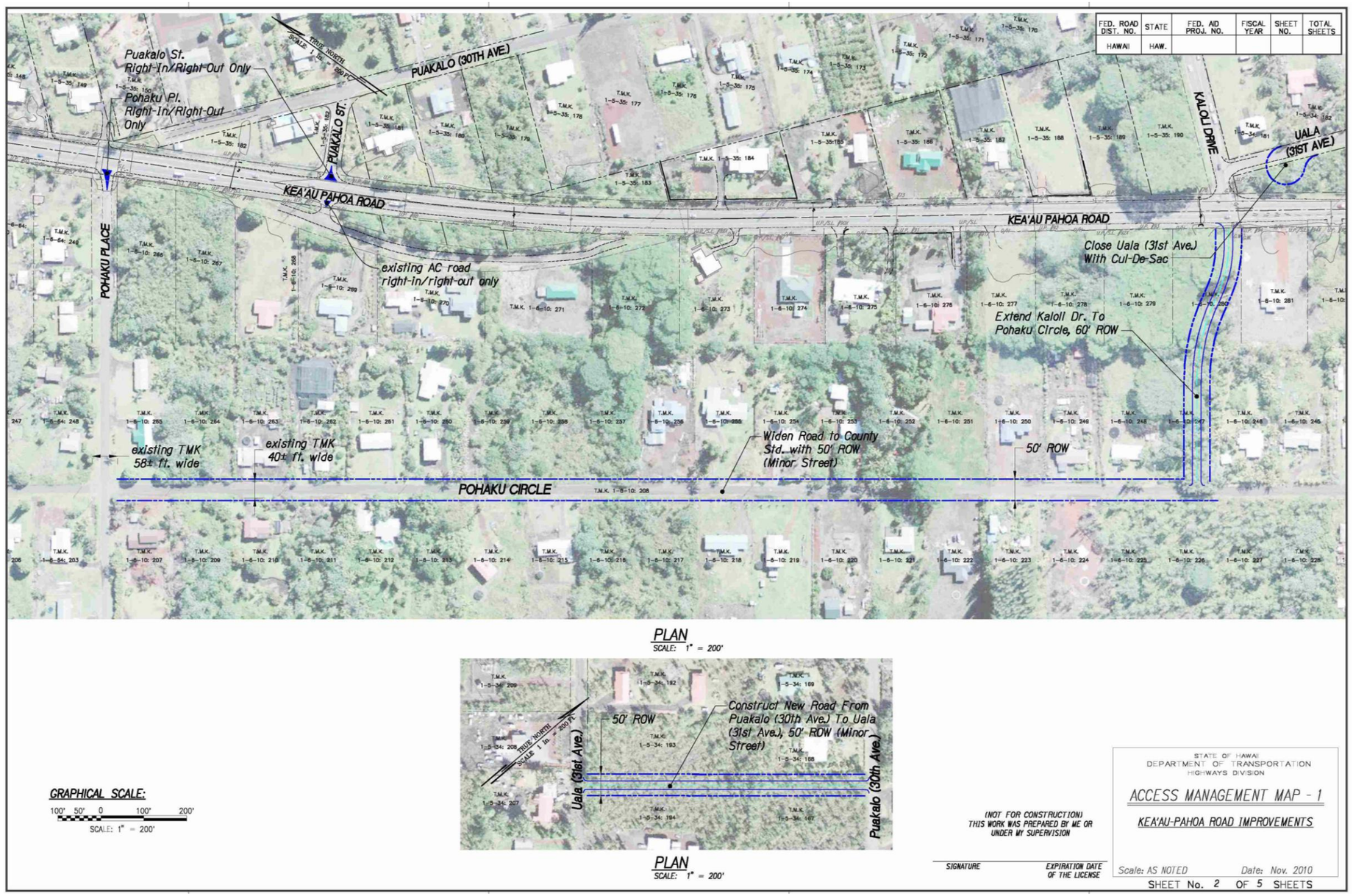

Figure 3. Client provided maps, detailing the locations of the proposed Uala (31st Avenue) cul-de-sac, the Kaloli Drive extension, the Pōhaku Circle improvements, and the Puakalo to Uala connector road

Figure 4. Client provided map, detailing the northern section of the proposed improvements to 34th Avenue

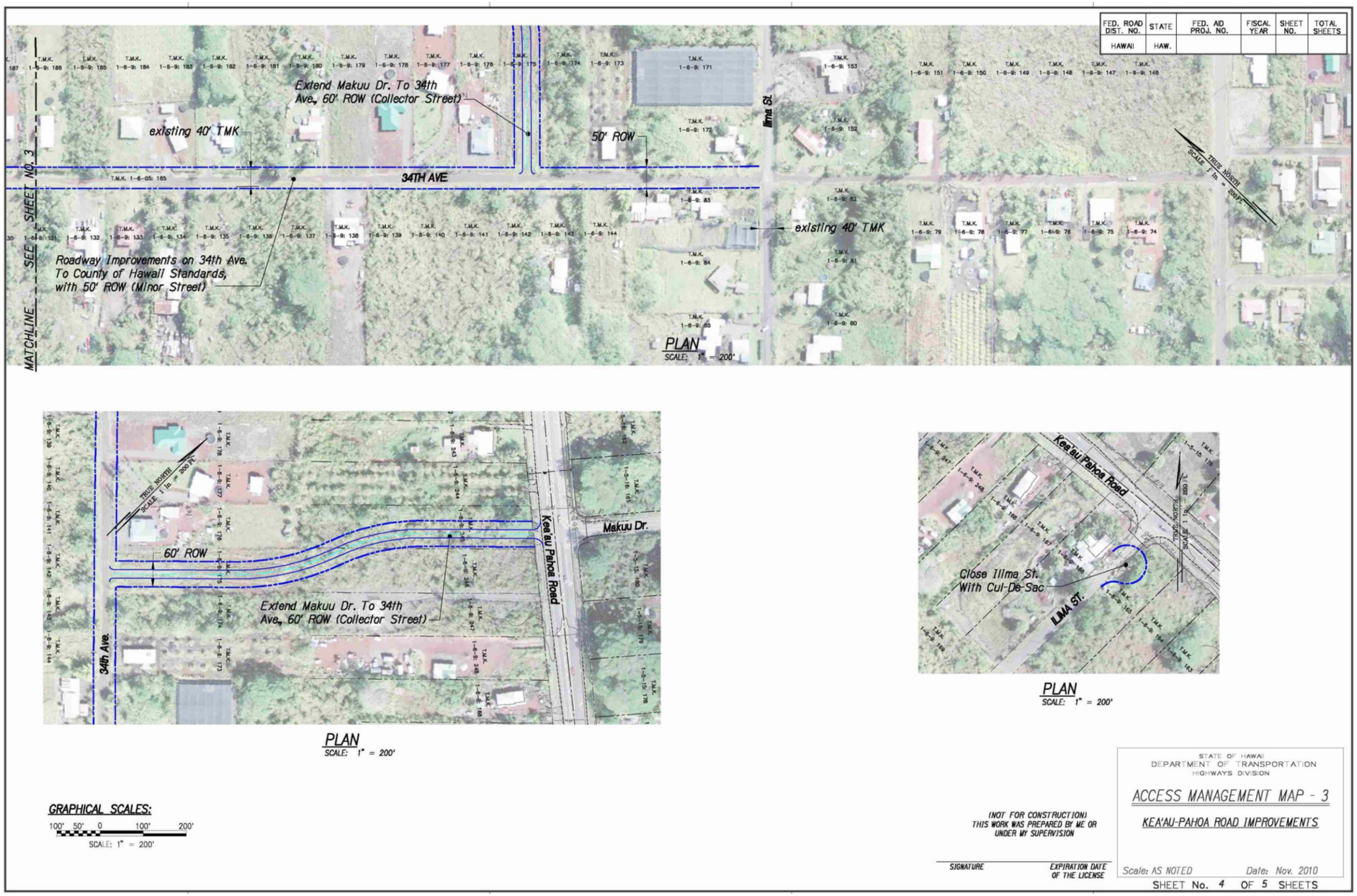

Figure 5. Client provided maps, detailing the southern section of the proposed improvements to 34th Avenue, the proposed Maku‘u Drive extension and the proposed Ilima Street cul-de-sac

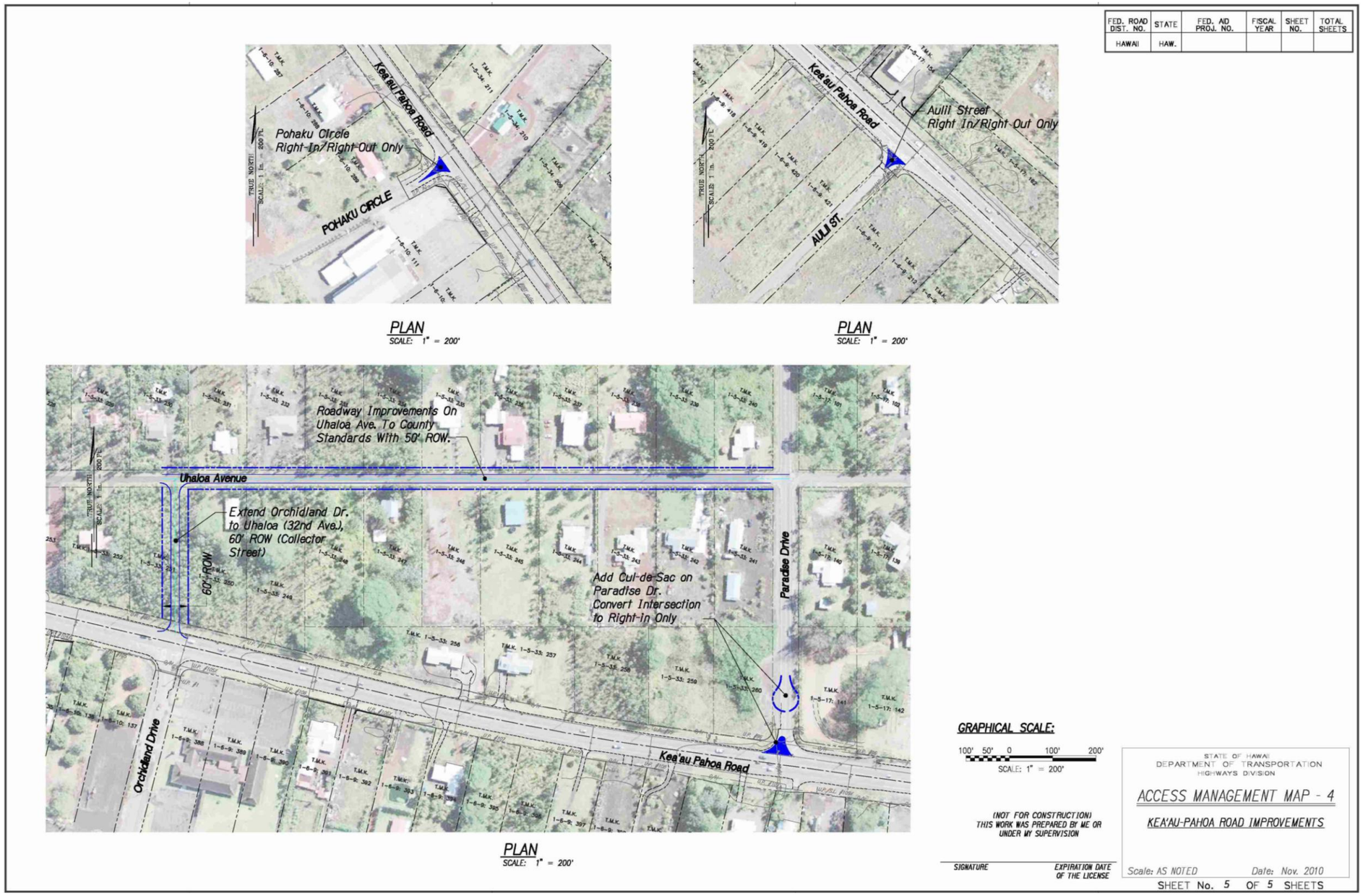

Figure 6. Client provided map, detailing the proposed Orchidland Drive extension and the improvements to Uhaloa Avenue

It should be noted that the actual area of effect may not include the presently posited APE, which, together with the APE covered by the initial survey, has been designed to address all of the alternatives presently considered.

1.2 Scope of Work

The following addendum AIS scope of work was developed and implemented to satisfy SHPD requirements. The scope of work for this addendum inventory survey was designed in accord with State Historic Preservation Division rules governing standards for archaeological inventory surveys and reports (HAR 13-13-276):

1. A complete ground survey of the entire addendum project area for the purpose of historic property inventory. If historic properties were located the following would be applicable: All historic properties would be located, described, and mapped with evaluation of function, interrelationships and significance. Documentation will include photographs and scale drawings of selected historic properties. All historic properties will be assigned Inventory of Historic Properties numbers by the SHPD and located with a Trimble Global Positioning System (GPS). The GPS data will be in the report in ArcGIS format and will be sufficient for planning purposes.
2. Limited subsurface testing, possibly with a backhoe, to determine if subsurface deposits are located in the project area, and if so, evaluate their significance. If appropriate samples from these excavations are found, they will be analyzed for chronological and paleoenvironmental information.
3. Research on historic and archaeological background, including search of historic maps, written records, and Land Commission Award documents. This research will focus on the specific area with general background on the *ahupua‘a* (traditional land division) and district and will emphasize settlement patterns.
4. Preparation of an addendum survey report which will include the following:
    a. A topographic map of the survey area showing all historic properties;
    b. Description of all historic properties with selected photographs, scale drawings, and discussions of function;
    c. Historical and archaeological background sections summarizing prehistoric and historic land use as they relate to the project area’s historic properties;
    d. A summary of historic property categories and their significance in an archaeological and historic context;
    e. Recommendations based on all information generated that will specify what steps should be taken to mitigate impact of development on the project area’s significant historic properties - such as data recovery (excavation) and preservation of specific areas. These recommendations will be developed in consultation with the client and the State agencies.

This scope of work also includes full coordination with the State Historic Preservation Division (SHPD) relating to archaeological matters. This coordination takes place after consent of the owner or representatives.

It should be noted that the addendum project area was adjusted after the notice-to-proceed in order to avoid potential effect upon an extensive and important historic property.

1.3 Environmental Setting

1.3.1 Natural Environment

The current addendum project area varies in elevation from approximately 380 ft above mean sea level (amsl) at the Pōhaku Circle and Pōhaku Place intersection to approximately 535 feet amsl along Ilima Street, though the landscape appears generally level. The distance of the addendum project area from the coastline ranges between approximately 7.7 km (4.8 miles) and 8.2 km (5.1 miles). The Access Management Roadways areas have generally been previously developed, though some portions of the current APE are situated on undisturbed land.

No perennial waterways are located near or within the current APE. There is abundant water traveling through this area from Mauna Loa, but it flows underground, exiting usually at or near the ocean via springs. These underground sources of water are known to be quite pristine, having been filtered through miles of lava rock. Lava tubes are numerous throughout the Puna district.

In 1996, the U. S. Geological Survey produced a geologic map of Hawai‘i Island with corresponding literature. This set details the types and ages of lava flows covering the island. The current addendum survey areas lay over flows from Kīlauea Volcano. These flows are classified as “p4,” dated 200 to 750 years B.P. Within this flow are pockets of “p4o,” a more specific type of “p4” flow, which dates from 400 to 750 years B.P. (Wolfe and Morris 1996: sheet 2).

The average annual rainfall in the general vicinity of the project area falls between approximately 120 and 160 inches (Juvik and Juvik 1998:57). Temperatures in this area of the Puna District usually fall between the sixties and eighties. As expected, the cooler temperatures and heavier rainfall occur in the winter months (October through April) and warmer temperatures and lighter rainfall occur during the summer months (May-September).

There are several soil and land types found along the entire project corridor (Figure 7). However, only one land type underlies the proposed Access Management Roadways areas covered by the addendum survey. That land type is classified as Lava flows, pahoehoe (rLW), a miscellaneous land type (Sato et al. 1973). *Pāhoehoe* lava has a billowy, glassy surface which can be relatively smooth or rough and broken. Hummocks and pressure domes are common. Bare *pāhoehoe* lava typically can support mosses and lichens, while in areas with more rainfall *‘ōhi‘a* trees, *‘ōhelo* berry, and *‘a‘ali‘i* can grow from cracks and crevices. “This miscellaneous land type occurs at elevations ranging from sea level to 13,000 feet. The annual rainfall ranges from 10 inches to more than 140 inches. Some flat slabs of pahoehoe lava are used as facings on buildings and fireplaces. In areas of higher rainfall, this lava contributes to the ground-water supply,” (Sato et al. 1973).

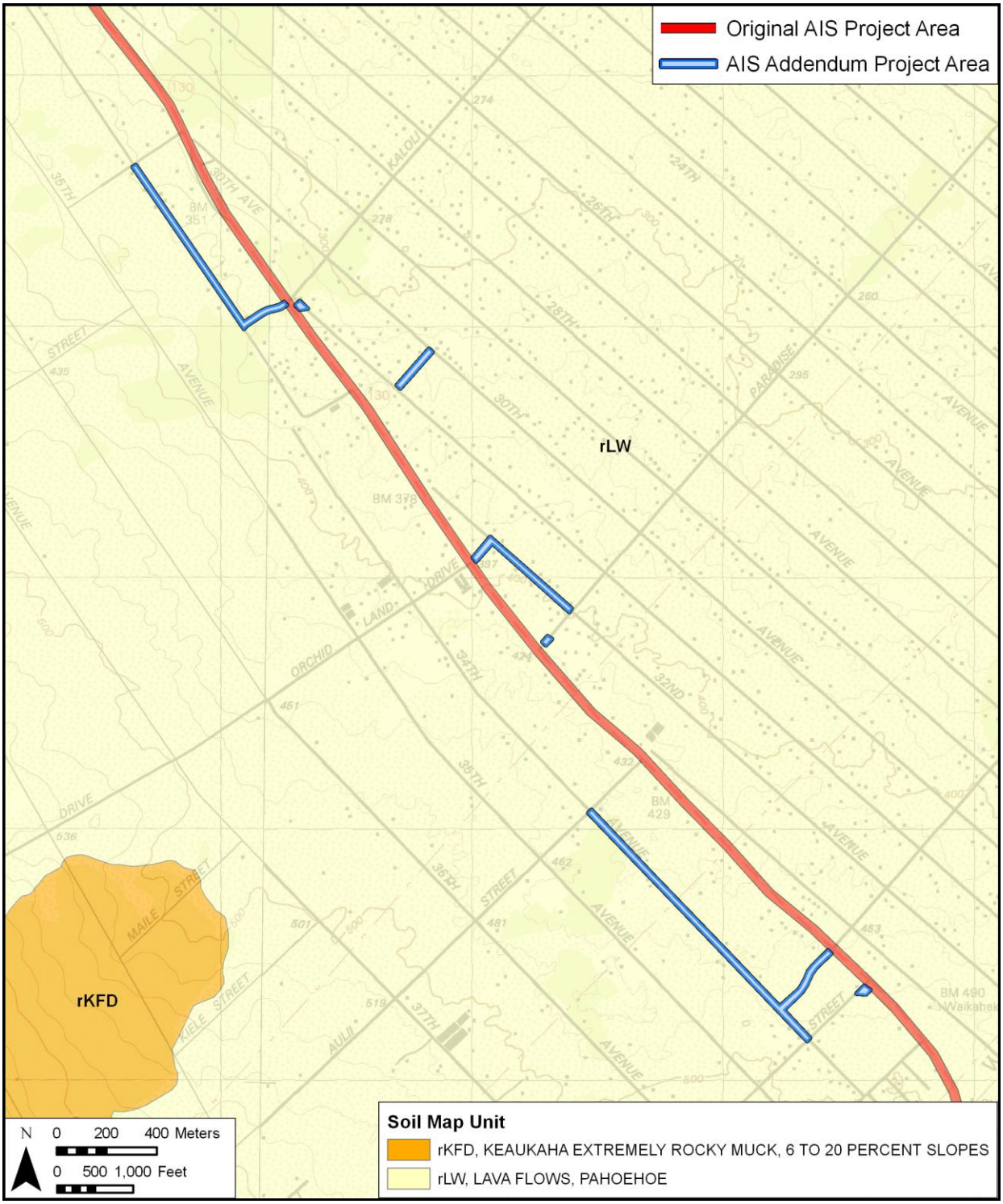

Figure 7. Portions of the Mountain View (1994) and Pāhoa North (1997) USGS 7.5-minute topographic quadrangle maps, overlain with soil survey data (Sato et al. 1973), showing the location of the addendum project area along the initial project corridor

The lands surrounding the project corridor have been largely transformed by human activity (Juvik and Juvik 1998:123). These lands were classified as wet forest and woodland before human settlement disrupted them (Juvik and Juvik 1998:122). The biota in this type of ecosystem consisted of:

> Vegetation: closed canopy forest of *‘ōhi‘a* [*Metrosideros polymorpha*], sometimes with *koa* or *‘ōlapa* codominant; dense tree fern (*Cibotium* species) understory…also, open-canopy forests or woodlands of *‘ōhi‘a* and *uluhe* (*Dicranopteris linearis*). Forests of *hala* (*Pandanus tectorius*) in coastal lowlands…Shrublands of *‘ōhi‘a* and ferns; also, *‘ākala* (*Rubus hawaiensis*) shrublands. Rare bogs and mosses (*Racomitrium* species), sedges, grasses, and native shrubs. Fauna: primary habitat of most extant Hawaiian honeycreepers and other forest birds…great diversity of native invertebrates. Endangered species: more than 50 plants species…birds include *‘ō‘ū* (*Psittirostra psittacea*), Maui parrotbill (*Pseudonestor xanthophrys*), and *‘ākohekohe* (*Palmeria dolei*) (Juvik and Juvik 1998:126-127).

Threats to this type of ecosystem include:

> Feral pig, mongoose, feral cat; black and Polynesian rats; alien slugs; introduced plants such as melastomes (*Clidemia hirta, Miconia clavescens*), banana poka (*Passiflora mollissima*), Hilo grass (*Paspalum conjugatum*), yellow raspberry (*Rubus ellipticus*), and strawberry guava (*Psidium cattleianum*). Clearing for agriculture and grazing, suburbanization (Juvik and Juvik 1998:127).

1.3.2 Built Environment

The currently developed lands within and adjacent to the addendum APE are dominated by housing subdivisions, including Hawaiian Paradise Park and Orchidland Estates. Some retail and commercial establishments are also located adjacent to the current survey areas, particularly at Orchidland Drive. The built environment includes the existing roadways and driveways. Utility poles, roadway barriers and signage are also present along the length of the existing roadways.

The general area within and adjacent to the current project corridor has been subjected to over a century of intensive sugar cane cultivation. Remnants dating from this time period may be found in the currently undeveloped sections along the project corridor.

Section 2 Methods

2.1 Field Methods

The fieldwork component of this addendum archaeological inventory survey was accomplished between January 17, 2011 and January 19, 2011, and on February 3, 2011 and February 11, 2011 by CSH archaeologists: Aulii Mitchell, B.A., Olivier M. Bautista, B.A., and Hallett H. Hammett, Ph.D. All fieldwork was conducted under the general supervision of Dr. Hammatt (principal investigator). The fieldwork required approximately 8 person-days to complete.

The addendum archaeological inventory survey involved a pedestrian inspection of the potential Access Management Roadways areas, described in Section 1.1 above. The archaeologists conducted sweeps, with personnel spaced 2-10 m apart, depending on the terrain and density of vegetation. Following standard inventory survey protocol, all cultural resources encountered were to be recorded and documented with a written field description, scale drawings, photographs, and using Garmin GPS map 60CSx GPS survey technology (accuracy 5-10 m).

2.2 Document Review

A document review was conducted for the initial AIS report for the Kea‘au-Pāhoa Road Widening Project. Background research included a review of previous archaeological studies and mitigation plans on file at SHPD/DLNR and a review of documents, books and maps at the CSH library. Land Commission Award documentation was researched using the Waihona ‘Āina online database and previous reports. Other sources such as the World Wide Web were utilized when necessary.

Section 3 Background Research

Background research was conducted for the initial AIS Report for the Kea‘au-Pāhoa Road Widening Project, as outlined in Section 2.2 above. The following background summary and predictive model is taken from the aforementioned document, though some information has been added regarding the Kazumura Cave, or SIHP 50-10-46-10001. Please refer to the initial AIS Report for a more extensive discussion of the traditional and historical background and previous archaeological studies of the project area lands.

3.1 Background Summary

In general, the mythological and historical background of the Puna District seems lean in comparison to other districts around the island. The District of Puna is located between the Hilo and Ka‘ū Districts, which were traditionally strongholds of chiefs and ruling families. While "Puna lands were desirable, and were eagerly sought…their control did not rest upon the conquering of Puna itself, but rather upon control of the adjacent districts, Kau and Hilo. An attempt to follow in detail the course of Puna's history is bound up with the fortunes of the ruling families on either side of her" (Emory et al. 1959:15). Additionally, with the arrival of missionaries such as Ellis and Wilkes in the early 1800s, massive conversion to Christianity seemed to bring with it a sense of unwillingness to relay traditional mythologies and histories of the land (Barrere 1971:11).

The lands along the current project area fall between approximately 380 and 535 feet amsl. The project area is located between approximately 4.8 and 5.1 miles from the Puna coastline, which is located on the windward side of Hawai‘i Island. This area seems to reflect aspects of McEldowney's (1979) Upland Agricultural and Lower Forest Zones, in that, while scattered agriculture was practiced throughout the area, the expansive *‘ōhi‘a* forests found in this region were also a major resource.

The end of the Contact Period saw a rapid decline in the population of the Puna District (Lyman 1924:103), a result of foreign disease and industrialization (Coan 1882:121). This contraction of population in Puna may help to account for the lack of *kuleana* awards throughout the region under the Māhele.

During the late 1800s men such as Lyman and Shipman turned large chunks of land throughout Puna into cattle ranches (Hurst and Shilz 1994; Cahill 1996). This industry took a toll on small-scale agriculture throughout the district, as cattle were prone to destroy unprotected plots. Remnants of the cattle industry are found across Puna today, in the form of historic features such as ranch walls.

Near the turn of the 20th century, large-scale coffee cultivation was attempted, particularly in the more coastal regions of Puna. This fledgling industry couldn't compete with more successful ventures located in other districts, and after a few decades the coffee industry in Puna was abandoned (Cordy 1977:4).

During the first half of the 20th century, Puna was dominated by the sugar industry. Thousands of acres of land were turned into sugar plantations, stretching from the south Hilo border to Cape Kumukahi, then west to inland areas of south Puna. The rapid success of the

sugar industry brought with it the Hilo Railway Company expansion across Puna, as well as an influx of foreign workers. When the 1946 tsunami shut down the rail line, the transportation of sugar continued with trucks (Treiber 2005).

Beginning in the 1950s and 1960s, residential development began in Puna, with Hawaiian Paradise Park in particular. Though agriculture is still an important industry in Puna, it has decreased over the years as settlement throughout the district has almost exponentially increased.

3.2 SIHP 50-10-46-10001

Recent studies (Allred and Allred 1997; Rechtman 2004) have emphasized the possibility of extensive lava tube systems underlying the present study area, including the Kazumura—or Puna—Cave in particular. A 1984 report entitled *Kapokohelele and the Puna Cave* (Olson 1984) discusses this cave, assigned as SIHP 50-10-46-10001. The report includes descriptions of “six separate, but seemingly related, major archaeological sites” (Olson 1984:1) found within the 14-mile length of the lava tube, which allegedly include features such as “underground temples, altars, platforms, walls, fire hearths, ceremonial areas, ancient burial tombs of ali‘i (chiefs), human sacrifices, stone images of ancient gods, and extensive deposits of prehistoric Hawaiian artifacts,” (Olson 1984:1). Of these six sites within the cave, two lie in the vicinity of the present study area: sites -10001-1 and -10001-2.

Olson asserts that SIHP 50-10-46-10001-1, which he calls “Kapo,” is the “key to understanding the entire Puna cave Complex…” (Olson 1984:2). This feature, which was the first recorded during the 1982 survey documented in Olson’s report,

> …is described as an underground heiau (temple or place of worship) with a most unique geological phenomenon as its focal point. Suspended between the convergence of a [sic] upper and lower lava tube is a lava squeeze-out formation in the shape of a 11’2” female external genetilia [sic] [Olson 1984:2].

Site 50-10-46-10001-2, located within the tube approximately 75 yards (68.6 meters) *mauka* of the *kohe* (vagina) feature, is an apparent habitation feature complete with terraces, platforms, and extensive cultural deposits. Bulldozer activity on the lot above this site, dubbed by Olson as the “Kahuna Living Quarters,” has blocked the opening accessing this portion of the tube and has covered much of the modified area with rock rubble (Olson 1984:8-9). The other four site complexes that were recorded within the cave system lie at a significant distance (more than one mile from) sites -10001-1 and -10001-2 and the present study area.

3.3 Predictive Model

It appears likely that a field survey within the addendum project area will yield few surface finds, particularly those of pre-contact origin. The most obvious reasons for this are the development of a majority of the lands along Highway 130, and the usage of portions of the land for sugarcane cultivation. However, the expectation remains the same for undeveloped, “native” sections as well, although agricultural terraces have been found in the vicinity of the project area (Komori 1987).

Archaeological studies throughout Puna have confirmed the land use patterns suggested by McEldowney, Ellis (Newman 1971), and Kirch (1985). These studies reflect that the majority of human settlement and land usage (i.e., intensive agriculture) were located in close proximity to the coastline. Puna’s coastal zone provided the bulk of the resources, including fresh water. The upland areas, in which the addendum project area lies, would have been used for more scattered agriculture and habitation, as well as the gathering of forest resources.

The lava flows covering this section of the island are relatively young and may have destroyed older pre-contact features. Surface features that may be encountered would most likely consist of historic structures related to cattle ranching, the sugarcane industry, and/or railroad infrastructure, though it is always possible that pre-contact agricultural features might be encountered.

Lava tubes may be encountered anywhere along the addendum project area. Archaeological research for the southern portion of the initial project corridor has focused on lava tubes in the vicinity of Pāhoa town (Kam 1982, Rechtman 2004, Yent 1983), though it is certain that the Kazumura Cave (SIHP 50-10-46-10001) crosses (underlies) the current project area in the immediate vicinity of the intersection with Orchidland Drive (Figure 8). This tube contains extensive and important archaeological site complexes, including the possible “*kohe o Kapo*” (vagina of Kapo) and human burials. A current survey of the section of Kazumura Cave underlying the project area, conducted by Imata and Associates, Inc., revealed that the ceiling of the cave lies 16.5 to 30 feet below the surface of the Kea‘au-Pāhoa Road (Figure 9). Furthermore, the cave appears to trend north under the highway beyond the proposed Orchidland Drive Extension APE. No tube openings were identified during the survey conducted by Imata and Associates, Inc.

Any lava tubes encountered during construction work would require a thorough investigation. Oftentimes, especially in heavily vegetated, undeveloped sections of land within the addendum survey areas, tube entrances are obscured. Based on the number of known tubes throughout the area, there is a significant possibility that a lava tube may be encountered during the current study or during project construction. It seems unlikely that the Kazumura Cave will be affected by project-related construction, given the depth of the cave below the surface and the lack of any openings within the project area.

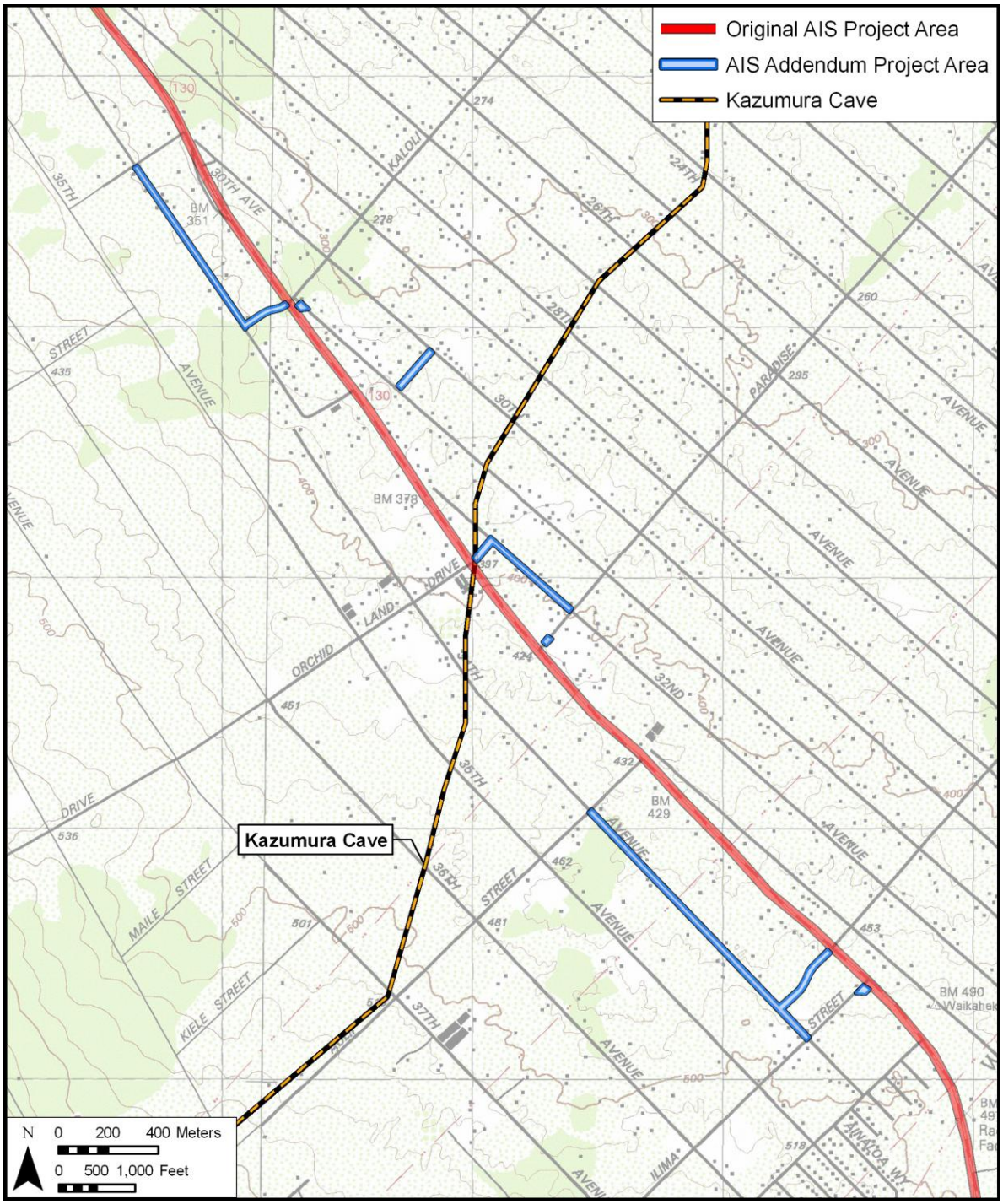

Figure 8. Portions of the Mountain View (1994) and Pāhoa North (1997) USGS 7.5-minute topographic quadrangle maps, showing the location of the addendum project area along the initial project corridor in relation to the approximate location of the Kazumura Cave (SIPH 50-10-46-10001) (source:www.showcaves.com/english/usa/caves/Kazumura.html)

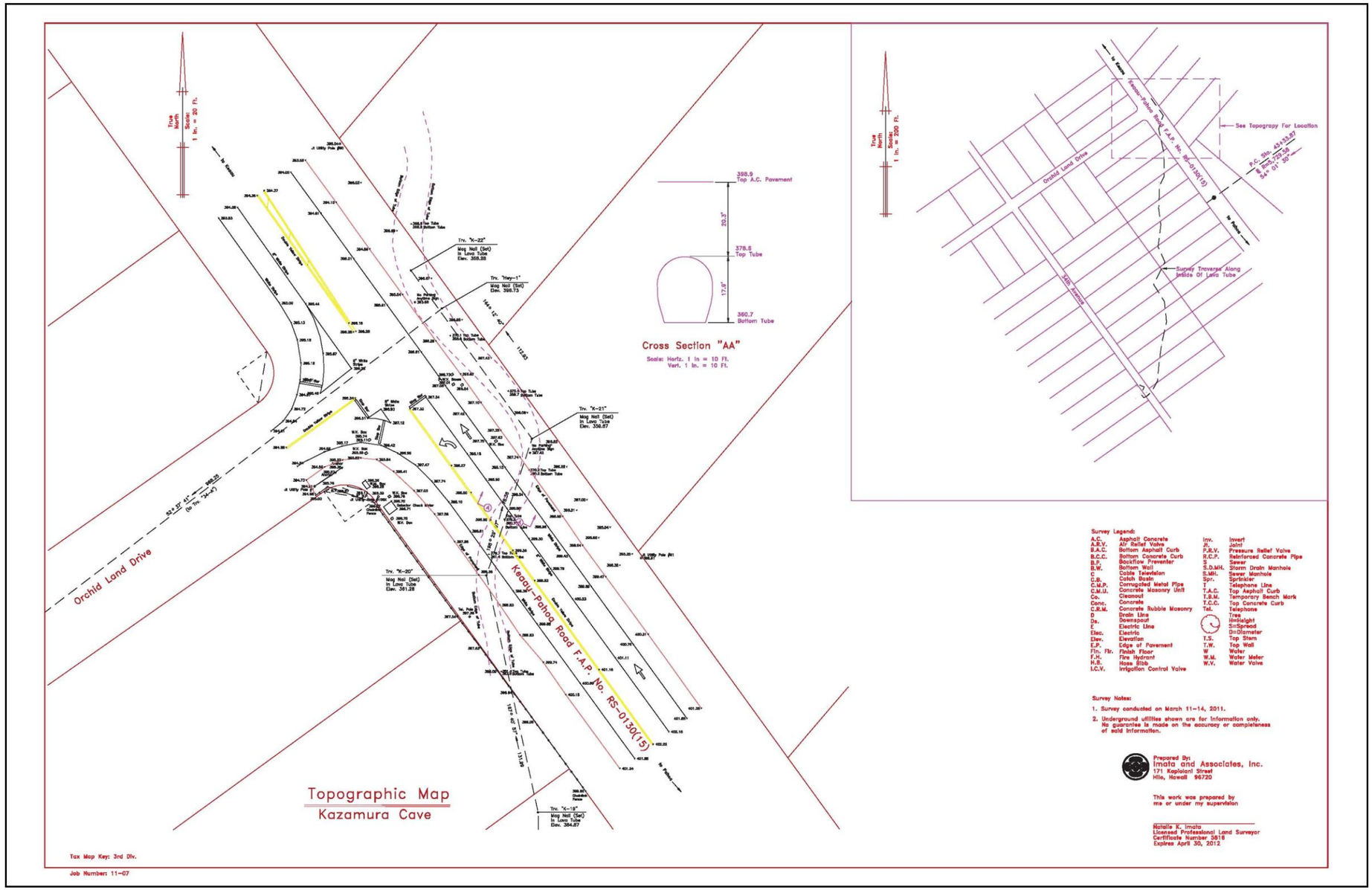

Figure 9. Map prepared by Imata and Associates, Inc., showing the depth of the Kazumura Cave in relation to the Kea‘au-Pāhoa Road; note that Cross Section “AA” shows the tube at a depth of 20 feet below the center of the road

Section 4 Results of Fieldwork

4.1 Survey Findings

While no lava tube openings were found during the addendum survey, the presence of any such lava tube entrances or “sky lights” may have been obscured in areas of dense vegetation. It should be noted, however, that the study conducted by Imata and Associates, Inc. confirms the lack of any openings to the Kazumura Cave within the project area (see Section 3.3 above).

No other cultural material, human remains, or archeological features were encountered within the project area during the addendum survey. General observations were recorded during the survey of each portion of the current project area, and are presented below.

A potential historic property, CSH 1, was located just outside (north) of the proposed Kaloli Extension APE (Figure 10). CSH 1 consists of a rock terrace, probably related to agriculture. As this site lies outside of the project APE in privately owned land, it was not fully documented during the present fieldwork.

4.1.1 Improvement of Pōhaku Circle

Pōhaku Circle is generally developed with numerous houses and landscaped yards including rock walls and fences (Figure 11). There are several vacant lots, some of which have been impacted by bulldozing in the past and are now overgrown with a variety of invasive and native plant species. The vegetation is extremely dense in the vacant lots that have never been dozed. Ground visibility within the vacant lots is generally very limited due to the heavy ground cover, which consists of a variety of fern species (the most prominent being *uluhe*).

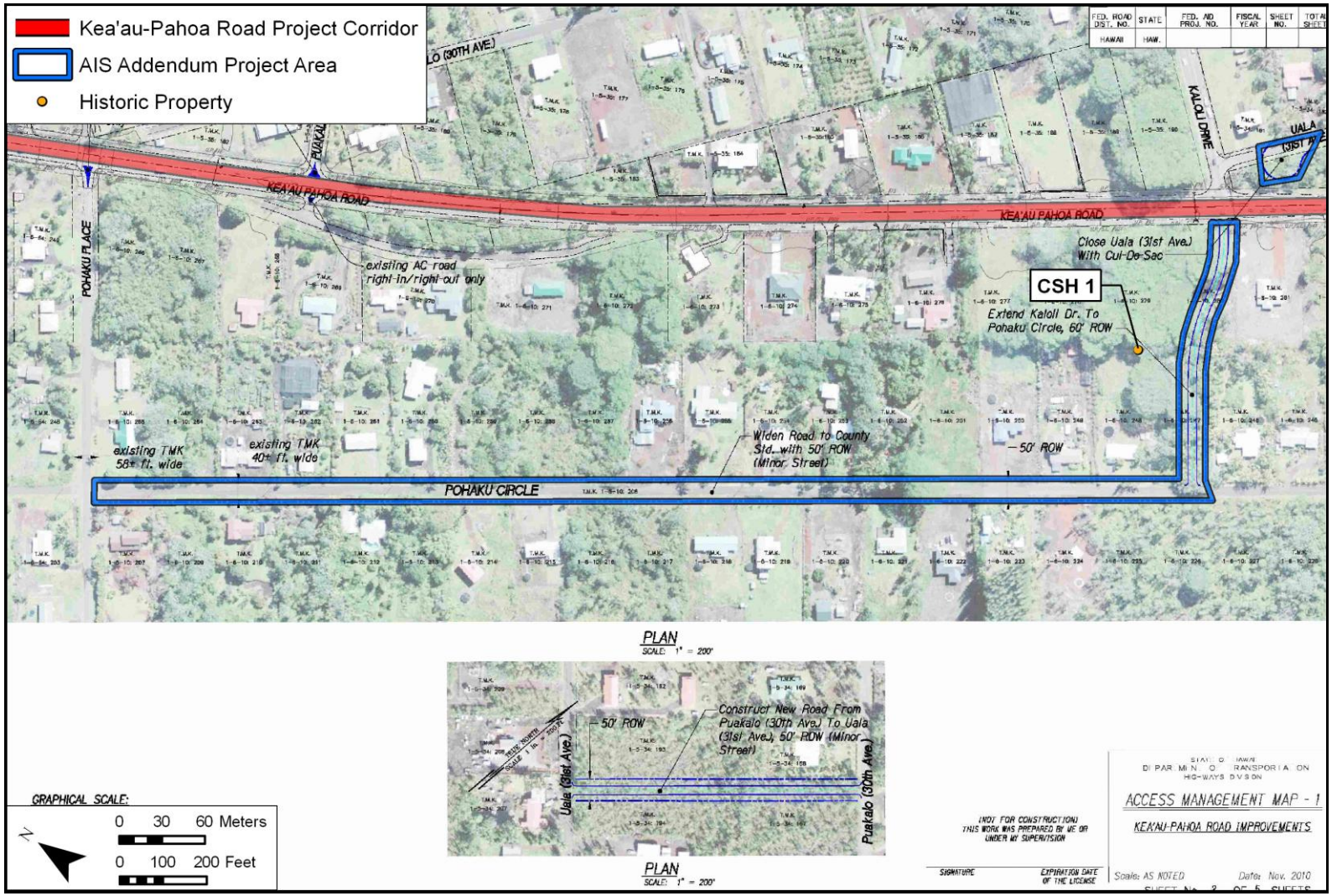

Figure 10. Client provided map overlain with the location of CSH 1, which lies just outside of the current APE

Figure 11. Photo showing the existing built environment along Pōhaku Circle; view to the northwest

4.1.2 Connector between Uala (31st Ave.) and Puakalo (30th Ave.)

This portion of the project area is comprised of vacant land that has never been bulldozed, and which exhibits numerous areas of exposed bedrock. The vegetation is moderately dense with heavy ground cover in some areas (Figure 12).

Figure 12. Photo showing the eastern end of the proposed Connector between Uala (31st Ave.) and Puakalo (30th Ave.); view to the southwest

4.1.3 Cul-de-sac on Uala (31st Ave.)

This area is an open space, currently intersecting with Kaloli Drive, which has been landscaped by a yard service company or possibly by the Paradise Park Community Association (Figure 13).

Figure 13. Photo showing the existing built environment at the location of the proposed Cul-de-sac on Uala (31st Avenue), which currently intersects with Kaloli Drive; view to the northwest

4.1.4 Extension of Kaloli Drive to Pōhaku Circle

This portion of the addendum project area consists of unimproved land marked by a natural drainage feature. This feature trends *mauka-makai* (seaward) and feeds into a culvert on the *mauka* edge of the Kea‘au-Pāhoa road. The terrain consists of undulating *pāhoehoe* with numerous depressions filled with alluvial soil accumulations. The vegetation is comprised of dense stands of guava (genus *Psidium*) and albizia (*Falcataria moluccana*), interspersed with *‘ōhi‘a* and dense thickets of *uluhe*. Figure 14 and Figure 15 show the location of each end of the proposed Extension. Just outside (north) of this section of the project area a small terrace was discovered and designated as site CSH 1 (see Figure 10).

Figure 14. Photo showing the eastern end of the proposed Kaloli Drive Extension, where it intersects with HI-130; view to the west

Figure 15. Photo showing the western end of the proposed Kaloli Drive Extension, where it intersects with Pōhaku Circle; view to the east

4.1.5 Improvement of 34th Avenue

Land use along the portion of 34th Avenue between Aulii Street and Ilima Street is generally residential. There are several vacant lots along 34th Avenue, some of which have been impacted by bulldozing and are now overgrown with a variety of invasive and native plant species (Figure 16). The vegetation is extremely dense in the vacant lots that have never been dozed. Ground visibility is generally very limited due to the heavy ground cover, which consists of a variety of fern species (the most prominent being *uluhe*).

Figure 16. Photo showing the existing built environment, vacant lots and vegetation along 34th Avenue, taken at the Aulii Street intersection; view to the southeast

4.1.6 Extension of Maku‘u Drive to 34th Avenue

This portion of the project area is comprised of vacant land that has never been bulldozed (Figure 17 and Figure 18). It exhibits numerous areas of exposed bedrock. The vegetation is moderately dense with heavy ground cover in some areas. Ground visibility ranged from poor to fair throughout.

Figure 17. Photo of the eastern end of the proposed Extension of Maku‘u Drive where it intersects with HI-130; view to the southwest

Figure 18. Photo of the western end of the proposed Extension of Maku‘u Drive where it intersects with 34th Avenue; view to the northeast

4.1.7 Extension of Orchidland Drive to Uhaloa (32nd Avenue)

This area is comprised of vacant land that is heavily forested (Figure 19 and Figure 20). The vegetation was extremely dense. Ground visibility was very limited due to the heavy ground cover. The Kazumura Cave (SIHP 50-10-46-10001) is know to underlie this general area (see Figure 8), but no openings to the tube were discovered during the addendum survey.

Figure 19. Photo of the eastern end of the proposed Extension of Orchidland Drive where it intersects with Uhaloa (32nd Avenue); view to the southwest

Figure 20. Photo of the western end of the proposed Extension of Orchidland Drive where it intersects with HI-130; view to the northeast

4.1.8 Cul-de-sac on Ilima Street

This portion of the project area is an open space, currently intersecting with HI-130 (Figure 21).

Figure 21. Photo of the location of the proposed Cul-de-sac on Ilima Street; view to the northeast

4.1.9 Improvement of Uhaloa (32nd Avenue)

Uhaloa (32nd Avenue) is generally developed with numerous houses and landscaped yards including rock walls and fences (Figure 22). There are several vacant lots present, all of which seem to have never been impacted by bulldozing. These lots are covered in a dense growth of vegetation with variety of invasive and native plant species. The heavy ground cover in these vacant lots provided poor ground visibility.

Figure 22. Photo showing the existing built environment along Uhaloa (32nd Avenue); view to the northwest

Section 5 Summary and Interpretation

In compliance with and to fulfill applicable federal and state historic preservation legislation, CSH completed this addendum archaeological inventory survey investigation for the proposed TSM alternative within the Kea‘au-Pāhoa Road Improvements Project, Project No. STP-0130 (27), which comprises an APE that would extend outside of the 256-acre project corridor surveyed in 2009. The addendum project area was adjusted after the notice-to-proceed in order to avoid potential effect upon an extensive and important historic property. Reflecting this adjustment, work associated with the proposed Access Management Roadways would consist of: improvements to Pōhaku Circle; construction of a connector road between Uala (31st Avenue) and Puakalo (30th Avenue); construction of a cul-de-sac on Uala (31st Avenue); construction of an extension of Kaloli Drive to Pōhaku Circle; improvements to 34th Avenue; construction of a extension of Maku‘u Drive to 34th Avenue; construction of an extension of Orchidland Drive to Uhaloa (32nd Avenue); construction of a cul-de-sac on Ilima Street; and improvements to Uhaloa (32nd Avenue).

Per the Hawai‘i state requirements for archaeological inventory surveys [HAR Chapter 13-276], this inventory survey investigation includes the results of cultural, historical, and archaeological background research and fieldwork, which are presented in full in the initial AIS report for this project (Wilkinson et al. 2010). The background research focused on summarizing the project area’s pre-contact and post-contact land use, cultural significance, and types and locations of potential historic properties within the project area and its vicinity.

Based upon previous research, sugarcane cultivation and young lava flows have destroyed pre-contact features. Lava tubes and remnants of historic structures related to cattle ranching, the sugarcane industry, and/or railroad infrastructure, were anticipated as potential finds within the project area.

No lava tube openings or surface archaeological sites were identified within the addendum survey APE. However, the Kazumura Cave (SIHP 50-10-46-10001) is known to underlie the addendum project area in the vicinity of Orchidland Drive (see Figure 8). In accordance with Olson’s (1984) findings, Allred and Allred (1997:67) asserted that “[p]rehistoric use of the cave by humans was heavy in the downstream nine kilometers nearest the ocean,” which includes the portion of the lava tube underlying the present project area. A current survey conducted by Imata and Associates, Inc. did not identify any openings to this lava tube within the proposed Orchidland Drive Extension APE, and established that the ceiling of the cave lies between 16.5 and 30 feet from the Keaa‘au-Pāhoa Road surface (see Figure 9). Therefore, it is highly unlikely that the current project will have any effect on this particular lava tube.

Section 6 Significance Assessments

Under federal and Hawai‘i state historic preservation legislation, archaeological inventory surveys are designed to identify, document, and provide significance and mitigation recommendations for historic properties. Due to FHWA funding, this project is a federal undertaking requiring compliance with Section 106 of the National Historic Preservation Act (NHPA) (under the Code of Federal Regulations Title 36 CFR Part 800), the National Environmental Policy Act (NEPA), and the Department of Transportation Act (DTA). Under Hawai‘i state historic preservation legislation (HAR Chapter 13-275-2), historic properties are defined as any "building, structure, object, district, area, or site, including *heiau* and underwater site, which is over fifty years old." A project's effect and potential mitigation measures are evaluated based on the project's potential impact to "significant" historic properties (those historic properties determined eligible, based on established significance criteria, for inclusion in the National/Hawai‘i Register). Determinations of eligibility to the National/Hawai‘i Register result when a state agency official's historic property "significance assessment" is approved by SHPD, or when SHPD itself makes an eligibility determination for an historic property (HAR Chapter 13-275).

The five criteria used (Criterion E is specific to the HRHP and not the NRHP) are:

A Associated with events that have made an important contribution to the broad patterns of our history;

B Associated with the lives of persons important in our past;

C Embodies the distinctive characteristics of a type, period, or method of construction, represents the work of a master, or possesses high artistic value;

D Have yielded, or is likely to yield information important for research on prehistory or history;

E Have an important value to the native Hawaiian people or to another ethnic group of the state due to associations with cultural practices once carried out, or still carried out, at the property, or due to associations with traditional beliefs, events or oral history accounts – these associations being important to the group's history and cultural identity.

No new historic properties were identified during the addendum study.

Section 7 Project Effect and Mitigation Recommendations

7.1 Project Effect

At this time, this project has an effect determination of “no effect,” based on the lack of findings during the addendum survey. However, the proposed project has the potential to adversely affect subsurface cultural resources presently unidentified, particularly resources that might be found within lava tubes.

The Kazumura Cave (SIHP 50-10-46-10001) underlies the current project area in the immediate vicinity of the intersection with Orchidland Drive (see Figure 8). It is asserted that: “Prehistoric use of the [Kazumura] cave by humans was heavy in the downstream nine kilometers nearest the ocean” (Allred and Allred 1997:67) – which would appear to include the vicinity of the portion of the lava tube underlying the present project area. A current survey conducted by Imata and Associates, Inc. did not identify any openings to this lava tube within the proposed Orchidland Drive Extension APE, and established that the ceiling of the cave lies between 16.5 and 30 feet below the Keaa‘au-Pāhoa Road surface (see Figure 9). Therefore, it is highly unlikely that the current project will have any effect on this particular lava tube.

The present AIS investigation identified one historic property just outside of the addendum APE: CSH 1, a late pre-contact or early historic terrace. This site is not expected to be adversely affected by the construction of the proposed Kaloli Drive extension. If the APE for this proposed extension was expanded to include the land under CSH 1, thorough documentation of this site would be necessary. In addition, the project effect and mitigation measures for this site would need to be established.

The recommended mitigation measures described below will reduce the project’s impact on significant historic properties and/or cultural resources that may be located within the addendum project area.

7.2 Mitigation Recommendations

Background research and the present addendum survey have indicated that there are lava tubes in the vicinity of the overall project corridor and within the current APE. Past findings in one of the lava tubes indicated this area was utilized by pre-contact Hawaiians. Thus it is possible that subsurface historic properties, associated with pre- and possibly post-contact land use, are present within both the original and addendum project areas. In order to mitigate the potential damage to these potential historic properties, it is recommended that project construction proceed under an archaeological monitoring program. Specifics of the archaeological monitoring would be addressed in the archaeological monitoring plan to be reviewed and approved by the SHPD. This monitoring program would facilitate the identification and proper treatment of any burials that might be discovered during project construction, and would gather information regarding the project’s non-burial archaeological deposits, should any be discovered.

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Appendix A SSFM-Compiled List of TMKs Affected by the Preferred Alternative for Access Management Improvements

TMK
Pōhaku Circle -makai side: About 2600' paved road upgraded to County Standards (50' ROW)
16010265
16010264
16010263
16010262
16010261
16010260
16010259
16010258
16010257
16010256
16010255
16010254
16010253
16010252
16010251
16010250
16010249
16010248
16010247
16010246
Pōhaku Circle - Mauka Side: About 2600' paved road upgraded to County Standards (50' ROW)
16010207
16010209
16010210
16010211
16010212
16010213
16010214
16010215
16010216
16010217
16010218
16010219
16010220

16010221
16010222
16010223
16010224
16010225
16010226
16010227
Kaloli Drive - New 650' Extension built to County Standards (60' ROW).
16010280
16010281
Uala/31st Avenue: Cul-de-sac constructed at Kaloli
15034181
15034182
15034216
New 750-foot Connector Road Extended between Uala/31st Avenue and Puakalo/30th Avenue (County Standards, 50' ROW)
15034193
15034168
15034194
15034167
34th Avenue - Makai Side- between Auli‘i Street and Ilima Street - Upgrade to County Standards (Paved 50' ROW)
16009208
16009207
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16009174
16009173
16009172
34th Avenue - Mauka Side- between Auli‘i Street and Ilima Street - Upgrade to County Standards (Paved 50' ROW)
16009109
16009110
16009111
16009112
16009113
16009114
16009115
16009116
16009117
16009118
16009119
16009120
16009121
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16009135
16009136
16009137
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16009143
16009144
16009083
New Extension of Makuu Drive between KP Road and 34th Avenue - 60' ROW - County Standards.
16009244
16009245
16009246
New Extension of Orchidland Drive between KP Road and Uhaloa/32nd Ave. built to 60-foot right of way width for length of approximately 350 feet.
15033251
15033250
Cul-de-Sac on Ilima Street at KP Road.
16009166
16009165
Upgrade Uhaloa/32nd Avenue - MAUKA SIDE - between Orchidland Extension & Paradise Drive to County Standards (60' ROW).
15033249
15033248
15033247
15033246
15033245
15033244
15033243

15033242
15033241
Upgrade of 32nd Avenue - MAKAI SIDE - between New Orchidland Extension and Paradise Drive to County Standards (60' ROW).
15033240
15017101
15033239
15033238
15033237
15033236
15033235
15033234
15033233
15033232
15033231
15033230
One Block of Paradise Drive Converted to one-way into HPP.
15033260
15017141

Appendix J-2: Draft EA Archaeological Inventory Survey

The Archaeological Inventory Survey from the Draft EA is incorporated here by reference. Consult the Draft EA for the full report.

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