STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

ADDENDUM NO. 1

FOR

HONOAPIILANI HIGHWAY REALIGNMENT, PHASE 1B-1,
LAHAINALUNA ROAD TO HOKIOKIO PLACE;

FEDERAL-AID PROJECT NO.: NH-030-1(38)

DISTRICT OF LAHAINA
ISLAND OF MAUI

FY 2010

Amend the bid documents as follows:

1. TABLE OF CONTENTS

Replace pages 1 and 2 dated 6/19/09, with the attached pages 1 and 2, dated r1/18/10.

2. SPECIAL PROVISIONS

a. Replace page 107-1a dated 7/01/08, with the attached pages 107-1a through 107-3a dated r1/18/10.

b. Replace page 109-1a dated 7/01/08, with the attached page 109-1a dated r1/18/10.

c. Replace page 203-1a dated 4/21/06, with the attached page 203-1a dated r1/19/10.

d. Add pages 212-1a through 212-5a dated 1/18/10.

e. Add page "ATTACHMENTS" after Federal Wage Rates.

3. PROPOSAL SCHEDULE

Replace pages P-8 through P-28 dated 12/4/09, with the attached pages P-8 through P-28 dated r1/18/10.

4. PLANS

Replace Plan Sheet Nos. 4, 8, 20, 21, 24, 27, 28, 31, 32, 44 to 52, 56 to 62, 71 to 73, 81, 83, 121, 137, 146, and 167 to 174; with the attached Plan Sheet Nos. ADD. 4, ADD. 8, ADD. 20, ADD. 21, ADD. 24, ADD. 27, ADD. 28, ADD. 31, ADD. 32, ADD. 44 to ADD. 52, ADD. 56 to ADD. 62, ADD. 71 to ADD. 73, ADD. 81, ADD. 83, ADD. 121, ADD. 137, ADD. 146, and ADD. 167 to ADD. 174.

5. PRE-BID CONFERENCE

Attached are the January 12, 2010 pre-bid conference meeting summary , handout, and attendance sheet.

6. FEDERAL WAGE RATES

Replace federal Wage Rates dated 10/23/09, with the attached Federal Wage Rates dated 1/8/10.

Please acknowledge receipt of this Addendum No. 1 by recording the date of its receipt in the space provided on Page P-4 of the Proposal.

BRENNON T. MORIOKA, Ph.D., P.E.
Director of Transportation

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Confirmation by DBE

Surety Bid Bond

SECTION 107 - LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

Make the following amendments to said Section:

(I) Amend **107.01(B)(1) – Commercial General Liability (Occurrence form)** as follows:

revise lines 61 to 62 to read:

"**(c)** Bodily Injury & Property Damage Insurance."

revise lines 64 to 65 to read:

"The State of Hawaii, its officers and employees, and property owners listed in Section 107.10 Furnishing Right-Of-Way, shall be as additional insureds under these coverages."

(II) Amend **107.01(B)(2) – Comprehensive Automobile Liability** as follows:

revise lines 71 to 72 to read:

"The State of Hawaii, its officers and employees, and property owners listed in Section 107.10 Furnishing Right-Of-Way, shall be as additional insureds under these coverages."

(III) Amend **107.01(B) – Types of Insurance** by adding the following after line 82.

"**(4) Builder's Risk:**

(a) New Buildings or Bridges. The Contractor shall take out a policy of builder's risk insurance, for the full replacement value of the insurable improvements of the project from a company licensed to do business in the State of Hawaii, covering all work, labor and materials furnished by such Contractor and all its subcontractors against loss by fire, windstorm, lightning, explosion and other perils covered by the standard Extended Coverage Endorsement, and vandalism and malicious mischief.

The State of Hawaii, its officers and employees, shall be as additional insureds under these coverages.

(b) Building or Bridge Renovation Contract. The Contractor shall take out a policy of builder's risk insurance in the amount equivalent to the contract amount, covering all work, labor and materials furnished by such Contractor and all its Subcontractors against loss by fire, windstorm, lightning, explosion and other perils covered by the Extended Coverage Endorsement, and vandalism and malicious mischief.

The State of Hawaii, its officers and employees, shall be as additional insureds under these coverages."

(IV) Amend **107.10 – Furnishing Right-Of-Way** by adding the following after line 279:

"The Department is processing Right of Entry Agreements with the following property owners, and the Contractor shall execute the Indemnification Agreement furnished by the Department, and shall mail the executed agreement to the current address of all property owners prior to construction:

(A) State of Hawaii, DLNR, TMK: (2) 4-6-14 Kauaula Stream

(B) B.P. Bishop Estate; TMK: (2) 4-6-18-03, TMK: (2) 4-6-14-02

(C) Pioneer Mill Co., Ltd.; TMK: (2)-4-6-18-02, TMK: (2)-4-6-15-01, TMK: (2)-4-6-14-04, TMK: (2)-4-6-14-01

(D) Kauaula Land Co., LLC; TMK: (2)-4-7-03-2, TMK: (2)-4-7-03-32, TMK: (2)-4-7-03-28, TMK: (2)-4-7-03-31

(E) deCarion Living Trust; TMK: (2)-4-7-03-30

(F) DLS Living Trust; TMK: (2)-4-7-03-29

(G) Robertson Living Trust; TMK: (2)-4-7-03-27."

(V) Amend **107.12 Protection of Persons and Property** by adding the following after line 356:

"(D) – Temporary Agricultural Road Access. The Contractor shall provide during the course of construction, temporary 12-foot wide gravel access road at proposed agricultural under crossing. The temporary gravel access road shall be used by agricultural vehicles as well as other means of transport used by families dwelling in Kauaula Valley. Contractor shall insure that temporary access road shall be adequately protected from construction activities. The limits of access road shall be

clearly marked by an orange safety fence and Type I Barricades with flashers. Cost of temporary access road shall be considered incidental to the 24 feet x 20 feet Agricultural Crossing."

(VI) Amend **107.16 (D) Material and Waste Brought to the Worksite** by adding the following after line 701:

"The Contractor shall not service or refuel any vehicles within private properties outside of the designated State right of way (including within construction parcels) without prior written consent from the landowner."

END OF 107

SECTION 109 – MEASUREMENT AND PAYMENT

Make the following amendment to said Section:

(I) Amend **Subsection 109.05 Allowances for Overhead and Profit** by revising lines 101 to 110 to read as follows:

"**(1)** 20 percent of the direct cost for any work performed by the Contractor's own labor force.

(2) 20 percent of the direct cost for any work performed by each subcontractor's own labor force.

(3) For the Contractor or any subcontractor for work performed by their respective subcontractor or tier subcontractor, 10 percent of the amount due to the performing subcontractor or tier subcontractor."

(II) Amend **Subsection 109.06 Force Account Provisions and Compensation** by adding the following after line 376:

"**(Q) Other Reimbursable Expenses.** Costs incurred by the Contractor for services rendered by other than subcontractors shall be allowed a 7% markup for overhead and profit. Examples of such services include, but are not limited to:

(1) Notice to Motorists;
(2) Payment to utility Companies for allowance items;
(3) Project trailer utilities;
(4) Rental fees;
(5) Surveying services;
(6) Traffic control services."

(III) Amend **Subsection 109.08(B) Payment for Material On Hand** by revising lines 421 to 423 to read as follows:

"**(2)** The materials shall be stored and handled in accordance with Subsection 105.14 – Storage and Handling of Materials and Equipment."

END OF SECTION 109

SECTION 203 – EXCAVATION AND EMBANKMENT

Make the following amendments to said Section:

(I) Amend **203.03(C)(2) – Relative Compaction Test** from line 240 to line 243 to read as follows:

"**(2) Relative Compaction Test.** Relative compaction test is a procedure for determining ratio of dry unit weight (density) of in-place soil to maximum dry unit weight of same soil. The Engineer shall perform the following tests:"

(II) Amend **203.03(C)(2)(a) – Maximum Dry Unit Weight** from line 245 to line 255 to read as follows:

> "**(a) Maximum Dry Unit Weight.** Test for maximum dry unit weight according to AASHTO T 180, and apply the correction for fraction larger than 3/4 inch. Use Hawaii Test Method HDOT TM 5 for sample preparation of sensitive soils when so designated by the Engineer."

(III) Amend **203.03(C)(3) – Compaction of Cut Areas and Embankments With Moisture and Density Tests** by deleting the last sentence of the first paragraph from line 269 to line 271.

END OF SECTION 203

Make the following Section a part of the Standard Specifications:

"SECTION 212 – ARCHAEOLOGICAL MONITORING

212.01 Description. This work includes archaeological monitoring of construction activities to identify, and provide mitigation for, archaeological resources and/or human burials that may be located in the project area.

212.02 Materials. None specified.

212.03 Construction. In addition to the requirements of Section 107.13 (B) - Archaeological, Historical, and Burial Sites, the Contractor shall obtain the services of a qualified archaeological firm to provide archaeological monitoring in accordance with the SHPD approved archaeological monitoring plan and as described herein.

212.04 Responsibilities of the Archaeological Monitor

Typical work will consist of on-site observation of surface and subsurface construction activities. Monitors will spend ten hours every week inspecting activities associated with removal of pushpiles designated to be removed and other construction activities. Emphasis will be on ground-disturbing work, such as clearing, grubbing, and grading, and the possible presence of subsurface deposits or unearthed artifacts.

Archaeological monitors will report to and coordinate with the Engineer. Scheduling requirements, reporting, and recommendations will be submitted to the Engineer.

Prior to beginning of fieldwork, the archaeological monitor will have a coordination meeting with the construction team to make them aware of the AMP and its stipulations.

Recording and sampling will be conducted in a manner that maximizes data on characteristics, location, and age of features and their depositional environments. Recording and sampling will also be conducted in a manner that minimizes impact to ongoing excavation work. Protection measures such as physical barriers will be installed in coordination with the archaeologist for sites threatened by the undertaking.

Archaeological monitors will be familiar with and comply with requirements of the Site Safety and Health Plan for the project.

212.05 Communications

Communications between the archaeological monitor and the construction contractor will be maintained throughout construction activities in order to

determine where intrusive activities are being undertaken, if those activities are in culturally sensitive areas, and whether or not cultural materials or features are identified in the excavations. To ensure that archaeological monitor is properly monitoring all areas of concern and that cultural resource site protection is successful, the following measures will be taken:

1 Maintain open communication lines with construction field supervisors and project managers;

2 Attend morning briefings on the once-weekly monitoring day;

3 Create maps showing correlation of cultural resource site locations and construction areas (as needed); and

4 Ascertain movement of construction teams throughout the project area.

The archaeological monitor shall maintain close communication with the Engineer regarding progress of the monitoring. Communication with these parties will include:

1 Verbal reports to each party on a weekly basis, depending on the nature of clearance activities and field findings;

2 In-field meetings at the contractor's field office upon request by the Engineer.

212.06 Excavation and Sampling

Test excavation, if necessary, will be conducted according to the following specifications. All excavated material will be passed through a minimum 1/4-inch mesh screen; however, 1/8-inch mesh will be used whenever possible. Any non-retained portion of the excavated material will be visually inspected for general compositional characteristics, artifacts, and/or significant cultural remains. All observations including depth of excavation from datum, plan view maps, and in situ location data will be recorded on standard excavation forms. If appropriate, redundant sets of archaeological materials will be retained.

Regarding specific excavation methodology (arbitrary levels or stratigraphic layers), decisions will be made by the Principal Investigator and Field Director based on the stratigraphic context of the unit. Soil, pollen, charcoal, and other sample types will be collected as deemed appropriate by supervisory personnel.

212.07 Documentation

All stages of the project will be fully documented in daily log and photographic

form. The daily log will contain data indicating time spent monitoring, sampling, and testing, the amount of sediment removed and its location, the presence or absence of cultural remains and/or significant soil strata, and the locations of all sampled areas.

212.08 Stratigraphic Documentation

Where subsurface cultural features are present, detailed stratigraphic profiles will be recorded. Additionally, where sampling or testing has been performed or where there is major sedimentary change, detailed stratigraphic profiles will also be recorded. Each week archaeological monitors will create one stratigraphic profile of excavation/ground disturbance that may be included in the final monitoring report. Profiles recorded in areas containing no cultural deposits will convey the general stratigraphy of the area in a manner that provides for future management needs.

In the event that test excavations are needed, detailed stratigraphic information will be recorded for at least one face of each excavation unit. If a test unit contains cultural features, all faces will be profiled.

All stratigraphic data will be described in accordance with current National Soil Survey Center and Munsell Color Notation conventions (Schoenberger et al. 1998; Munsell 1992).

212.09 Photographic Documentation

Weekly photos are to be taken of excavation/ground disturbance. All stages of fieldwork will be documented using 35mm film or digital photography. All in situ cultural features and surface artifacts will be photo-documented.

Two sets of photographic documentation will be delivered to POH. Documentation will consist of project photographs with corresponding photo logs. For the 35mm photographs, a contact sheet will be included as well as one set of negatives. The digital photographs will be submitted on Compact Disc (CD). Lastly, all project specific color photos, whether 35mm or digital, will be printed on high quality photo paper and included in an unbound final deliverable.

As needed, the archaeological monitor(s) will also shoot video of field discoveries, testing, and/or sampling. The video will be delivered in DVD format with explanatory text.

212.10 Measurement. The Engineer will measure archaeological monitoring, including remedial measures, on a force account basis according to Subsection 109.06 – Force Account Provisions and Compensation and as ordered by the Engineer.

212.11 Payment. The Engineer will pay for the accepted pay items listed below at the contract price per pay unit. Payment will be full compensation for the work prescribed in this section and the contract documents.

The Engineer will pay for the following pay items when included in the proposal schedule:

Pay Item	**Pay Unit**
Archaeological Monitoring	Force Account

An estimated amount for the force account is allocated as shown in the proposal schedule under 'Archaeological Monitoring' but the actual amount to be paid will be the sum shown on the accepted force account records, whether this sum be more or less than the estimated amount allocated in the proposal schedule.

The Engineer will not pay for work required that is due to the Contractor's convenience, negligence, carelessness or failure to properly monitor excavation activity."

DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION, HONOLULU, HAWAII

HAWAII STATE HISTORIC PRESERVATION APPROVAL
601 Kamokila Boulevard, Room 555, Kapolei, Hawaii 96707
(Telephone: 692-8015)

of

ARCHAEOLOGICAL MONITOR

of

HONOAPIILANI HIGHWAY REALIGNMENT, PHASE 1B1
LAHAINALUNA ROAD TO HOKIOKIO PLACE
FEDERAL-AID PROJECT NO. NH-030-1(38)
DISTRICT OF LAHAINA
ISLAND OF MAUI

The bidder shall include, on the Subcontractor Proposal Page of its bid, the name of a qualified person or firm to perform as an Archaeological Monitor for the subject project. The Archaeological Monitor will be required to coordinate and adhere to the approved Archaeological Monitoring Plan during the course of the excavation activities.

The bidder shall obtain the Hawaii State Historic Preservation Division's approval for the named archaeological monitor using the form provided and submit the completed to the Department of Transportation Contracts Office prior to award.

ARCHAEOLOGICAL MONITOR:		**BIDDER:**	
Firm	_____	Firm	_____
Address	_____	Address	_____
	_____		_____
Signature	_____	Signature	_____
Date	_____	Date	_____
Signer's Name	_____	Signer's Name	_____
Signer's Title	_____	Signer's Title	_____
Telephone	_____	Telephone	_____

HAWAII STATE HISTORIC PRESERVATION DIVISION APPROVAL:

Signature	_____	Date	_____
Signer's Name	_____	Signer's Title	_____
Telephone	_____	"	

END OF SECTION 212

ATTACHMENTS

The following are provided:

1) Geotechnical Investigation, on CD;

2) Archaeological Inventory Survey Documentation of Inadvertent Finds, on CD;

3) Addendum Report for Archaeological Inventory Survey Documentation of Inadvertent Finds, on CD;

4) Indemnification Agreement.

GEOTECHNICAL INVESTIGATION
HONOAPIILANI HIGHWAY
REALIGNMENT, PHASE 1B-1
FROM LAHAINALUNA ROAD
TO HOKIOKIO PLACE
LAHAINA, MAUI, HAWAII

for

AUSTIN TSUTSUMI & ASSOCIATES, INC.

HIRATA & ASSOCIATES, INC.
W.O. 08-4582
October 27, 2009

Hirata & Associates
Geotechnical Engineering
Hirata & Associates, Inc.
99-1433 Koaha Pl
Aiea, HI 96701
tel 808.486.0787
fax 808.486.0870

October 27, 2009
W.O. 08-4582

Mr. Terrance Arashiro
Austin, Tsutsumi & Associates, Inc.
501 Sumner Street, Suite 521
Honolulu, Hawaii 96817

Dear Mr. Arashiro:

Our report, "Geotechnical Investigation, Honoapiilani Highway Realignment, Phase 1B-1, From Lahainaluna Road to Hokiokio Place, Lahaina, Maui, Hawaii" dated October 27, 2009, our Work Order 08-4582 is enclosed. This investigation was conducted in general conformance with the scope of work presented in our proposal dated April 26, 2007.

The surface soil along Phase 1B-1 of the proposed highway realignment consisted of reddish brown to brown clayey silt and silty clay. The soils were in a medium stiff to stiff condition and ranged in thickness from less than 12 inches to about 8 feet. In the northern half of the site, the surface soil was underlain by dense to hard basalt down to the maximum depths drilled. In the southern section of the site, the surface soil was underlain by a stratum of cobbles and boulders in a matrix of silt, sand, and gravel. The cobble and boulder layer was in a dense to very dense condition to the maximum depths drilled in most borings. Borings B16, B18, and B19 encountered hard basalt below the cobbles and boulders. Neither groundwater nor seepage water was encountered in our borings.

Based on our exploratory fieldwork, laboratory testing, and analyses, it is our opinion that from a geotechnical viewpoint, the site can generally be developed as planned. Conventional shallow foundations may be used to support the Kauaula Stream bridge, as well as the proposed underpass, and culvert structures. Recommendations for site grading, as well geotechnical parameters for design of the various structures are presented in our report.

We appreciate this opportunity to be of service. Should you have any questions concerning this report, please feel free to call on us.

Very truly yours,

HIRATA & ASSOCIATES, INC.

Paul S. Morimoto

Paul S. Morimoto President

PSM:CCT

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APPENDIX A

APPENDIX B

GEOTECHNICAL INVESTIGATION
HONOAPIILANI HIGHWAY REALIGNMENT, PHASE 1B-1
FROM LAHAINALUNA ROAD TO HOKIOKIO PLACE
LAHAINA, MAUI, HAWAII

INTRODUCTION

This report presents the results of our geotechnical investigation performed for the proposed Phase 1B-1 of the Honoapiilani Highway realignment project in Lahaina, Maui. Our services for this study included the following:

- A visual reconnaissance of the site to observe existing conditions which may affect the project. The general location of the project site is shown on the enclosed Location Map, Plate A2.1.

- A review of available in-house soils information pertinent to the site and the proposed project.

- Drilling and sampling 30 exploratory test borings to depths ranging from about 15 to 85 feet. A description of our field investigation is summarized on Plates A1.1 and A1.2. The approximate exploratory test boring locations are shown on the enclosed Boring Location Plans, Plates A2.2 through A2.5, and the soils encountered in the borings are described on the Boring Logs, Plates A4.1 through A4.49.

- Laboratory testing of selected soil samples. Testing procedures are presented in the Description of Laboratory Testing, Plates B1.1 and B1.2. Test results are presented in the Description of Laboratory Testing, on the Boring Logs, Consolidation Test reports, (Plates B2.1 through B2.3), Direct Shear Test reports (Plates B3.1 through B3.4), Modified Proctor Test reports (Plates B4.1 through B4.4), California Bearing Ratio Test reports, (Plates B5.1 through B5.3), R-value Test reports, (Figures B6.1 through B6.6), and Rock Core Unconfined Compression Test reports, (Plate B7.1).

- Engineering analyses of the field and laboratory data.

- Preparation of this report presenting geotechnical recommendations for the design of culvert and stream crossing foundations, including seismic considerations, resistance to lateral pressures, and site grading.

PROJECT CONSIDERATIONS

Phase 1B-1 of the proposed Honoapiilani Highway Realignment extends from approximately Station 298 to Station 386, for a total of about 8,800 lineal feet. The highway will have an ultimate section consisting of four 12-foot wide lanes, a 10-foot right-hand shoulder, a 4-foot left-hand should, and a 34-foot landscaped median. During the initial construction phase, the full roadway prism will be mass graded, but only the Mauka northbound lanes will be constructed. The Makai southbound lanes will be constructed when traffic volumes warrant the improvements.

The highway will require eight culvert crossings at various locations, one stream crossing at Kauaula Stream, and a grade separation structure/underpass for residents of Kauaula Valley. The culverts will include either multiple 8 feet by 8 feet and 8 feet by 10 feet reinforced concrete boxes or precast concrete arches, as well as reinforced concrete pipes ranging from 36 to 60 inches in diameters. The underpass structure will be about 17 feet wide and 20 feet high, and the Kauaula Stream crossing will be a single span bridge, about 100 feet in length.

Grading along the highway alignment will include significant cuts and fills. Cuts will generally be located in the northern portions of the alignment, with maximum cuts on the order of 20 feet and maximum cut slope heights of about 32 feet. Fills will generally be in the southern section of the alignment, with maximum fill heights of about 25 feet and maximum fill slope heights on the order of 30 feet. Preliminary plans indicate that the cut and fill slopes will have 2H:1V slope gradients.

SITE CONDITIONS

The proposed realigned highway will be located on the Mauka side of existing Honoapiilani Highway in Lahaina, Maui. Phase 1B-1 of the proposed highway begins approximately 900 feet south of Lahainaluna Road and ends about 900 feet south of Hokiokio Place.

The new road will generally extend through open lands and banana fields, with ground elevations ranging from about +240 at the north end of the alignment, to about +102 at the south end.

Large boulder stockpiles and boulder/soil mounts were observed along the proposed alignment in the southern section of the site. At the time of our fieldwork, boulder crushing operations were also observed near the boulder mounts.

SOIL CONDITIONS

The surface soil consisted of reddish brown and brown clayey silt and silty clay in a medium stiff to stiff condition. The clayey silt and silty clay extended to the depths ranging from less than 12 inches to about 8 feet. Cobbles and boulders were also encountered within the surface soil layer.

Underlying the surface soil in the northern half of the site (Borings B1 through B15) was basalt extending down to the maximum depths drilled. The basalt strata varied from dense and completely weathered to hard and slightly weathered conditions. Numerous clinker pockets were encountered within the basalt stratum. The clinker layers varied from about 12 inches to several feet in thickness.

Underlying the surface soil in the southern half of the site was older alluvium consisting of cobbles and boulders in a matrix of silt, sand, and gravel. The cobble and boulder layer was in a dense to very dense condition, while the boulders were hard and ranged from about 1 to 4 feet in maximum dimension. Hard basalt was encountered below the cobble and boulder layer in borings B16, B18, and B19. In the remaining borings, the cobbles and boulders extended down to the maximum depths drilled.

Borings B22 through B25, drilled adjacent to Kauaula Stream, encountered the older alluvium (cobble and boulder layer) at depths ranging from about 12 inches to 4.5 feet, extending down to the maximum depths drilled to about 85 feet. The cobbles and boulders were hard, and were densely packed in a matrix of silt, sand, and gravel. In some sections, the silt and sand matrix was also partially to completely cemented and was in a medium hard to hard condition.

Neither groundwater nor seepage water was encountered in our test borings at the time of our fieldwork.

CONCLUSIONS AND RECOMMENDATIONS

Based on our test borings, cuts in the northern section of the proposed roadway alignment will generally encounter dense to hard basalt. Excavations extending into the hard basalt will require pneumatic equipment. The excavated basalt may be used as fill material, provided the rock is crushed or processed to a well-graded granular fill material.

Existing boulder stockpiles and boulder/soil mounts located in the southern section of the site should be removed. The boulders may be reused in boulder fills or crushed/processed to well-graded granular fill material.

We understand that Kauaula Stream was determined to be relatively stable and that significant scour is not anticipated. As a result, conventional shallow foundations founded on the dense to very dense cobble and boulder stratum may be used to support the proposed Kauaula Stream bridge.

Site Grading

Site Preparation - The project site should be cleared of all vegetation, large tree roots, and other deleterious material. Prior to placement of fill, the existing ground should first be scarified to a depth of six inches, moistened to about 2 percent above optimum moisture content, and compacted to a minimum 90 percent compaction as determined by AASHTO T-180 (ASTM D 1557). Underlying soft or loose soils, indicated by pumping conditions, should be removed and replaced with either approved onsite material or imported granular structural fill.

Existing boulder mounts within the proposed roadway limits should be also removed. The boulders may be reused in boulder fills or crushed/processed to well-graded granular fill material.

Proofrolling - Grading is expected to expose basalt at pavement subgrade elevation in the northern section of the new highway. In order to detect and collapse potential near surface cavities in the basalt stratum, proofrolling should be performed prior to construction of the roadway pavement after the site has been graded to approximate finish subgrade. The proofrolling should be performed using a large vibratory drum roller with a minimum static weight of 15 tons or a heavy bulldozer for a minimum of eight passes. Yielding areas or cavities disclosed during the proofrolling operations should be exposed and properly backfilled with compacted fill or controlled low strength material (CLSM).

Excavation - Excavations into the surface soils and highly to completely weathered basalt can be accomplished using conventional earth moving equipment. However, excavations into the underlying hard basalt stratum may require pneumatic equipment.

Slope Gradients - Fill slopes and cut slopes exposing surface soil and highly to completely weathered basalt should be stable at gradients of 2:1 (horizontal to vertical) or flatter. Fill slopes exceeding 30 feet in height should include benches at least 8 feet in width. The benches should be constructed at intervals not exceeding 30 feet in vertical height.

Fill slopes should be constructed from the bottom up. Structural and embankment fill should be continually benched into existing slopes as the fill is brought up in lifts. The benches should extend into competent material and wide enough for compaction equipment to work effectively. Minimum bench width should be about 6 feet while minimum bench heigh should be 2 feet. Fill slopes should be constructed by overfilling and cutting back to the design slope gradient to obtain a well-compacted slope face.

Cut slopes exposing hard basalt should be stable at gradients of 1H:1V or flatter.

Where applicable, all slopes should be planted as soon as practical upon completion of grading to reduce the effects of erosion and weathering.

Onsite Fill Material - The surface reddish brown to brown clayey silt and silty clay may be reused in embankment fills, provided all rock fragments larger than 6 inches in maximum dimension are removed. In addition, the moisture content of the soil should be maintained at about 2 percent above the optimum moisture content during recompaction. Due to the relatively low R-values of the surface clayey silt and silty clay, the clayey silt and silty clay should not be reused as compacted fill within 3 feet of pavement finish subgrade.

The excavated basalt and boulders may be reused in compacted fills provided the material is crushed to a well-graded consistency, and all rock fragments larger than six inches in maximum dimension are removed.

Imported Fill Material - Imported structural fill should be well-graded, non-expansive granular material. Specifications for imported granular structural fill should indicate a maximum particle size of 3 inches, and state that between 8 and 20 percent of soil by weight shall pass the #200 sieve. In addition, the plasticity index (P.I.) of that portion of the soil passing the #40 sieve shall not be greater than 10. Imported fill should also have a minimum CBR value of 20 and a CBR expansion potential no greater than 1.0 percent when tested in accordance with AASHTO T-193 (ASTM D 1883).

Boulder Fill - Boulder disposal may be permitted in deeper fill areas where no structures or improvements are planned. Boulders should not be placed within 5 feet of finish grade, nor within 10 feet of slope faces, measured horizontally. Boulder fill should also not be placed in anticipated utility line alignments nor within the depths of the anticipated utility lines.

The size of the boulders should be limited to approximately 36 inches in diameter. Boulders larger than 36 inches in maximum dimension should not be used unless reduced in size. The boulders should be placed in relatively level areas and in a manner that reduces the potential for the formation of voids. Voids between boulders should be filled using sand and gravel material, water jetted into place. Each boulder layer should be limited to 36 inches in thickness.

A 12-inch thick choke layer, consisting of 6-inch minus material, should be placed over each boulder layer. The choke layers should be compacted in lifts to the recommended standards as indicated in the *Compaction* section below.

Compaction - All fill placement should be in accordance with the Hawaii Standard Specifications for Road, Bridge, and Public Works Construction. Fill placed in areas which slope steeper than 5H:1V should be continually benched as the fill is brought up in lifts.

Compaction testing of the boulder layer is generally not practical. The boulder layer should be compacted to a dense, non-yielding condition with a Caterpillar D-9 bulldozer, or similar sized heavy construction equipment. In general, the number of passes required for proper compaction should be determined at the start of boulder fill placement by performing a trial test pad. The choke layer placed over the boulder layer should be compacted in horizontal lifts to a minimum 95 percent compaction as determined by AASHTO T-180 (ASTM D 1557).

Foundations - Kauaula Stream Crossing

Conventional spread footings founded on the older alluvium consisting of dense to very dense cobbles and boulders in a in a matrix of silt, sand, and gravel may be used to support the proposed bridge structure. However, in order to provide more uniform support over the boulder material and to avoid hard spots, we recommend

that at least 18 inches of compacted base course be placed between the cobbles and boulders and the concrete footings.

Footings may be designed for bearing values of 6,750 and 15,000 pounds per square foot for strength limit states and extreme event limit states, respectively. A bearing value of 5,000 pounds per square foot may be assumed for service limit states.

Spread footings should be a minimum of 16 inches in width and embedded at least 24 inches below finish adjacent grade. In addition, footings should be embedded such that a minimum horizontal distance of 8 feet is maintained between the bottom edge of footing and slope face.

The footing subgrade should be clean of all loose material prior to placement of the aggregate base course. Loose and soft soil exposed at the bottom of footing excavations should be removed down to competent material and replaced with aggregate base course. The replacement aggregate base course as well as the recommended 18-inch base course layer should be compacted in 8-inch loose lifts to a minimum 95 percent compaction as determined by AASHTO T-180 (ASTM D 1557).

Foundations - Underpass and Culvert Structures

Foundation excavations for the underpass and culvert structures are expected to expose basalt, cobbles and boulders, and new compacted fill. Conventional spread footings may be used to support the proposed structures. To provide more uniform support, footings excavations exposing cobbles and boulders should be underlain by at least 12 inches of base course. The base course should be compacted to a minimum 95 percent compaction.

Footings may be designed for bearing values of 6,000 and 12,000 pounds per square foot for strength limit states and extreme event limit states, respectively for

foundations founded on new compacted fill and cobbles and boulders. A bearing value of 4,000 pounds per square foot may be assumed for service limit states. For footings founded on basalt, higher bearing values of 6,000, 11,000, and 20,000 pounds per square foot may be used for service, strength, and extreme event limit states respectively. To reduce potential differential settlement, footings supporting the same structure should be founded on the same material and designed for the same bearing pressures.

Spread footings should be a minimum of 16 inches in width and embedded at least 24 inches below finish adjacent grade. Footings located on and near the top of the slope should be embedded such that a minimum horizontal distance of 5 feet is maintained between the bottom edge of footing and slope face.

The bottom of footing excavation should be clean of all loose material. Soft and loose pockets exposed at footing subgrade should be completely removed and replaced with aggregate base course. The base course should be compacted in 8-inch loose lifts to a minimum 95 percent compaction as determined by AASHTO T-180 (ASTM D 1557).

All loose material should be removed prior to placement of reinforcing steel and concrete.

Seismic Design

Based on our borings advanced for this study and our knowledge of the deep soil conditions in the area, the soil profile at the site may be classified as a Site Class C at the Kauaula Stream crossing. Based on 2008 design criteria provided by the State of Hawaii - Department of Transportation, Highway Division, the project site will need to be designed based on a seismic acceleration coefficient of 0.28g.

Lateral Design

Resistance to lateral loading may be provided by friction acting at the base of foundations, and by passive earth pressure acting on the buried portions of foundations.

For footings founded on cobbles and boulders and new fill, coefficients of friction of 0.46, and 0.58 may be used with the dead load forces to compute friction acting at the base of foundations for strength limit state and extreme event limit state, respectively. Coefficients of friction of 0.6 and 0.7 for strength and extreme event limit states respectively may be assumed for footings founded on basalt.

Passive earth pressure may be computed as an equivalent fluid having a density of 200 and 400 pounds per cubic foot for strength limit state and extreme event limit state, respectively. Unless covered by pavement or concrete slabs, the upper 12 inches of soil should not be considered in computing lateral resistance.

For design of abutment walls, culvert head walls, and other retaining structures the following equivalent fluid pressures may be used.

Soil Type	Level Backfill Condition	Sloping Backfill Condition	Restrained/ At-rest Condition
Onsite Soil	37 pcf	53 pcf	57 pcf
Compacted Fill	37 pcf	53 pcf	57 pcf
Basalt	25 pcf	25 pcf	25 pcf

For dynamic lateral earth pressure considerations, a dynamic lateral force of $4.5H^2$ pounds per lineal foot of wall length may be used for level backfill conditions where walls are free to translate up to 2 to 3 inches or rotate. For walls that are restricted to lesser movement of less than 0.5 inches, a dynamic lateral earth pressure of $17H^2$

is recommended. H is the height of retained soil or backfill in feet. A dynamic lateral force of $18H^2$ pounds per lineal foot of wall length may be assumed for sloping backfill conditions where walls are free to translate up to 2 to 3 inches or rotate. The dynamic lateral force may be assumed to act through the mid-height of the wall. The dynamic lateral earth pressures are in addition to the static earth pressures.

To prevent buildup of hydrostatic pressures, retaining structures should be well-drained. Standard practice consists of placing a minimum 12-inch thick layer of free-draining gravel at the back of the wall. The gravel should extend from the base of the wall, around subdrains and/or weepholes, and up to within 12 inches of finish grade. Alternatively, prefabricated drainage geocomposites, such as Miradrain or J-drain, may be used in lieu of the free-draining gravel. As with the free-draining gravel, the drainage geocomposites should be placed at the back of the wall, be connected with the weepholes and/or subdrains (in accordance with manufacturers specifications), and extend to within 12 inches of finish grade. For freestanding walls, the drainage system should be covered by at least 12 inches of compacted, low permeability soil, such as the onsite clayey silt and silty clay.

Foundation Settlement

Based on a bearing value of 5,000 pounds per square foot for service limit states, settlement of the Kauaula Stream bridge abutment is expected to be less than 5/8 inch. Much of the settlement is expected to occur during construction, upon initial application of loads.

Bridge Approach Slabs

If approach slabs behind the bridge abutments are required, we recommend that the slabs be at least 20 feet in length. The slabs should be underlain by at least 6 inches of aggregate base course. The base course and subgrade should be compacted to a

minimum 95 percent compaction as determined by AASHTO T-180 (ASTM D 1557).

ADDITIONAL SERVICES

We recommend that we perform a general review of the final design plans and specifications. This will allow us to verify that the foundation design and earthwork recommendations have been properly interpreted and implemented in the design plans and construction specifications.

For continuity, we recommend that we be retained during construction to (1) observe fill placement and perform compaction testing, (2) observe footing excavations prior to placement of base course, reinforcing steel and concrete, (3) review and/or perform laboratory testing on import borrow to determine its acceptability for use in compacted fills, and (4) provide geotechnical consultation as required. Our services during construction will allow us to verify that our recommendations are properly interpreted and included in construction, and if necessary, to make modifications to those recommendations, thereby reducing construction delays in the event subsurface conditions differ from those anticipated.

LIMITATIONS

The boring logs indicate the approximate subsurface soil conditions encountered only at those times and locations where our test borings were made, and may not represent conditions at other times and locations.

This report was prepared specifically for Austin, Tsutsumi and Associates, Inc. and their sub-consultants for design of Phase 1B-1 of the proposed Honoapiilani Highway Realignment in Lahaina, Maui. The boring logs, laboratory test results, and recommendations presented in this report are for design purposes only, and are not intended for use in developing cost estimates by the contractor.

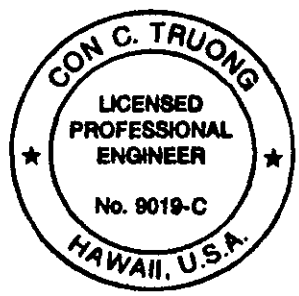
During construction, should subsurface conditions differ from those encountered in our test borings, we should be advised immediately in order to re-evaluate our recommendations, and to revise or verify them in writing before proceeding with construction.

Our recommendations and conclusions are based upon the site materials observed, the preliminary design information made available, the data obtained from our site exploration, our engineering analyses, and our experience and engineering judgement. The conclusions and recommendations are professional opinions which we have strived to develop in a manner consistent with that level of care, skill, and competence ordinarily exercised by members of the profession in good standing, currently practicing under similar conditions in the same locality. We will be responsible for those recommendations and conclusions, but will not be responsible for the interpretation by others of the information developed. No warranty is made regarding the services performed under this agreement, either express or implied.

Respectfully submitted,

HIRATA & ASSOCIATES, INC.

Con C. Truong, P.E.



This work was prepared by
me or under my supervision
Expiration Date of License:
April 30, 2010

APPENDIX A

FIELD INVESTIGATION

DESCRIPTION OF FIELD INVESTIGATION

GENERAL

The site was explored between August 21, 2008 and June 2, 2009, by performing a visual site reconnaissance and drilling 30 exploratory test borings to depths ranging from about 15 to 85 feet with a Mobile B53 truck-mounted drill rig.

During drilling operations, the soils were continuously logged by our field engineer and classified by visual examination in accordance with the Unified Soil Classification System. The boring logs indicate the depths at which the soils or their characteristics change, although the change could actually be gradual. If the change occurred between sample locations, the depth was interpreted based on field observations. Classifications and sampling intervals are shown on the boring logs. A Boring Log Legend is presented on Plate A3.1; the Unified Soil Classification and Rock Weathering Classification Systems are shown on Plates A3.2 and A3.3, respectively. The soils encountered are logged on Plates A4.1 through A4.49.

Boring locations were located in the field by measuring/taping offsets from existing site features shown on the plans. The accuracy of the boring locations shown on Plates A2.2 through A2.5 are therefore approximate, in accordance with the field methods used. Ground surface elevations at boring locations were estimated using a topographic survey map provided by Austin, Tsutsumi & Associates, Inc.

SOIL SAMPLING

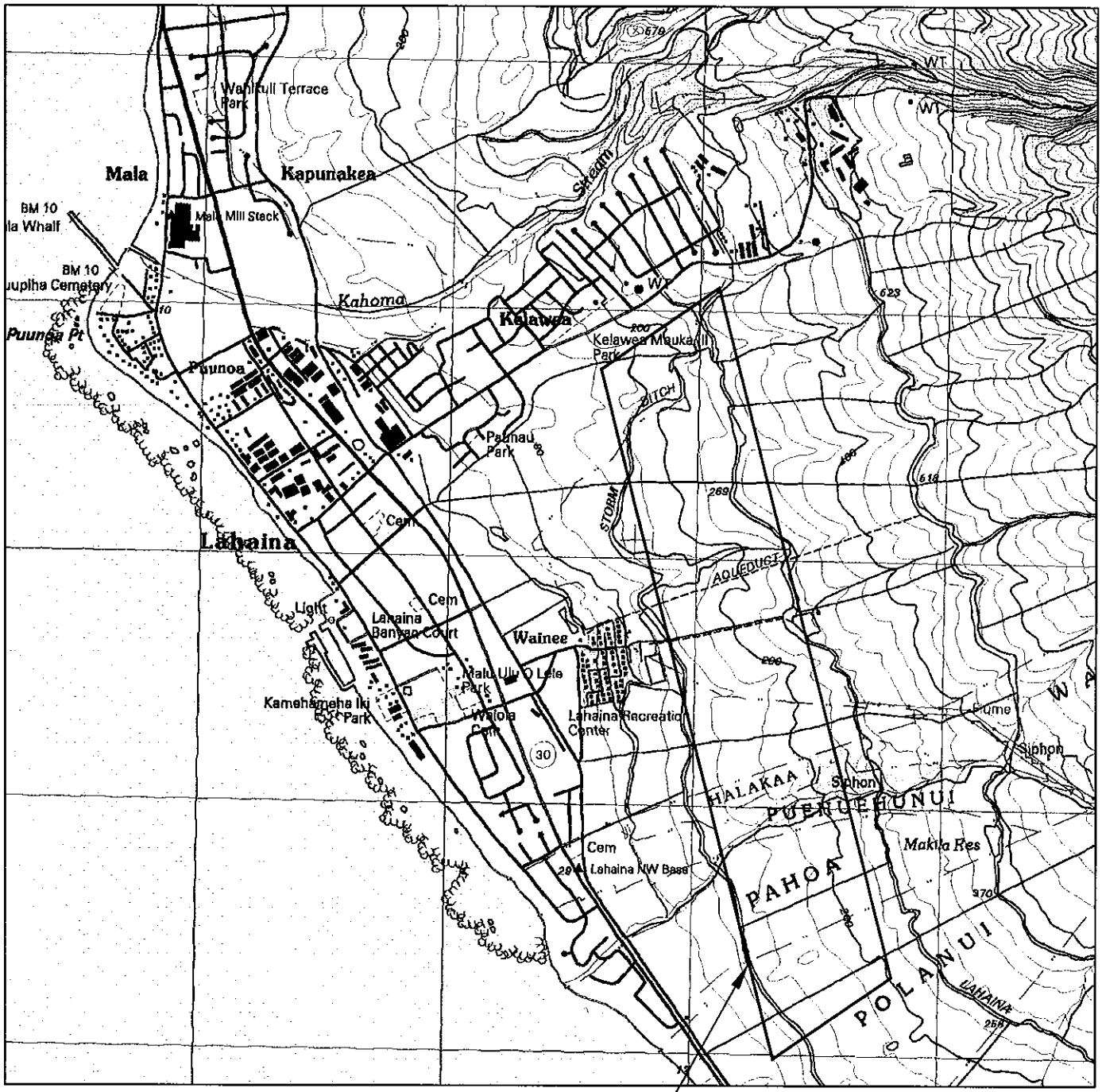
Representative soil samples and core samples of basalt and boulders were recovered from the borings for selected laboratory testing and analyses. Representative samples were recovered by driving a 3-inch O.D. split tube sampler a total of 18 inches with a 140-pound hammer dropped from a height of 30 inches. The number of blows required to drive the 3-inch O.D. split tube sampler the final 12 inches as well as blows counts from standard split spoon sampler are recorded at the appropriate depths on the boring logs, unless noted otherwise.

Core samples were obtained by drilling with NX and HQ core barrels having an inside diameter of 2.1 and 2.5 inches, respectively. The depths and recovery percentages for each core run are shown on the enclosed Boring Logs. The rock quality designation (RQD) for each core run is also shown on the Boring Logs. This is a modified core recovery percentage which takes into account the number of fractures observed in the core samples. Only pieces of core 4 inches in length or longer, as measured along the centerline, were included in the determination of this modified core recovery percentage. Fractures caused by drilling or handling were ignored.

The following is a general correlation between RQD percentages and rock quality.

RQD (%)	Description of Rock Quality
0 - 25	Very Poor
25 - 50	Poor
50 - 75	Fair
75 - 90	Good
90 - 100	Excellent

Reference: Tunnel Engineering Handbook, Second Edition, edited by J.O. Bickel, T.R. Kuesel, and E.H. King, 1996.

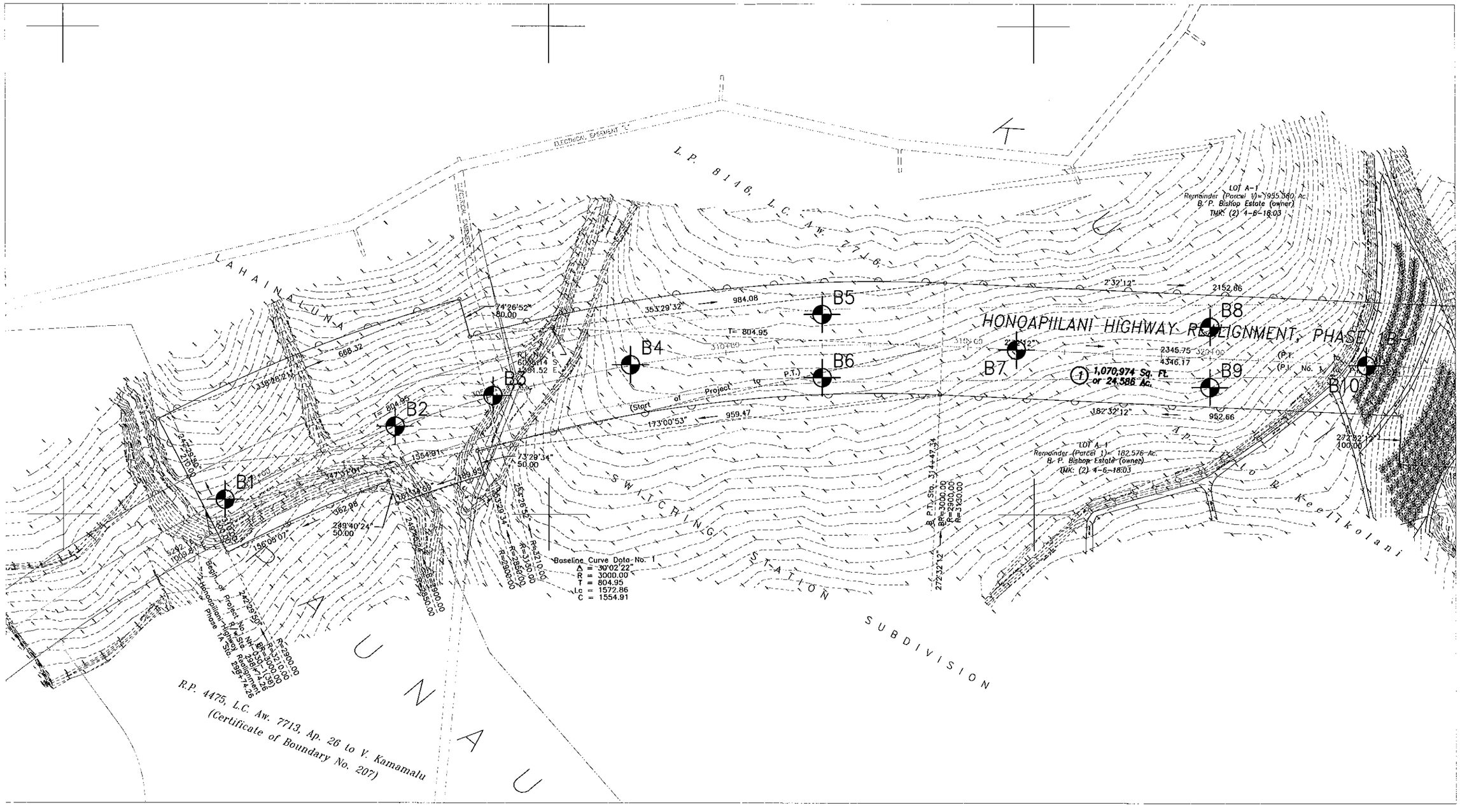


2000 1000 0 2000 FT.

GRAPHIC SCALE

Reference: Topographic quadrangle map prepared by the United States Department of the Interior Geologic Survey Lahaina Quadrangle, Maui County, Hawaii. 1992.

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	LOCATION MAP Plate A2.1



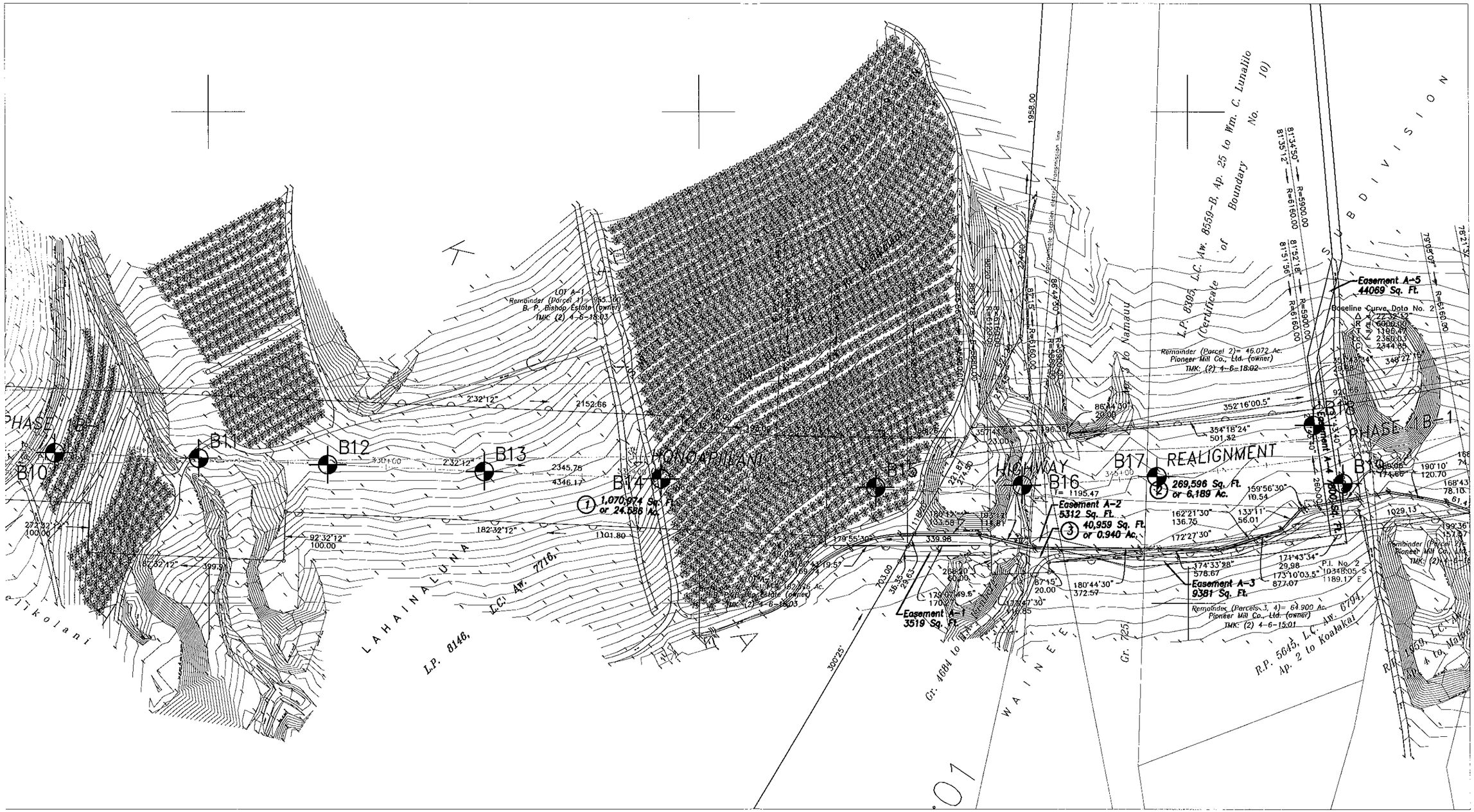
LEGEND:

Approximate location of borings

Reference: AutoCAD file of topographic survey map provided by Austin, Tsutsumi & Associates, Inc.

GRAPHIC SCALE:
0 100 200 400FT.
1" = 200'

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	BORING LOCATION PLAN Plate A2.2



LEGEND:

Approximate location of borings

Reference: AutoCAD file of topographic survey map provided by Austin, Tsutsumi & Associates, Inc.

GRAPHIC SCALE:
0 100 200 400FT.
1" = 200'

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	BORING LOCATION PLAN Plate A2.3

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	BORING LOCATION PLAN Plate A2.4

LEGEND:

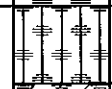
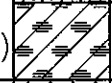
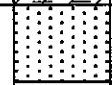
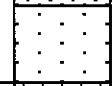
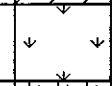
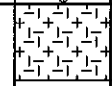
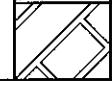
Approximate location of borings

Reference: AutoCAD file of topographic survey map provided by Austin, Tsutsumi & Associates, Inc.

GRAPHIC SCALE:
0 100 200 400FT.
1" = 200'

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	BORING LOCATION PLAN

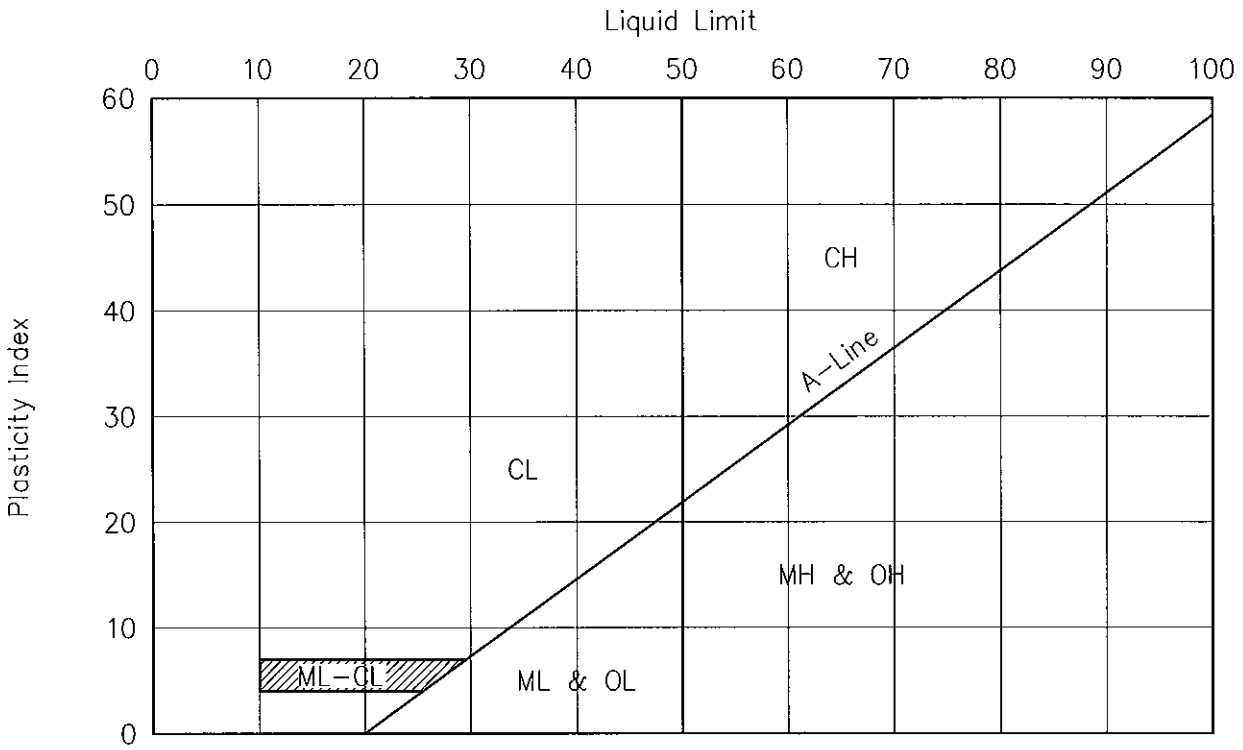
Plate A2.5

MAJOR DIVISIONS			GROUP SYMBOLS		TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of the material is LARGER than No. 200 sieve size.)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size.)	CLEAN GRAVELS (Little or no fines.)		GW	Well graded gravels, gravel–sand mixtures, little or no fines.
				GP	Poorly graded gravels or gravel–sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines.)		GM	Silty gravels, gravel–sand–silt mixtures.
				GC	Clayey gravels, gravel–sand–clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size.)	CLEAN SANDS (Little or no fines.)		SW	Well graded sands, gravelly sands, little or no fines.
				SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines.)		SM	Silty sands, sand–silt mixtures.
				SC	Clayey sands, sand–clay mixtures.
FINE GRAINED SOILS (More than 50% of the material is SMALLER than No. 200 sieve size.)	SILTS AND CLAYS (Liquid limit LESS than 50.)			ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
				CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
				OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50.)			MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
				CH	Inorganic clays of high plasticity, fat clays.
				OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS				PT	Peat and other highly organic soils.
					FRESH TO MODERATELY WEATHERED BASALT
					VOLCANIC TUFF / HIGHLY TO COMPLETELY WEATHERED BASALT
					CORAL

SAMPLE DEFINITION		
2" O.D. Standard Split Spoon Sampler	Shelby Tube	RQD Rock Quality Designation
3" O.D. Split Tube Sampler	NX / 4" Coring	Water Level

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1
Hirata & Associates, Inc.	BORING LOG LEGEND Plate A3.1

PLASTICITY CHART



GRADATION CHART

COMPONENT DEFINITIONS BY GRADATION	
COMPONENT	SIZE RANGE
Boulders	Above 12 in.
Cobbles	3 in. to 12 in.
Gravel Coarse gravel Fine gravel	3 in. to No. 4 (4.76 mm) 3 in. to 3/4 in. 3/4 in. to No. 4 (4.76 mm)
Sand Coarse sand Medium sand Fine sand	No. 4 (4.76 mm) to No. 200 (0.074 mm) No. 4 (4.76 mm) to No. 10 (2.0 mm) No. 10 (2.0 mm) to No. 40 (0.42 mm) No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and clay	Smaller than No. 200 (0.074 mm)

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1
Hirata & Associates, Inc.	UNIFIED SOIL CLASSIFICATION SYSTEM Plate A3.2

Grade	Symbol	Description
Fresh	F	No visible signs of decomposition or discoloration. Rings under hammer impact.
Slightly Weathered	WS	Slight discoloration inwards from open fractures, otherwise similar to F.
Moderately Weathered	WM	Discoloration throughout. Weaker minerals such as feldspar decomposed. Strength somewhat less than fresh rock but cores cannot be broken by hand or scraped by knife. Texture preserved.
Highly Weathered	WH	Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct but fabric preserved.
Completely Weathered	WC	Minerals decomposed to soil but fabric and structure preserved (Saprolite). Specimens easily crumbled or penetrated.
Residual Soil	RS	Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.

Reference: Soils Mechanics, NAVFAC DM-7.1, Department of the Navy, Naval Facilities Engineering Command, September, 1986.

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1
Hirata & Associates, Inc.	ROCK WEATHERING CLASSIFICATION SYSTEM Plate A3.3

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B1 DRIVING WT. 140 lb. START DATE 8/21/08

SURFACE ELEV. 224±* DROP 30 in. END DATE 8/21/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Clayey SILT (ML) – Reddish brown, moist, stiff to very stiff, with gravel.
			54	76	27	
			37	61	27	
5			31	70	35	BASALT (WH-WC) – Dark gray, moist, dense, highly to completely weathered, with volcanic clinker. Grayish brown in color from 7 feet.
10			50/No Penetration			BASALT (WS) – Gray, hard, slightly fractured, slightly weathered. Begin NX coring at 10 feet. 100% Recovery from 10 to 15 feet. RQD = 100%
15						87% Recovery from 15 to 20 feet. RQD = 78%
20						95% Recovery from 20 to 25 feet. RQD = 78% Moderately fractured from 23 feet.
25						92% Recovery from 25 to 30 feet. RQD = 53%
30						GRAVEL AND COBBLES – Brownish gray, medium hard, partially cemented. (Welded Volcanic Clinker)

Plate A4.1

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B1 (Continued) DRIVING WT. 140 lb. START DATE 8/21/08

SURFACE ELEV. 224± DROP 30 in. END DATE 8/21/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						BASALT (WS) – Gray, hard, slightly fractured, slightly weathered. 90% Recovery from 30 to 35 feet. RQD = 53% Volcanic clinker at 31 feet.
35						End boring at 35 feet. Neither groundwater nor seepage water encountered. * Elevations based on a topographic survey map provided by Austin, Tsutsumi & Associates, Inc.
40						
45						
50						
55						
60						

Plate A4.2

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B2 DRIVING WT. 140 lb. START DATE 8/22/08

SURFACE ELEV. 214± DROP 30 in. END DATE 8/22/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (CL) – Reddish brown, moist, stiff, with highly weathered rock.
			50/5"		8	
5						BASALT (WS) – Gray, hard, slightly fractured, slightly weathered. Begin NX coring at 4 feet. 80% Recovery from 4 to 9 feet. RQD = 70%
10						100% Recovery from 9 to 14 feet. RQD = 83% Highly to moderately weathered from 9 to 11 feet.
15						100% Recovery from 14 to 19 feet. RQD = 92%
						CEMENTED SAND AND GRAVEL – Mottled reddish brown, medium hard. (Welded Volcanic Clinker)
20						End boring at 19 feet. Neither groundwater nor seepage water encountered.
25						
30						

Plate A4.3

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B3 DRIVING WT. 140 lb. START DATE 8/22/08

SURFACE ELEV. 215± DROP 30 in. END DATE 8/25/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			36	77	17	Silty CLAY (CL) – Reddish brown, moist, stiff, with gravel.
			45	81	27	
5			24/6" 50/2"	89	21	BASALT (WH) – Dark gray, moist, dense, highly weathered.
10						BASALT (WS) – Gray, hard, slightly fractured, slightly weathered. Begin NX coring at 9 feet. 88% Recovery from 9 to 14 feet. RQD = 47%
15						GRAVEL (GP) – Gray, dense to medium hard, inter-layered with basalt. 81% Recovery from 14 to 17 feet. RQD = 22% 94% Recovery from 17 to 20 feet. RQD = 44%
20						BASALT (WS) – Gray, hard, slightly fractured, slightly weathered. End boring at 20 feet. Neither groundwater nor seepage water encountered.
25						
30						

Plate A4.4

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B4 DRIVING WT. 140 lb. START DATE 8/25/08

SURFACE ELEV. 235± DROP 30 in. END DATE 8/26/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			10/No Penetration			Silty CLAY (CL) – Reddish brown, moist, stiff. Boulder from 0.5 to 3.5 feet.
			10/No Penetration			
5			17	63	20	BASALT (WH–WC) – Dark grayish brown, moist, medium dense, highly to completely weathered. Dense from 6.5 feet.
10			10/No Penetration			BASALT (WS) – Gray, hard, slightly weathered.
15			22	86	6	GRAVEL (GP) – Mottled reddish brown, slightly moist, medium dense. (Volcanic Clinker)
20						BASALT (WS) – Gray, hard, slight to moderately fractured, slightly weathered. Begin NX coring at 19 feet. 90% Recovery from 19 to 24 feet. RQD = 55% Weathered seam at 20 feet.
25						90% Recovery from 24 to 29 feet. RQD = 48%
30						Volcanic clinker from 28 to 31 feet. 93% Recovery from 29 to 34 feet. RQD = 63%

Plate A4.5

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B4 (Continued) DRIVING WT. 140 lb. START DATE 8/25/08

SURFACE ELEV. 235± DROP 30 in. END DATE 8/26/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
35						92% Recovery from 34 to 39 feet. RQD = 65%
40						98% Recovery from 39 to 44 feet. RQD = 80% Volcanic Clinker at 39 feet.
45						End boring at 44 feet. Neither groundwater nor seepage water encountered.
50						
55						
60						

Plate A4.6

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B5 DRIVING WT. 140 lb. START DATE 5/21/09

SURFACE ELEV. 243± DROP 30 in. END DATE 5/21/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						
			23	76	16	Silty CLAY (CL) – Reddish brown, moist, medium stiff.
			45	67	4	BASALT (WH-WC) – Dark grayish brown, moist, dense to medium hard, highly to completely weathered.
5			50/5"	68	3	Mottled reddish brown in color at 5 feet.
						BASALT (WS) – Gray, hard, slightly fractured, slightly weathered.
						Begin NX coring at 8 feet. 83% Recovery from 8 to 13 feet. RQD = 73%
10						Volcanic clinker from 11.5 to 14 feet.
						93% Recovery from 13 to 18 feet. RQD = 0% Highly fractured from 16 feet.
15						
20						GRAVEL (GP) – Reddish brown, dense to medium hard. (Volcanic Clinker) 37% Recovery from 18 to 23 feet. RQD = 0%
25						BASALT (WS) – Dark gray, medium hard to hard, highly vesicular, highly fractured, slightly weathered. 100% Recovery from 23 to 28 feet. RQD = 38%
						100% Recovery from 28 to 33 feet. RQD = 48%
30						

Plate A4.7

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B5 (Continued) DRIVING WT. 140 lb. START DATE 5/21/09

SURFACE ELEV. 243± DROP 30 in. END DATE 5/21/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
						100% Recovery from 33 to 38 feet. RQD = 48%
35						
						100% Recovery from 38 to 43 feet. RQD = 63%
40						
						End boring at 43 feet.
45						Neither groundwater nor seepage water encountered.
50						
55						
60						

Plate A4.8

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B6 DRIVING WT. 140 lb. START DATE 8/27/08

SURFACE ELEV. 235± DROP 30 in. END DATE 8/28/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			6	58	13	Silty CLAY (CL) – Reddish brown, moist, medium stiff, with gravel.
5			31	84	5	BASALT (WH–WC) – Dark grayish brown, slightly moist, medium dense, highly to completely weathered.
10						BASALT (WS) – Gray, hard, slightly fractured, slightly weathered. Begin NX coring at 9 feet. 85% Recovery from 9 to 14 feet. RQD = 55% Weathered seam at 11 feet.
15						GRAVEL (GP) – Gray, dense to medium hard. (Volcanic Clinker) 78% Recovery from 14 to 19 feet. RQD = 47%
20						BASALT (WS) – Gray, hard, slightly fractured, slightly weathered. Volcanic Clinker at 18 feet. 93% Recovery from 19 to 24 feet. RQD = 63% Volcanic clinker at 23 feet.
25						BASALT (WS–WM) – Brownish gray, hard, highly fractured, slight to moderately weathered, with clinker seams. 87% Recovery from 24 to 29 feet. RQD = 42%
30						100% Recovery from 29 to 34 feet. RQD = 28%

Plate A4.9

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B6 (Continued) DRIVING WT. 140 lb. START DATE 8/27/08
SURFACE ELEV. 235± DROP 30 in. END DATE 8/28/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						Volcanic clinker at 31 feet.
35						BASALT (WS) – Gray, hard, slightly fractured, slightly weathered. 100% Recovery from 34 to 39 feet. RQD = 97%
40						75% Recovery from 39 to 44 feet. RQD = 47%
						CEMENTED SAND AND GRAVEL – Reddish brown, medium hard, moderated weathered. (Welded Volcanic Clinker)
45						BASALT (WS) – Gray, hard, highly fractured, slightly weathered. 97% Recovery from 44 to 49 feet. RQD = 30%
50						95% Recovery from 49 to 54 feet. RQD = 60% Welded Volcanic Clinker at 50 feet.
55						BASALT (WS) – Gray, hard, slightly fractured, slightly weathered. 97% Recovery from 54 to 59 feet. RQD = 78%
60						End boring at 59 feet. Neither groundwater nor seepage water encountered.

Plate A4.10

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B7 DRIVING WT. 140 lb. START DATE 5/27/09

SURFACE ELEV. 229± DROP 30 in. END DATE 5/27/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			21/6" 50/3"	68	25	Silty CLAY (CL) – Reddish brown, moist, stiff, with gravel.
			50/5"	76	7	BASALT (WH-WC) – Mottled grayish brown, moist, dense to medium hard, highly to completely weathered.
5			13	70	33	Weathered volcanic clinker from 4.5 to 7.5 feet, medium dense.
			10/6" 10/No Penetration	84	11	
10						BASALT (WS) – Gray, hard, slightly fractured, slightly weathered. Begin HQ coring at 10.5 feet. 91% Recovery from 10.5 to 15 feet. RQD = 80%
15						100% Recovery from 15 to 20 feet. RQD = 95%
20						BASALT (WS) – Gray, medium hard to hard, vesicular, moderately fractured, slightly weathered. 87% Recovery from 20 to 25 feet. RQD = 38% Welded volcanic clinker at 20 feet.
25						Welded volcanic clinker at 24 feet. 83% Recovery from 25 to 30 feet. RQD = 57%
30						

Plate A4.11

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B7 (Continued) DRIVING WT. 140 lb. START DATE 5/27/09
SURFACE ELEV. 229± DROP 30 in. END DATE 5/27/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						92% Recovery from 30 to 35 feet. RQD = 25% Welded volcanic clinker at 30 feet.
35						80% Recovery from 35 to 40 feet. RQD = 43%
40						95% Recovery from 40 to 45 feet. RQD = 38% Welded volcanic clinker at 40 feet.
						Welded volcanic clinker at 44 feet.
45						End boring at 45 feet.
						Neither groundwater nor seepage water encountered.
50						
55						
60						

Plate A4.12

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B8 DRIVING WT. 140 lb. START DATE 8/26/08

SURFACE ELEV. 226± DROP 30 in. END DATE 8/27/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (ML) – Brown, moist, stiff, with gravel.
			40	74	22	BASALT (WH–WC) – Gray, dense to medium hard, highly to completely weathered.
			35/6" 50/3"	83	24	
5			63	79	36	Reddish brown in color from 5 feet.
10			76/11"	70	26	
			10/No Penetration			BASALT (WS) – Gray, hard, slightly fractured, slightly weathered.
15						Begin NX coring at 14 feet. 96% Recovery from 14 to 18.5 feet. RQD = 96%
20						98% Recovery from 18.5 to 23.5 feet. RQD = 83% Volcanic clinker at 19.5 feet.
25						95% Recovery from 23.5 to 28.5 feet. RQD = 92%
30						98% Recovery from 28.5 to 32.5 feet. RQD = 52%

Plate A4.13

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B8 (Continued) DRIVING WT. 140 lb. START DATE 8/26/08

SURFACE ELEV. 226± DROP 30 in. END DATE 8/27/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						Volcanic clinker at 30 feet
						Volcanic clinker at 32 feet. 100% Recovery from 32.5 to 37.5 feet. RQD = 95%
35						
						95% Recovery from 37.5 to 42.5 feet. RQD = 72%
40						
						100% Recovery from 42.5 to 47.5 feet. RQD = 83%
45						
						CEMENTED SAND AND GRAVEL – Mottled reddish brown, medium hard. (Welded Volcanic Clinker)
						BASALT (WS) – Gray, hard, slight to moderately fractured, slightly weathered.
50						100% Recovery from 47.5 to 52.5 feet. RQD = 75%
						97% Recovery from 52.5 to 57.5 feet. RQD = 58%
55						Volcanic clinker at 55 feet. 100% Recovery from 57.5 to 60 feet. RQD = 70%
60						End boring at 60 feet. Neither groundwater nor seepage water encountered.

Plate A4.14

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B9 DRIVING WT. 140 lb. START DATE 5/27/09

SURFACE ELEV. 216± DROP 30 in. END DATE 5/28/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			63	70	18	Silty CLAY (CL) – Brown, moist, stiff, with gravel. Cobble from 0.5 foot.
			10/No Penetration			BASALT (WS) – Gray, hard, slight to moderately fractured, slightly weathered. Begin HQ coring at 4 feet. 100% Recovery from 4 to 9 feet. RQD = 42% 73% Recovery from 9 to 14 feet. RQD = 13% Volcanic clinker from 11.5 to 14 feet. 97% Recovery from 14 to 19 feet. RQD = 48% Volcanic clinker from 15.5 to 17.5 feet.
5						
10						
15						
20						BASALT (WS-WM) – Gray, medium hard to hard, highly fractured, slight to moderately weathered. 75% Recovery from 19 to 24 feet. RQD = 40% Volcanic clinker from 22 to 24 feet. 80% Recovery from 24 to 29 feet. RQD = 13%
25						
30						

Plate A4.15

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B9 (Continued) DRIVING WT. 140 lb. START DATE 5/27/09
SURFACE ELEV. 216± DROP 30 in. END DATE 5/28/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						BASALT (WS) – Gray, hard, slightly fractured, slightly weathered. 93% Recovery from 29 to 34 feet. RQD = 73% 92% Recovery from 34 to 39 feet. RQD = 40% Volcanic clinker at 35 feet. Moderately fractured from 36 feet.
35						
40						End boring at 39 feet. Neither groundwater nor seepage water encountered.
45						
50						
55						
60						

Plate A4.16

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B10 DRIVING WT. 140 lb. START DATE 6/2/09

SURFACE ELEV. 196± DROP 30 in. END DATE 6/2/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Silty CLAY (CL) – Brown, moist, stiff, with cobbles and boulders.
			30/4"	87	9	
			10/No Penetration			
			50/4"	86	12	
5			10/No Penetration			
						BASALT (WH-WC) – Mottled grayish brown, moist, medium dense to dense, highly to completely weathered.
10			34	88	24	
			10/No Penetration			BASALT (WS) – Gray, hard, slightly fractured, slightly weathered.
15						Begin NX coring at 14 feet. 92% Recovery from 14 to 19 feet. RQD = 92%
20						End boring at 19 feet.
						Neither groundwater nor seepage water encountered.
25						
30						

Plate A4.17

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B11 DRIVING WT. 140 lb. START DATE 5/21/09

SURFACE ELEV. 158± DROP 30 in. END DATE 5/21/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						
			18/6" 10/No Penetration			Silty CILAY (CL) – Brown, moist, stiff, with cobbles and boulders.
			86/10"	84	20	
5			50/2"			
10			35	71	11	BASALT (WH-WC) – Mottled reddish brown, moist, dense, highly to completely weathered.
						BASALT (WS) – Gray, hard, slight to moderately fractured, slightly weathered.
						Begin NX coring at 13 feet. 100% Recovery from 13 to 18 feet. RQD = 65%
15						Volcanic clinker at 17 feet.
						End boring at 18 feet.
20						Neither groundwater nor seepage water encountered.
25						
30						

Plate A4.18

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B12 DRIVING WT. 140 lb. START DATE 5/26/09

SURFACE ELEV. 165± DROP 30 in. END DATE 5/26/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						BASALT (WS-WM) – Gray, hard, slight to moderately fractured, slight to moderately weathered. Covered by a thin layer of brown silty clay.
						Begin NX coring at 2 feet.
						100% Recovery from 2 to 5 feet. RQD = 61%
5						95% Recovery from 5 to 10 feet. RQD = 20% Volcanic clinker at 5.5 feet.
10						100% Recovery from 10 to 15 feet. RQD = 52%
						Volcanic clinker at 12 feet.
15						End boring at 15 feet.
						Neither groundwater nor seepage water encountered.
20						
25						
30						

Plate A4.19

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B13 DRIVING WT. 140 lb. START DATE 6/2/09

SURFACE ELEV. 162± DROP 30 in. END DATE 6/2/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			37	76	23	Silty CLAY (CL) – Reddish brown, moist, stiff, with gravel.
5			56		17	BASALT (WH) – Mottled grayish brown, moist, dense to medium hard, highly weathered.
			10/No Penetration			
10			34/6" 50/4"	77	10	
15			10/No Penetration			BASALT (WS) – Gray, hard, slight to moderately fractured, slightly weathered. Begin NX coring at 14 feet. 100% Recovery from 14 to 19 feet. RQD = 23% Weathered seam at 18 feet.
20						End boring at 19 feet. Neither groundwater nor seepage water encountered.
25						
30						

Plate A4.20

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B14 DRIVING WT. 140 lb. START DATE 5/28/09

SURFACE ELEV. 145± DROP 30 in. END DATE 5/28/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			30	73	30	Silty CLAY (CL) – Reddish brown, moist, stiff, with gravel.
			48	75	21	WEATHERED BASALT (WH) – Mottled gray, moist, dense, highly weathered.
5			31	84	15	
10						BASALT (WS) – Gray, hard, moderately to highly fractured, slightly weathered. Begin NX coring at 9 feet. 100% Recovery from 9 to 10 feet. RQD = 0% 100% Recovery from 10 to 15 feet. RQD = 87%
15						93% Recovery from 15 to 20 feet. RQD = 20% Volcanic clinker from 15.5 to 18 feet.
20						End boring at 20 feet. Neither groundwater nor seepage water encountered.
25						
30						

Plate A4.21

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B15 DRIVING WT. 140 lb. START DATE 6/1/09

SURFACE ELEV. 114± DROP 30 in. END DATE 6/1/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						
			99/11"	94	25	Silty CLAY (CL) – Brown, moist, stiff, with gravel.
			54	75	26	WEATHERED BASALT (WH–WC) – Mottled brown, moist, dense, highly to completely weathered.
5			17/6" 50/3"	71	24	
			18	70	20	Mottled dark gray, medium dense from 8.5 feet
10						
			19	69	12	
15						
			10/No Penetration			BASALT (WM–WH) – Gray, hard, moderately to highly weathered.
						End boring at 18 feet.
20						Neither groundwater nor seepage water encountered.
25						
30						

Plate A4.22

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B16 DRIVING WT. 140 lb. START DATE 5/20/09
SURFACE ELEV. 109± DROP 30 in. END DATE 5/20/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						
			40/6" 10/No Penetration	81	12	COBBLES AND BOULDERS – Brown, slightly moist, dense, in a matrix of silt, sand, and gravel. (Older Alluvium) Covered by a thin layer of brown silty clay.
5						Begin NX coring at 5.5 feet. 67% Recovery from 5.5 to 7.5 feet.
						End NX coring at 7.5 feet.
						Begin HQ coring at 7.5 feet. 100% Recovery from 7.5 to 10 feet.
10						75% Recovery from 10 to 15 feet.
						BASALT (WS) – Gray, hard, moderately fractured, slightly weathered.
15						End boring at 15 feet.
						Neither groundwater nor seepage water encountered.
20						
25						
30						

Plate A4.23

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B17 DRIVING WT. 140 lb. START DATE 5/20/09

SURFACE ELEV. 113± DROP 30 in. END DATE 5/20/09

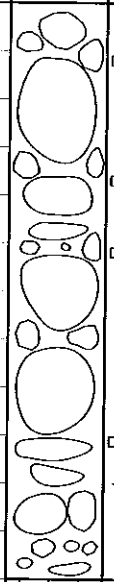
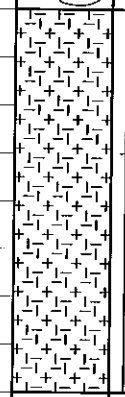
DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			10/No Penetration			COBBLES AND BOULDERS – Brown, slightly moist, dense, in a matrix of silt, sand, and gravel. (Older Alluvium) Covered by a thin layer of brown silty clay.
			10/No Penetration			
5			10/No Penetration			
			50/3"		9	
10						Begin NX coring at 10 feet. 92% Recovery from 10 to 15 feet.
						BASALT (WS) – Gray, hard, slightly fractured, slightly weathered.
15						83% Recovery from 15 to 20 feet. RQD = 70%
						Slight to moderately weathered from 18 feet.
20						End boring at 20 feet.
						Neither groundwater nor seepage water encountered.
25						
30						

Plate A4.24

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B18 DRIVING WT. 140 lb. START DATE 5/14/09

SURFACE ELEV. 116± DROP 30 in. END DATE 5/18/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			83/10"	91	12	Silty CLAY (CL) – Brown, slightly moist, stiff, with sand, gravel, and cobbles.
			100/9"	99	9	
5			50/2"			COBBLES AND BOULDERS – Brown, slightly moist, dense, in a matrix of silt, sand, and gravel. (Older Alluvium)
10			79	101	17	Begin NX coring at 12 feet. 75% Recovery from 12 to 17 feet.
15						69% Recovery from 17 to 20 feet.
20						71% Recovery from 20 to 22 feet. End NX coring at 22 feet. Begin HQ coring at 22 feet. 65% Recovery from 22 to 27 feet.
25						
30						BASALT (WS-WM) – Gray, hard, slight to moderately fractured, slightly weathered. 97% Recovery from 27 to 32 feet. RQD = 67%

Plate A4.25

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B18 (Continued) DRIVING WT. 140 lb. START DATE 5/14/09

SURFACE ELEV. 116± DROP 30 in. END DATE 5/18/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						Volcanic clinker at 31 feet.
						End boring at 32 feet.
						Neither groundwater nor seepage water encountered.
35						
40						
45						
50						
55						
60						

Plate A4.26

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B19 DRIVING WT. 140 lb. START DATE 5/19/09
SURFACE ELEV. 108± DROP 30 in. END DATE 5/19/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						COBBLES AND BOULDERS – Brown, slightly moist, dense, in a matrix of silt, sand, and gravel. (Older Alluvium) Covered by a thin layer of brown silty clay.
			22/6" 10/No Penetration	70	20	
			40/6" 50/4"	106	16	
5			10/No Penetration			
			50/3"			
10						Begin HQ coring at 11 feet. 73% Recovery from 11 to 16 feet.
15						92% Recovery from 16 to 21 feet.
20						98% Recovery from 21 to 26 feet.
25						BASALT (WS) – Gray, hard, slightly to moderately fractured, slightly weathered. 92% Recovery from 26 to 31 feet. RQD = 70% Volcanic clinker at 28 feet.
30						

Plate A4.27

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B19 (Continued) DRIVING WT. 140 lb. START DATE 5/19/09
SURFACE ELEV. 109± DROP 30 in. END DATE 5/19/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						98% Recovery from 31 to 35 feet. RQD = 77%
35						End boring at 35 feet. Neither groundwater nor seepage water encountered.
40						
45						
50						
55						
60						

Plate A4.28

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B20 DRIVING WT. 140 lb. START DATE 4/30/09
SURFACE ELEV. 119± DROP 30 in. END DATE 4/30/09

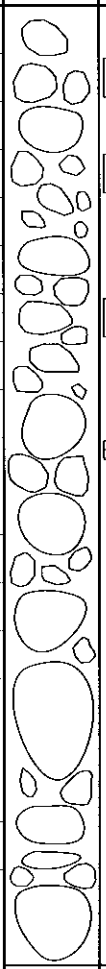
DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			17/6" 10/No Penetration	83	21	COBBLES AND BOULDERS – Brown, slightly moist, dense, in a matrix of silt, sand, and gravel. (Older Alluvium) Covered by a thin layer of brown sitly clay.
			46/6" 50/2"	103	11	
5			25/6" 50/2"	98	14	
			50/5"			
10						
15						Begin NX coring at 15 feet. 92% Recovery from 15 to 20 feet.
20						End boring at 20 feet.
						Neither groundwater nor seepage water encountered.
25						
30						

Plate A4.29

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B21 DRIVING WT. 140 lb. START DATE 4/29/09
SURFACE ELEV. 121± DROP 30 in. END DATE 4/29/09

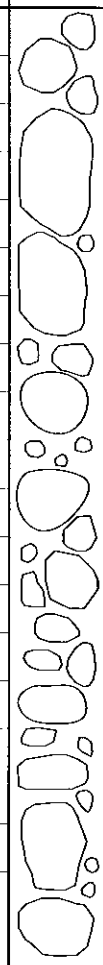
DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			19/5"	93	14	COBBLES AND BOULDERS – Brown, slightly moist, dense, in a matrix of silt, sand, and gravel. (Older Alluvium) Covered by a thin layer of brown silty clay.
5						
			10/No Penetration			Begin HQ coring at 7 feet. 54% Recovery from 7 to 9 feet.
10			10/No Penetration			100% Recovery from 9 to 11 feet. 80% Recovery from 11 to 16 feet.
15						75% Recovery from 16 to 20 feet.
20						End boring at 20 feet. Neither groundwater nor seepage water encountered.
25						
30						

Plate A4.30

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B22 DRIVING WT. 140 lb. START DATE 4/23/09

SURFACE ELEV. 116± DROP 30 in. END DATE 4/28/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			19/6" 50/5"	95	6	Clayey SILT (ML) – Reddish brown, slightly moist, stiff, with sand and gravel. Boulder at one foot.
5			10/No Penetration			COBBLES AND BOULDERS – Mottled brown, dense to very dense, in a matrix of silt, sand, and gravel. (Older Alluvium) Begin HQ coring at 6 feet. 70% Recovery from 6 to 11 feet.
10						70% Recovery from 11 to 16 feet.
15			50/4" 10/No Penetration			88% Recovery from 16 to 21 feet.
20						72% Recovery from 21 to 26 feet.
25			10/No Penetration			88% Recovery from 26 to 31 feet.
30						COBBLES AND BOULDERS – Mottled brown, medium hard to hard, in a matrix of cemented silt, sand, and gravel. (Older Alluvium)

Plate A4.31

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B22 (Continued) DRIVING WT. 140 lb. START DATE 4/23/09

SURFACE ELEV. 116± DROP 30 in. END DATE 4/28/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						35% Recovery from 31 to 36 feet.
35						100% Recovery from 36 to 41 feet.
40						
45						COBBLES AND BOULDERS – Mottled brown, dense to very dense, in a matrix of silt, sand, and gravel. (Older Alluvium) 70% Recovery from 41 to 46 feet.
			10/No Penetration			COBBLES AND BOULDERS – Mottled brown, medium hard to hard, in a matrix of cemented silt, sand, and gravel. (Older Alluvium) 100% Recovery from 46 to 51 feet.
50						83% Recovery from 51 to 56 feet.
55						
			90/10"		26	COBBLES AND BOULDERS – Mottled gray, dense to very dense, in a matrix of silt, sand, and gravel. (Older Alluvium) 70% Recovery from 56 to 61 feet.
60						

Plate A4.32

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B22 (Continued) DRIVING WT. 140 lb. START DATE 4/23/09
SURFACE ELEV. 116± DROP 30 in. END DATE 4/28/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
60			10/No Penetration			
						End boring at 61 feet.
						Neither groundwater nor seepage water encountered.
65						
70						
75						
80						
85						
90						

Plate A4.33

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B23 DRIVING WT. 140 lb. START DATE 4/14/09

SURFACE ELEV. 120± DROP 30 in. END DATE 4/16/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			18	84	8	Clayey SILT (ML) – Reddish brown, slightly moist, medium stiff to stiff, with sand and gravel.
			15	105	9	
5			10/No Penetration			COBBLES AND BOULDERS – Mottled brown, dense to very dense, in a matrix of silt, sand, and gravel. (Older Alluvium) Begin HQ coring at 5.5 feet. 47% Recovery from 5.5 to 8 feet. 80% Recovery from 8 to 13 feet. 58% Recovery from 13 to 18 feet. 92% Recovery from 18 to 21 feet. 87% Recovery from 21 to 26 feet.
10						
15						
20						
25						
30						COBBLES AND BOULDERS – Mottled gray, medium hard to hard, in a matrix of cemented silt, sand, and gravel. (Older Alluvium) 90% Recovery from 26 to 31 feet.

Plate A4.34

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08--4582

BORING NO. B23 (Continued) DRIVING WT. 140 lb. START DATE 4/14/09

SURFACE ELEV. 120± DROP 30 in. END DATE 4/16/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						90% Recovery from 31 to 36 feet.
35						100% Recovery from 36 to 41 feet.
40						100% Recovery from 41 to 46 feet.
45						100% Recovery from 46 to 51 feet.
50						100% Recovery from 51 to 56 feet.
55						100% Recovery from 56 to 61 feet.
60						

Plate A4.35

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B23 (Continued) DRIVING WT. 140 lb. START DATE 4/14/09
SURFACE ELEV. 120± DROP 30 in. END DATE 4/16/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
60						100% Recovery from 61 to 66 feet.
65						100% Recovery from 66 to 71 feet.
70						100% Recovery from 71 to 76 feet.
75						100% Recovery from 76 to 81 feet.
80						78% Recovery from 81 to 84 feet.
85						End boring at 84 feet. Neither groundwater nor seepage water encountered.
90						

Plate A4.36

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B24 DRIVING WT. 140 lb. START DATE 9/8/08

SURFACE ELEV. 116± DROP 30 in. END DATE 9/12/08

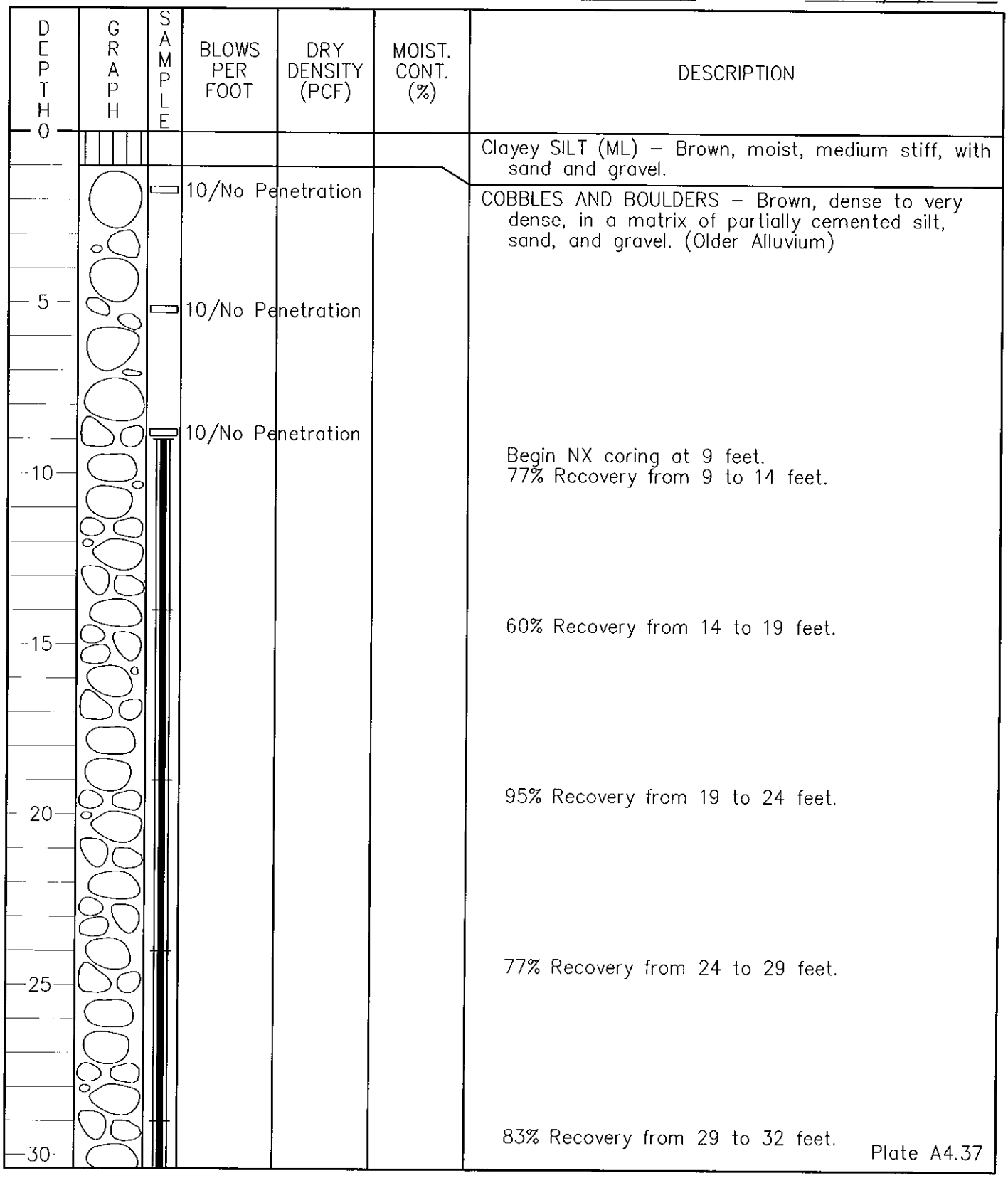


Plate A4.37

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B24 (Continued) DRIVING WT. 140 lb. START DATE 9/8/08

SURFACE ELEV. 116± DROP 30 in. END DATE 9/12/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						72% Recovery from 32 to 35 feet.
35						COBBLES AND BOULDERS – Mottled gray, medium hard to hard, in a matrix of cemented silt, sand, and gravel. (Older Alluvium) 78% Recovery from 35 to 40 feet.
40						COBBLES AND BOULDERS – Mottled brown, dense to very dense, in a matrix of silt, sand, and gravel. (Older Alluvium) 92% Recovery from 40 to 45 feet.
45						77% Recovery from 45 to 50 feet.
50						75% Recovery from 50 to 52 feet.
55						COBBLES AND BOULDERS – Mottled brown, medium hard to hard, in a matrix of cemented silt, sand, and gravel. (Older Alluvium) 97% Recovery from 52 to 55 feet. 95% Recovery from 55 to 60 feet.
60						Plate A4.38

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B24 (Continued) DRIVING WT. 140 lb. START DATE 9/8/08
SURFACE ELEV. 116± DROP 30 in. END DATE 9/12/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
60						100% Recovery from 60 to 65 feet.
65						100% Recovery from 65 to 70 feet.
70						100% Recovery from 70 to 75 feet.
75						100% Recovery from 75 to 80 feet.
80						COBBLES AND BOULDERS – Mottled brown, dense to very dense, in a matrix of silt, sand, and gravel. (Older Alluvium) 87% Recovery from 80 to 85 feet.
85						End boring at 85 feet. Neither groundwater nor seepage water encountered.
90						

Plate A4.39

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B25 DRIVING WT. 140 lb. START DATE 5/11/09

SURFACE ELEV. 111± DROP 30 in. END DATE 5/13/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						Clayey SILT (ML) – Reddish brown, slightly moist, stiff, with sand and gravel.
			10/No Penetration			COBBLES AND BOULDERS – Mottled brown, dense to very dense, in a matrix of silt, sand, and gravel. Partially cemented from 2 to 10 feet, medium hard to hard. (Older Alluvium)
5						
10						Begin HQ coring at 9 feet. 70% Recovery from 9 to 14 feet.
15			12		31	
						100% Recovery from 16 to 19 feet.
20						100% Recovery from 19 to 24 feet.
25			50/2"		10	92% Recovery from 24 to 29 feet.
30			50/3"		12	67% Recovery from 29 to 34 feet.

Plate A4.40

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B25 (Continued) DRIVING WT. 140 lb. START DATE 5/11/09

SURFACE ELEV. 111± DROP 30 in. END DATE 5/13/09

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
						58% Recovery from 34 to 39 feet.
35						
			10/No Penetration			92% Recovery from 39 to 44 feet.
40						
						70% Recovery from 44 to 49 feet.
45						
			25/6" 10/No Penetration		21	
50						83% Recovery from 50 to 54 feet.
						83% Recovery from 54 to 59 feet.
55						
			10/No Penetration			COBBLES AND BOULDERS – Brown, medium hard to hard, in a matrix of cemented silt, sand, and gravel. (Older Alluvium)
60						Plate A4.41

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B25 (Continued) DRIVING WT. 140 lb. START DATE 5/11/09

SURFACE ELEV. 111± DROP 30 in. END DATE 5/13/09

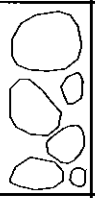
DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
60						100% Recovery from 59 to 64 feet.
65						End boring at 64 feet. Neither groundwater nor seepage water encountered.
70						
75						
80						
85						
90						

Plate A4.42

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B26 DRIVING WT. 140 lb. START DATE 9/13/08

SURFACE ELEV. 107± DROP 30 in. END DATE 9/13/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			8/6" 50/2"	89	6	COBBLES AND BOULDERS – Brown, slightly moist, dense, in a matrix of silt, sand, and gravel. (Older Alluvium) Covered by a thin layer of brown clayey silt.
5						
10						Begin NX coring at 9 feet. 93% Recovery from 9 to 11.5 feet. 67% Recovery from 11.5 to 15 feet.
15						65% Recovery from 15 to 19.5 feet.
20						End boring at 19.5 feet. Neither groundwater nor seepage water encountered.
25						
30						

Plate A4.43

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B27 DRIVING WT. 140 lb. START DATE 9/13/08

SURFACE ELEV. 103± DROP 30 in. END DATE 9/13/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0						COBBLES AND BOULDERS – Brown, slightly moist, dense, in a matrix of silt, sand, and gravel. (Older Alluvium) Covered by a thin layer of brown clayey silt.
			28/6" 50/3"	93	15	
5						
			50/5"			
10			50/4"			
15			50/5"	86	21	
20			50/4"	102	8	
						End boring at 20.5 feet.
						Neither groundwater nor seepage water encountered.
25						
30						

Plate A4.44

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B28 DRIVING WT. 140 lb. START DATE 9/2/08

SURFACE ELEV. 118± DROP 30 in. END DATE 9/2/08

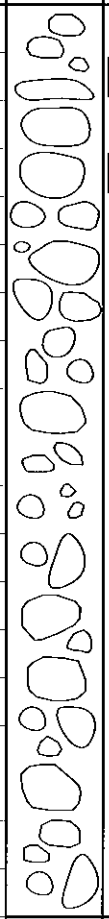
DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			28/6" 50/3"	97	6	COBBLES AND BOULDERS – Brown, slightly moist, dense, in a matrix of silt, sand, and gravel. (Older Alluvium) Covered by a thin layer of brown clayey silt.
			43/6" 50/2"	97	11	
5						Begin NX coring at 5 feet. 80% Recovery from 5 to 10 feet.
10						100% Recovery from 10 to 11 feet. 88% Recovery from 11 to 15 feet.
15						79% Recovery from 15 to 19 feet.
20						End boring at 19 feet. Neither groundwater nor seepage water encountered.
25						
30						

Plate A4.45

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B29 DRIVING WT. 140 lb. START DATE 9/3/08

SURFACE ELEV. 135± DROP 30 in. END DATE 9/4/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			50/5"	72	18	Clayey SILT (ML) – Brown, slightly moist, stiff, with sand, gravel, and cobbles.
5			10/No Penetration			COBBLES AND BOULDERS – Brown, slightly moist, dense, in a matrix of silt, sand, and gravel. (Older Alluvium) Begin NX coring at 5 feet. 97% Recovery from 5 to 10 feet.
10						COBBLES AND BOULDERS – Mottled gray, medium hard, to hard, in a matrix of cemented silt, sand, and gravel. (Older Alluvium) 90% Recovery from 10 to 15 feet.
15						93% Recovery from 15 to 20 feet.
20						COBBLES AND BOULDERS – Mottled gray, dense, in a matrix of silt, sand, and gravel. (Older Alluvium) 67% Recovery from 20 to 25 feet.
25						85% Recovery from 25 to 29 feet.
30						72% Recovery from 29 to 34 feet.

Plate A4.46

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B29 (Continued) DRIVING WT. 140 lb. START DATE 9/3/08

SURFACE ELEV. 135± DROP 30 in. END DATE 9/4/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						
35						End boring at 34 feet. Neither groundwater nor seepage water encountered.
40						
45						
50						
55						
60						

Plate A4.47

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B30 DRIVING WT. 140 lb. START DATE 9/4/08
SURFACE ELEV. 136± DROP 30 in. END DATE 9/5/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
0			63	71	23	Clayey SILT (ML) – Brown, moist, stiff, with sand and gravel.
5			50/3"			COBBLES AND BOULDERS – Mottled brown, slightly moist, dense to very dense, in a matrix of silt, sand, and gravel. (Older Alluvium)
			50/2"			
10			10/No Penetration			
15			50/4"	79	14	
20						Begin NX coring at 19 feet. 90% Recovery from 19 to 24 feet.
25						81% Recovery from 24 to 27 feet.
30						COBBLES AND BOULDERS – Brown, medium hard to hard, in a matrix of cemented silt, sand, and gravel. (Older Alluvium) 100% Recovery from 27 to 30 feet.

Plate A4.48

HIRATA & ASSOCIATES, INC.

BORING LOG

W.O. 08-4582

BORING NO. B30 (Continued) DRIVING WT. 140 lb. START DATE 9/4/08

SURFACE ELEV. 136± DROP 30 in. END DATE 9/5/08

DEPTH	GRAPH	SAMPLE	BLOWS PER FOOT	DRY DENSITY (PCF)	MOIST. CONT. (%)	DESCRIPTION
30						98% Recovery from 30 to 35 feet.
35						End boring at 35 feet. Neither groundwater nor seepage water encountered.
40						
45						
50						
55						
60						

Plate A4.49

APPENDIX B

LABORATORY TESTING

DESCRIPTION OF LABORATORY TESTING

CLASSIFICATION

Field classification was verified in the laboratory in accordance with the Unified Soil Classification System. Laboratory classification was determined by both visual examination and Atterberg Limit tests performed in general accordance with ASTM D 4318. Tests results are presented below. The final classifications are shown at the appropriate locations on the Boring Logs, Plates A4.1 through A4.49.

Sample	Liquid Limit	Plasticity Index (PI)
B1 at 3 ft	44	12
B2 at 1 ft	37	14
B5 at near surface	42	18
B10 at near surface	49	22
B13 at near surface	49	21
B26 at 1 ft	30	7
B30 at 1 ft	43	16

MOISTURE-DENSITY

Representative samples were tested for field moisture content and dry unit weight. The dry unit weight was determined in pounds per cubic foot while the moisture content was determined as a percentage of dry weight. Samples were obtained using a 3-inch O.D. split tube sampler. Test results are shown at the appropriate depths on the Boring Logs, Plates A4.1 through A4.49.

CONSOLIDATION

Selected representative samples were tested for their consolidation characteristics. Test samples were 2.42 inches in diameter and 1 inch high. Porous stones were placed in contact with the top and bottom of test samples to permit addition and release of pore fluid. Loads were then applied in several increments in a geometric

progression, and the resulting deformations recorded at selected time intervals. Test results are plotted on the Consolidation Test Reports, Plates B2.1 through B2.3.

SHEAR TESTS

Shear tests were performed in the Direct Shear Machine which is of the strain control type. Each sample was sheared under varying confining loads in order to determine the Coulomb shear strength parameters, cohesion and angle of internal friction. Test results are presented on Plates B3.1 through B3.4.

PROCTOR TESTS

Modified Proctor tests were performed in general accordance with ASTM D 1557 on bulk samples of near surface soils at selected boring locations. The test is used to determine the optimum moisture content at which the soil compacts to 100 percent density. Results are shown on Plates B4.1 through B4.4.

CALIFORNIA BEARING RATIO TESTS

CBR tests were performed on bulk samples of near surface soils. The tests were performed in general accordance with ASTM D 1883. Results are shown on Plates B5.1 through B5.3.

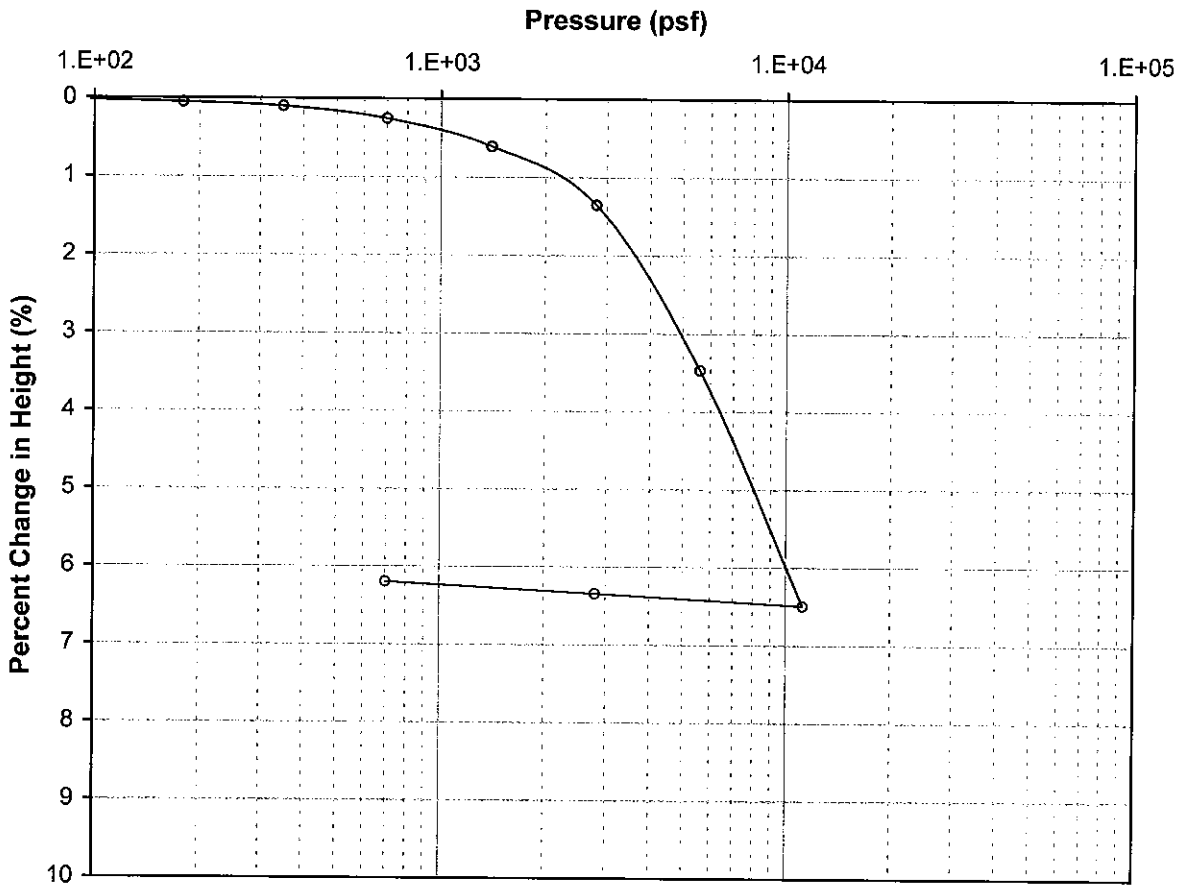
R-VALUE TESTS

R-Value tests were performed on bulk samples of near surface soils. The tests were performed by Signet Testing Labs, Inc. in Hayward, California, in general accordance with ASTM D 2844. Test results are shown on Figures B6.1 through B6.6.

UNCONFINED COMPRESSION TESTS OF ROCK CORE

Unconfined compression tests were performed on selected basalt and boulder rock cores. The tests were performed by Construction Engineering Labs in Pearl City, Hawaii, in general accordance with ASTM D 2938. Test results are shown on Plate B7.1.

Consolidation Test Results



Sample Description

Boring No.: B10 Depth (ft): 9

Soil Description: Mottled grayish brown weathered rock

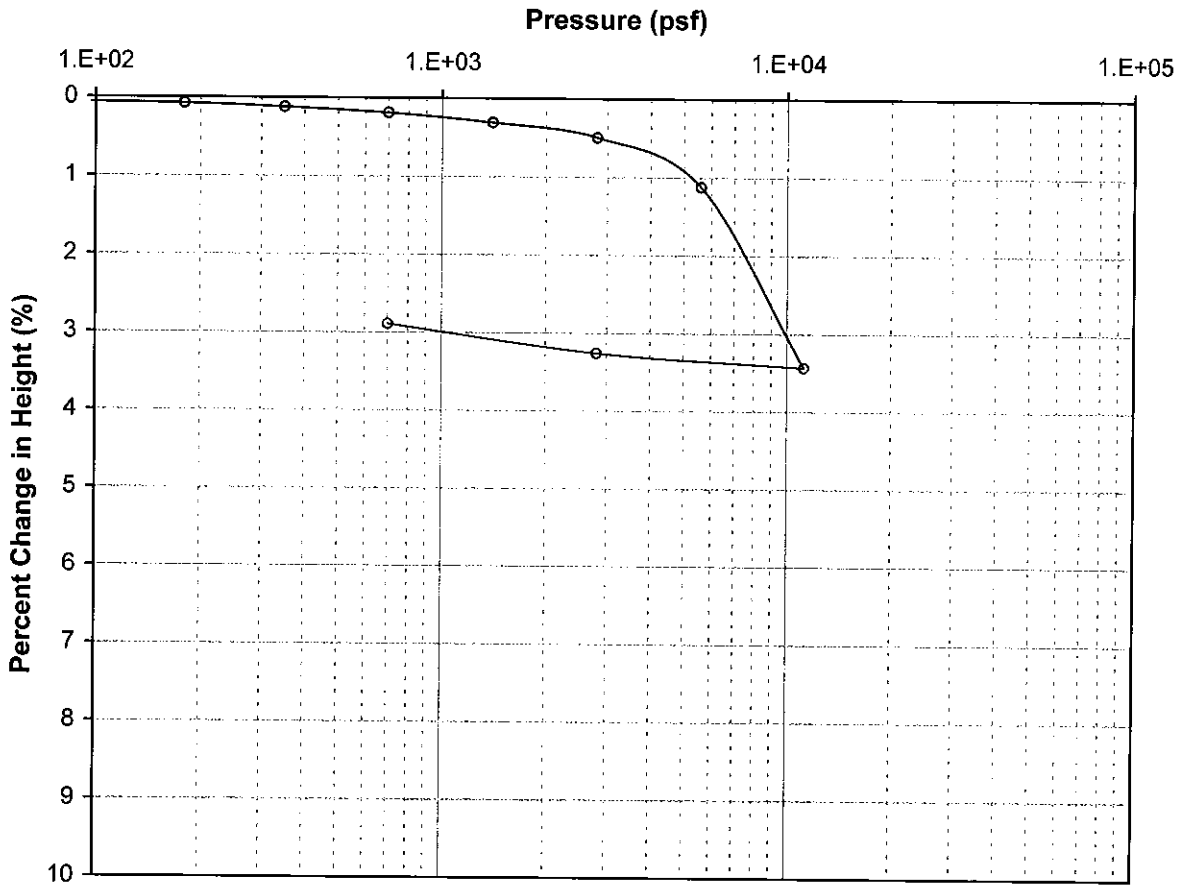
	Moisture Content (%)	Dry Density (pcf)
Initial	23.5	88.2
Final	18.6	94.0

Remark: 05/14/09

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	**CONSOLIDATION TEST**

Plate B2.1

Consolidation Test Results



Sample Description

Boring No.: B14 Depth (ft): 3

Soil Description: Mottled gray weathered rock

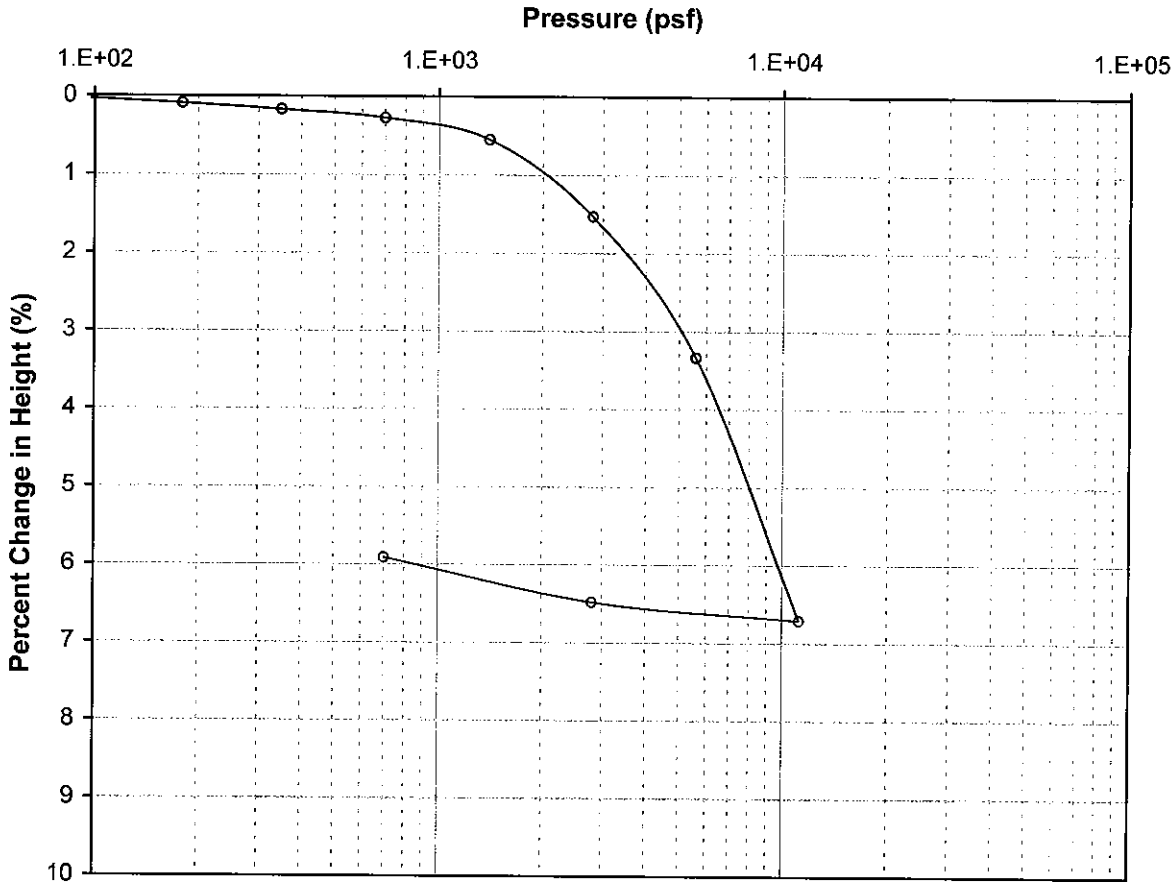
	Moisture Content (%)	Dry Density (pcf)
Initial	20.7	75.0
Final	17.7	77.2

Remark: 06/14/09

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	**CONSOLIDATION TEST**

Plate B2.2

Consolidation Test Results



Sample Description

Boring No.: B15 Depth (ft): 5

Soil Description: Mottled brown weathered rock

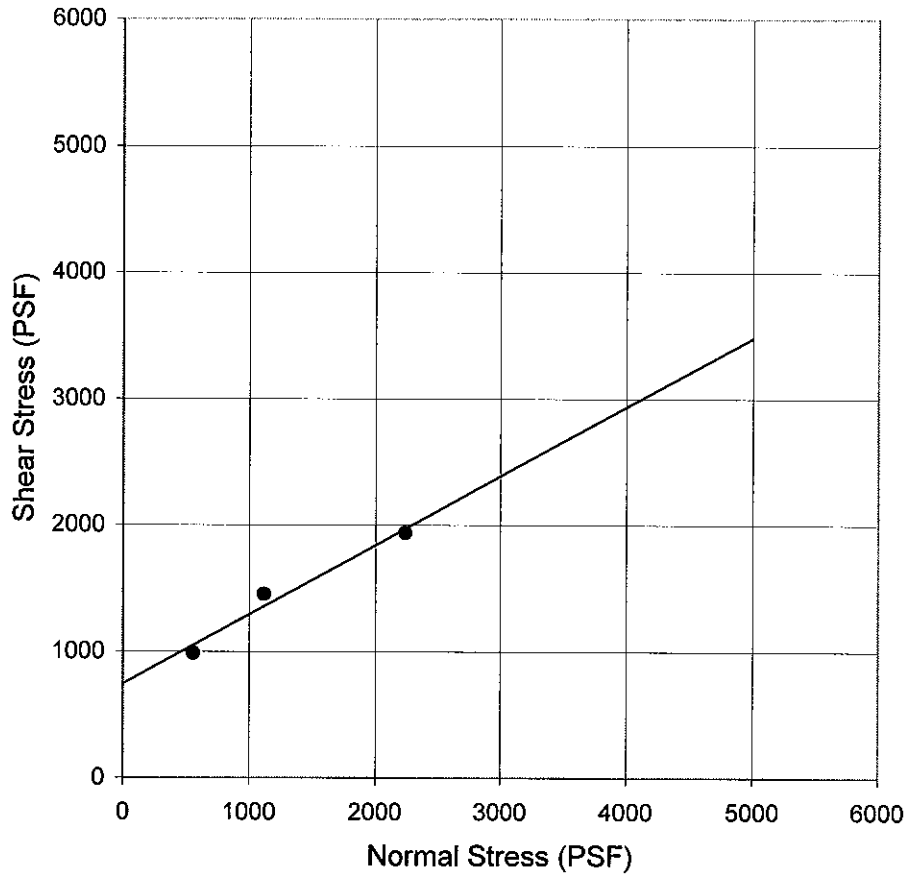
	Moisture Content (%)	Dry Density (pcf)
Initial	23.6	71.1
Final	20.1	75.6

Remark: 06/13/09

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	**CONSOLIDATION TEST**

Plate B2.3

Direct Shear Test Results



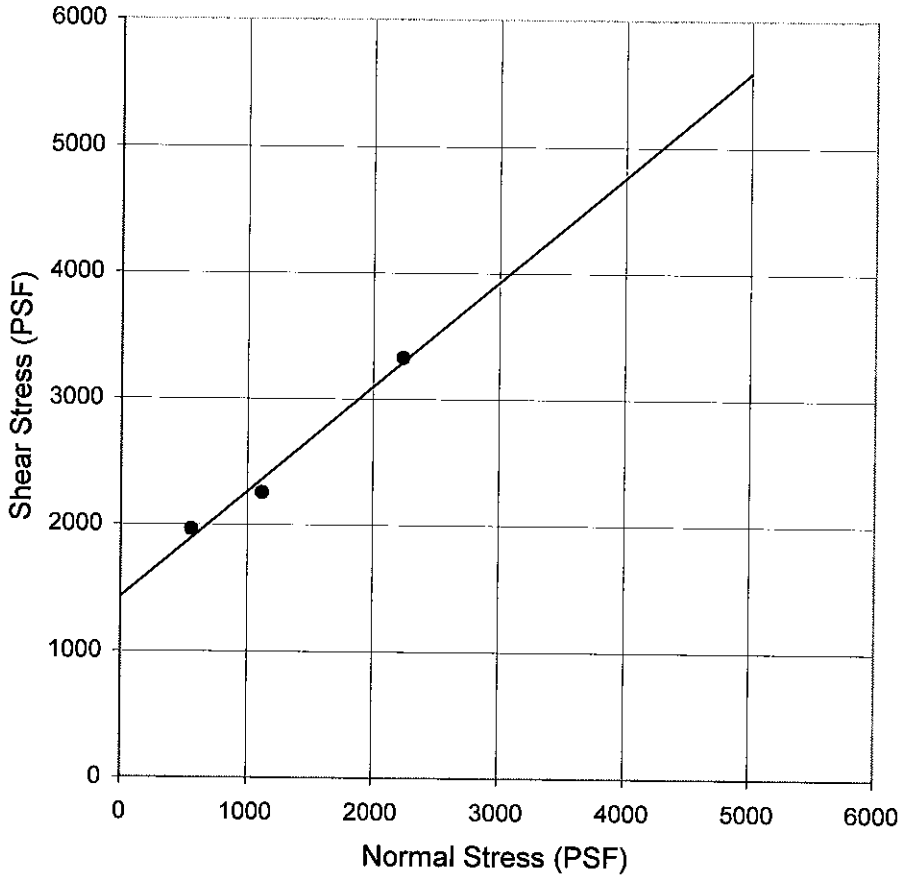
Sample Description

Boring No.: B5 Depth (ft): 1
Soil Description: Reddish brown silty clay
Strength Intercept (C): 743.1 PSF (Peak Strength)
Friction Angle (ϕ): 28.7 DEG (Peak Strength)

Remark: 06/10/09

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	**DIRECT SHEAR TEST** Plate B3.1

Direct Shear Test Results



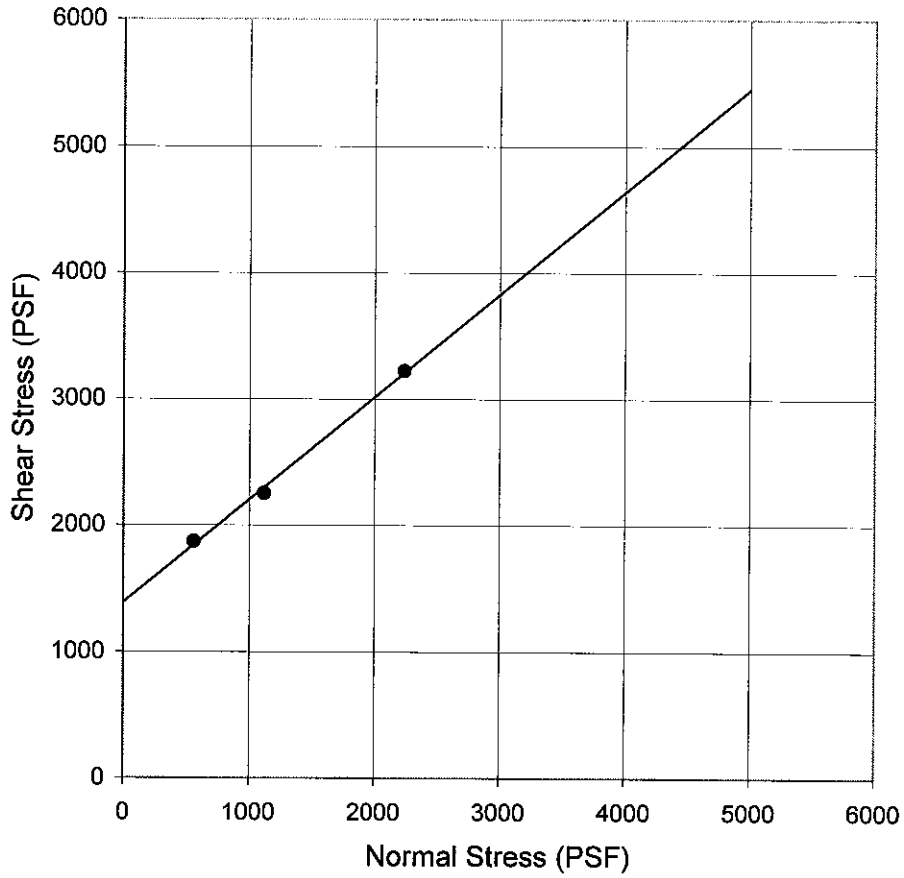
Sample Description

Boring No.: B8 Depth (ft): 5
Soil Description: Reddish brown weathered rock
Strength Intercept (C): 1427.6 PSF
Friction Angle (ϕ): 39.8 DEG

Remark: 10/29/08

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	DIRECT SHEAR TEST Plate B3.2

Direct Shear Test Results



Sample Description

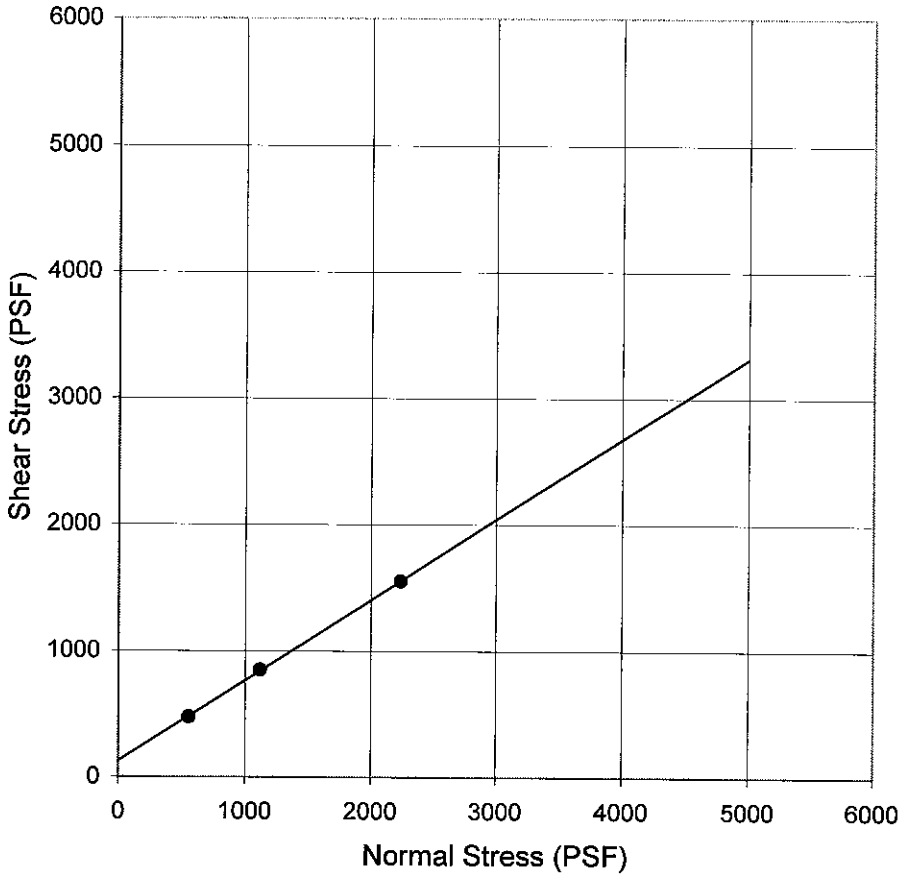
Boring No.: B15 Depth (ft): 3
Soil Description: Mottled brown weathered rock
Strength Intercept (C): 1385.6 PSF (Peak Strength)
Friction Angle (ϕ): 39.1 DEG (Peak Strength)

Remark: 07/06/09

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	**DIRECT SHEAR TEST**

Plate B3.3

Direct Shear Test Results



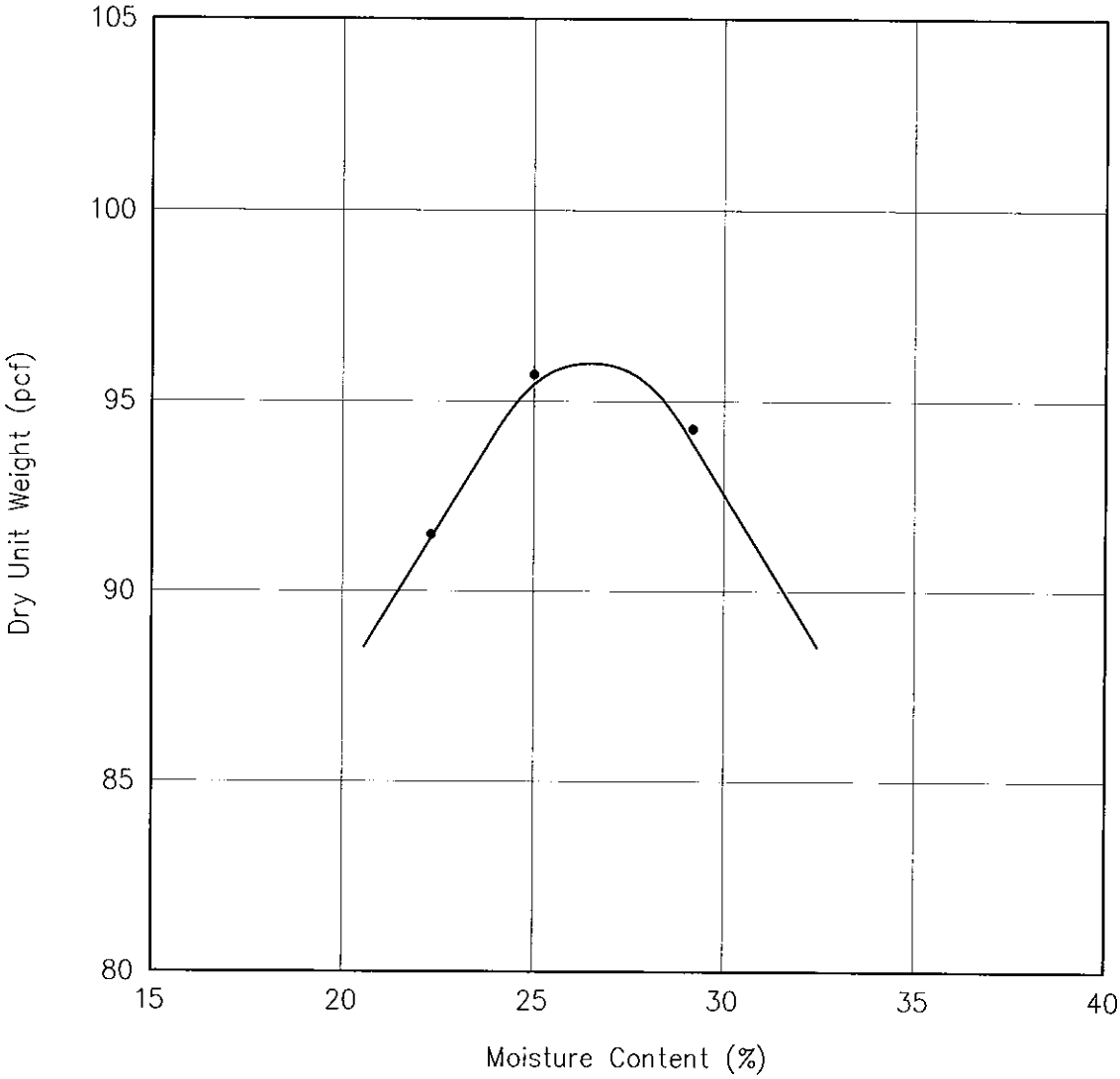
Sample Description

Boring No.: B23 Depth (ft): 3
Soil Description: Reddish brown clayey silt with sand and gravel
Strength Intercept (C): 126.1 PSF (Peak Strength)
Friction Angle (ϕ): 32.5 DEG (Peak Strength)

Remark: 05/08/09

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	**DIRECT SHEAR TEST**

Plate B3.4



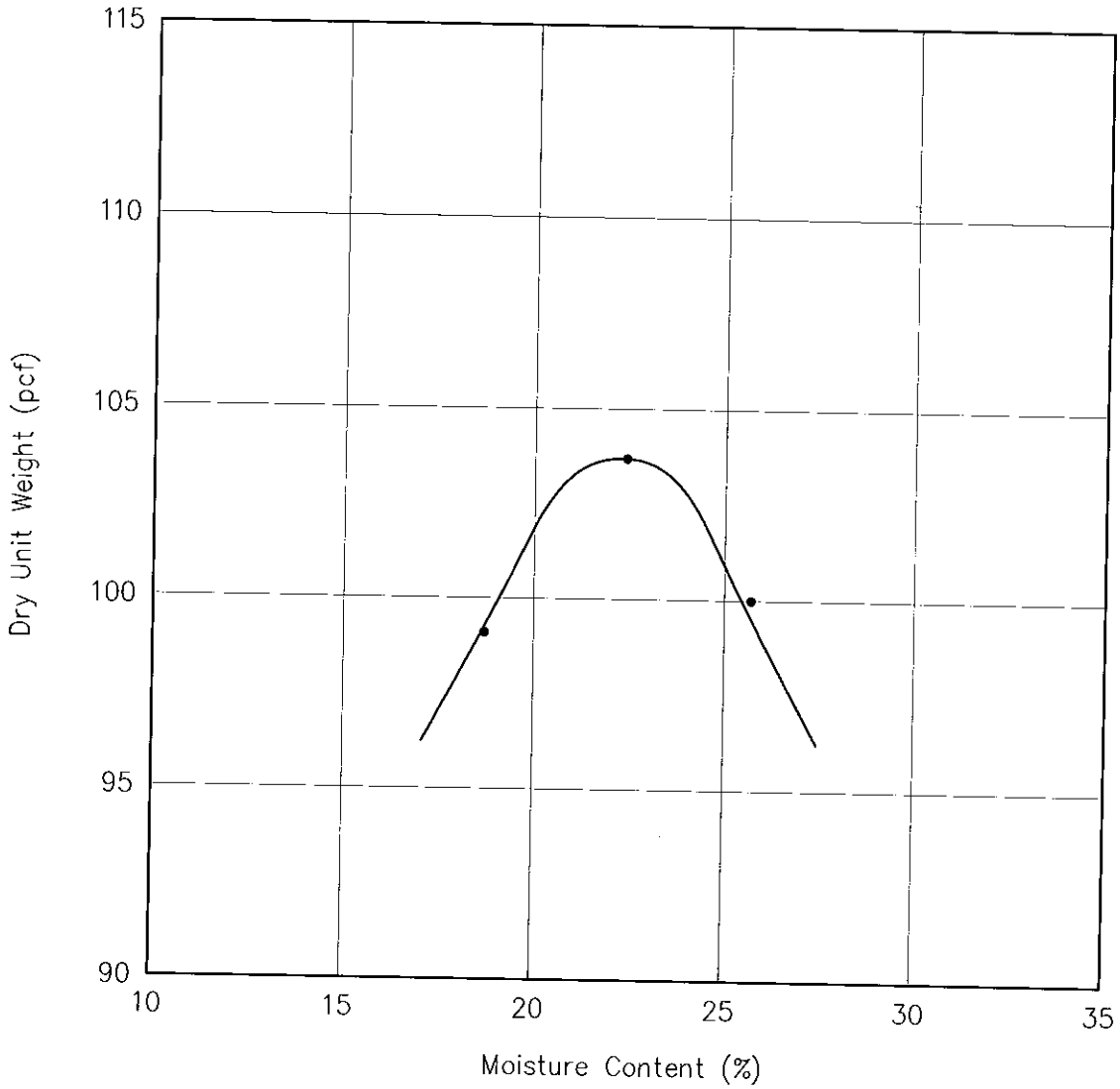
Soil Data

Location: Boring B1 at near surface
Description: Reddish brown clayey silt

Test Results

Maximum Dry Density: 96 pcf
Optimum Moisture Content: 26.5%

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B1, Maui
Hirata & Associates, Inc.	MODIFIED PROCTOR CURVE Plate B4.1



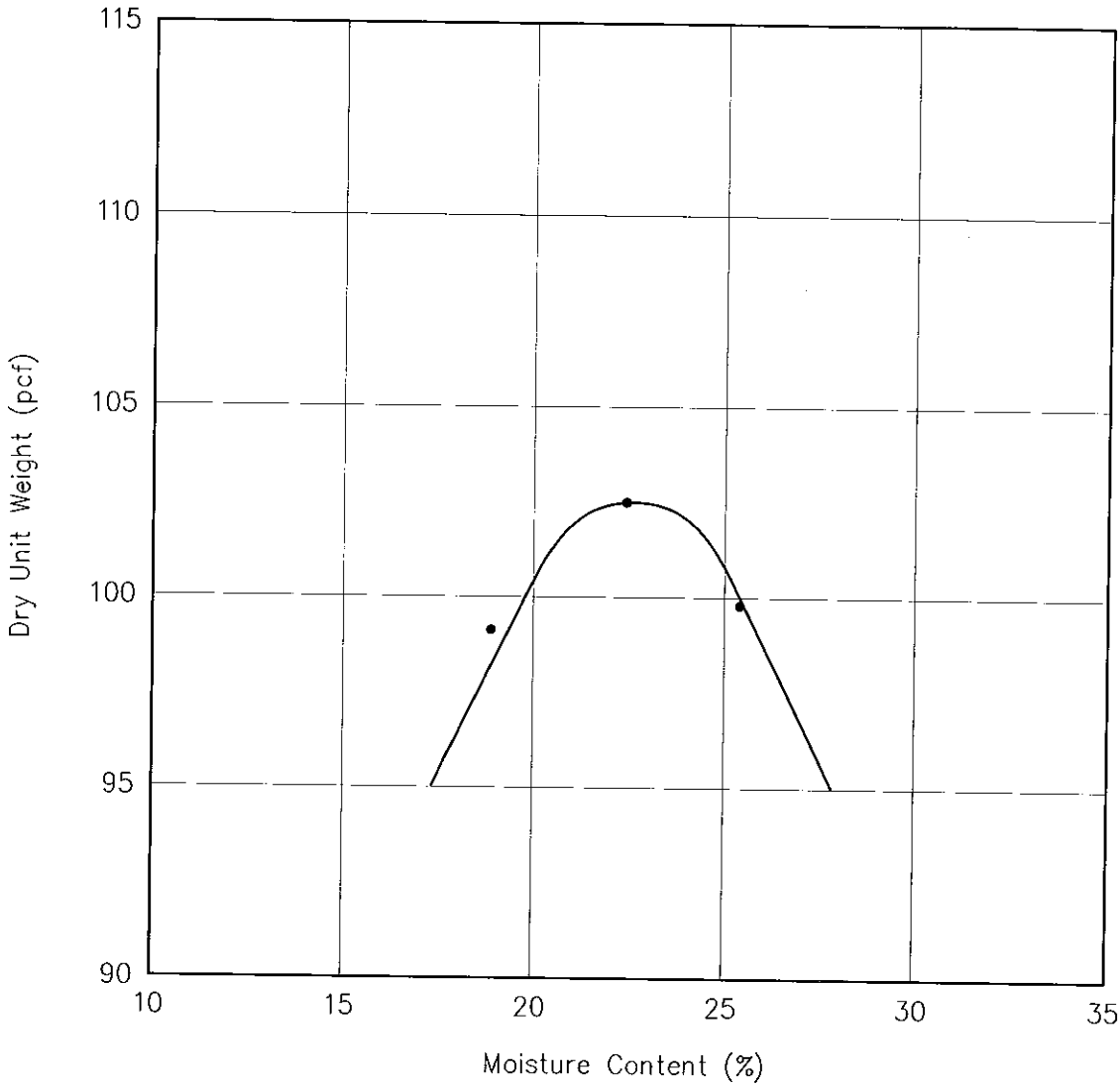
Soil Data

Location: Boring B10 at near surface
Description: Brown silty clay with gravel

Test Results

Maximum Dry Density: 104 pcf
Optimum Moisture Content: 22.5%

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B1, Maui
Hirata & Associates, Inc.	MODIFIED PROCTOR CURVE Plate B4.2



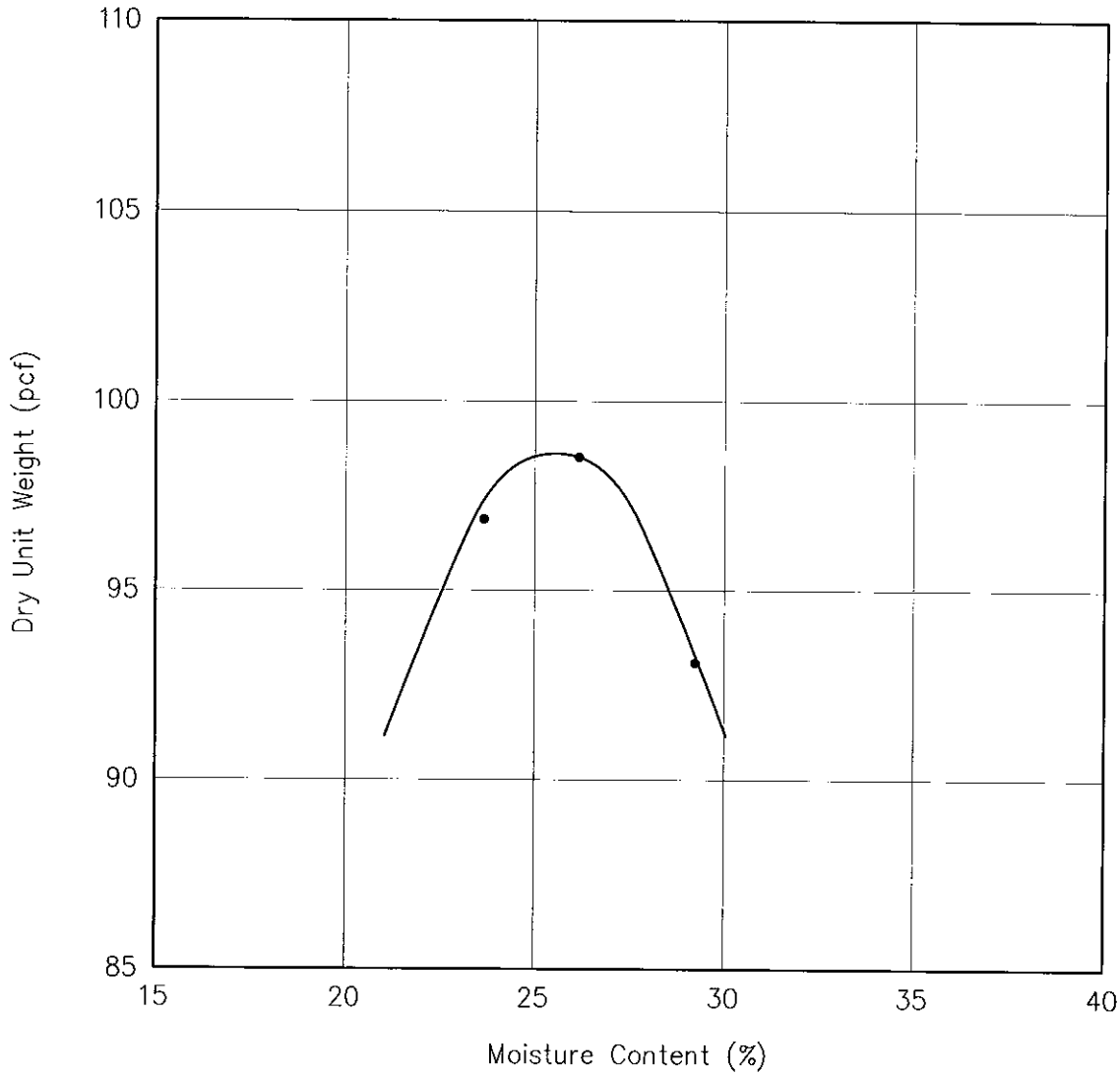
Soil Data

Location: Boring B20 at near surface
Description: Brown silty clay with gravel

Test Results

Maximum Dry Density: 103 pcf
Optimum Moisture Content: 23%

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B1, Maui
Hirata & Associates, Inc.	MODIFIED PROCTOR CURVE Plate B4.3



Soil Data

Location: Boring B29 at near surface

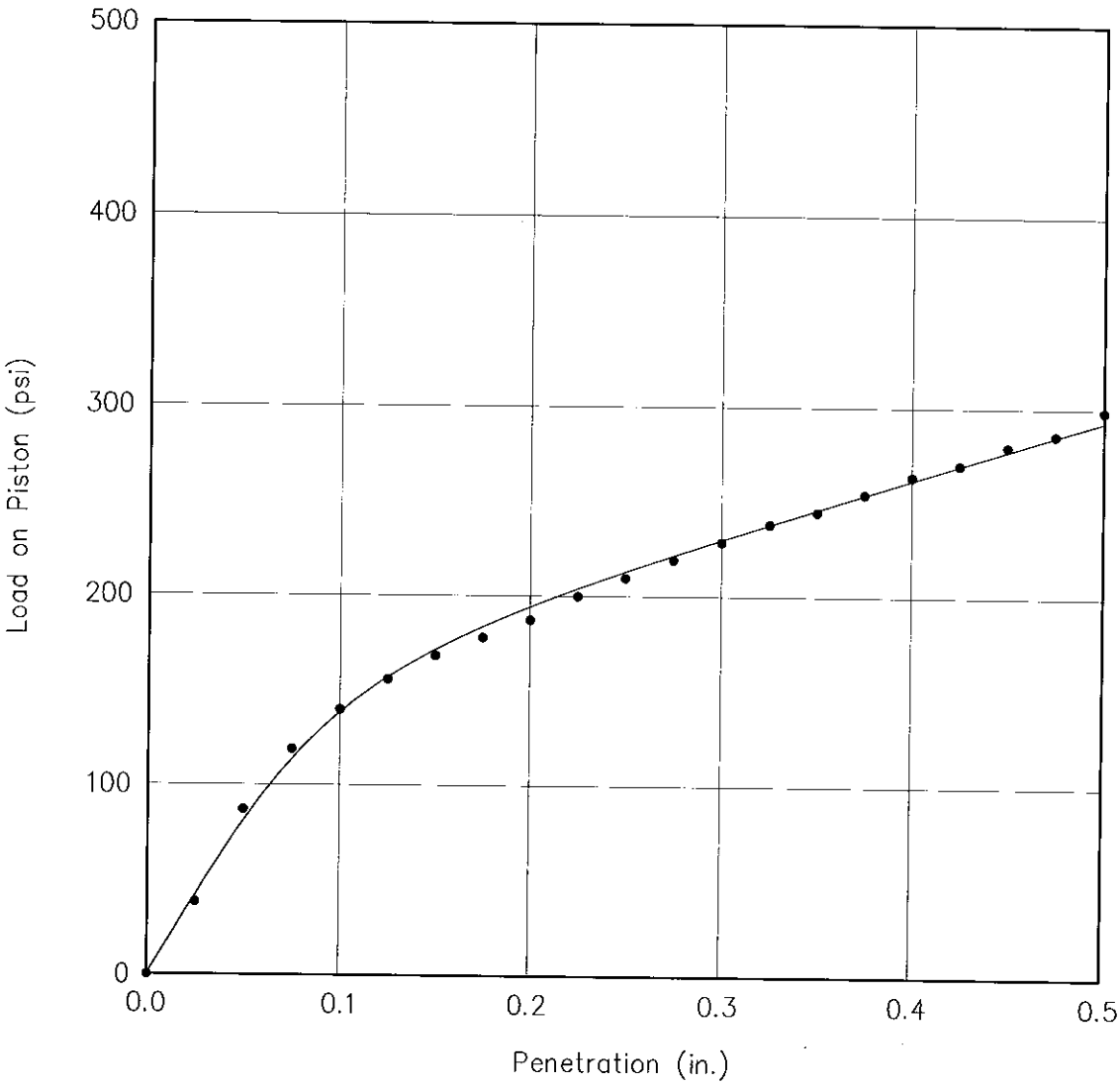
Description: Reddish brown clayey silt with gravel

Test Results

Maximum Dry Density: 99 pcf

Optimum Moisture Content: 25.5%

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B1, Maui
Hirata & Associates, Inc.	MODIFIED PROCTOR CURVE Plate B4.4



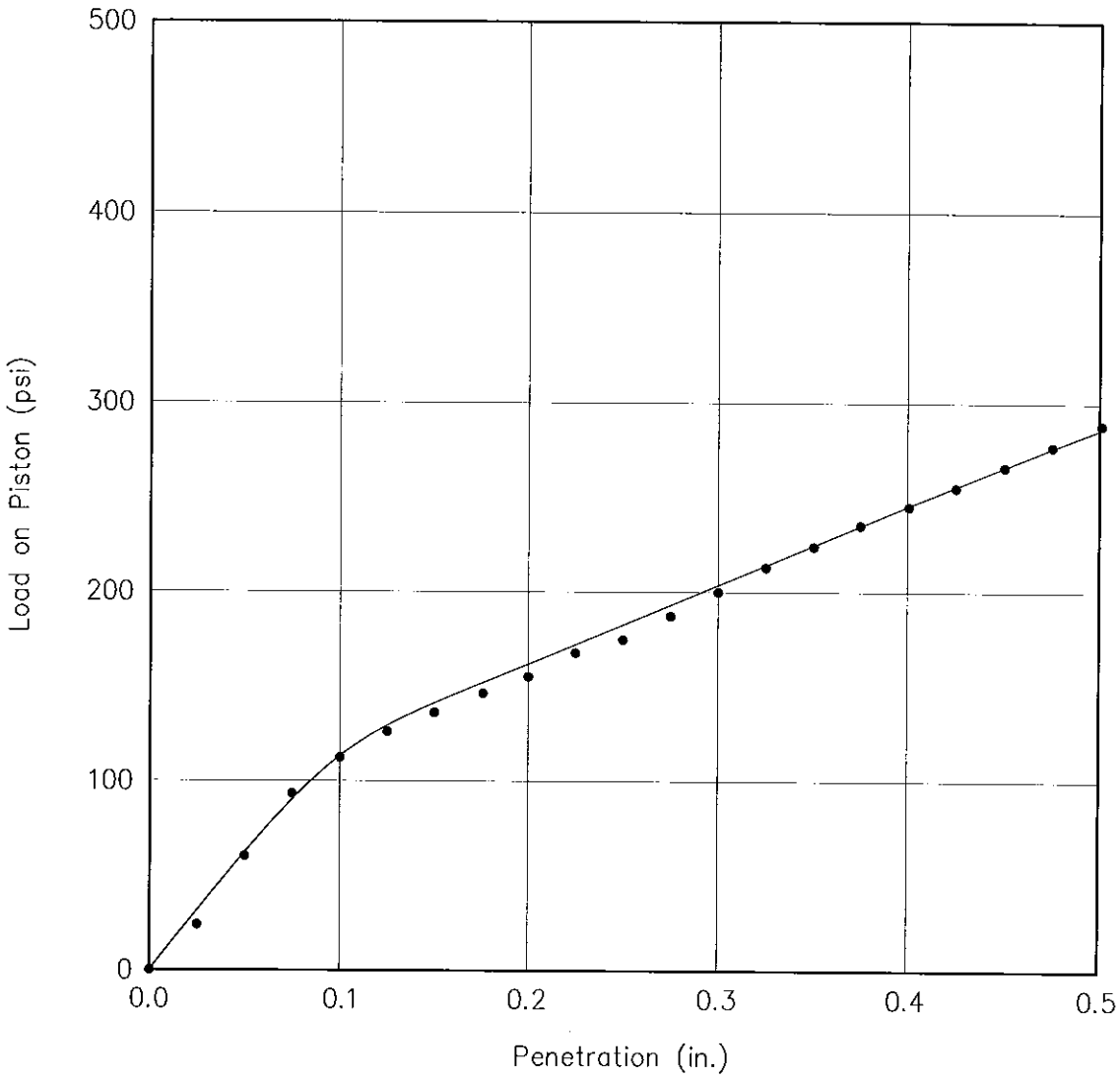
Soil Data

Location:	Boring B10 at near surface
Description:	Brown silty clay with gravel
Sample Dry Density:	103.5 pcf
Sample Moisture Content:	23%

Test Results

CBR Value:	14%
Expansion:	1.2%

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	CBR STRESS PENETRATION CURVE Plate B5.1



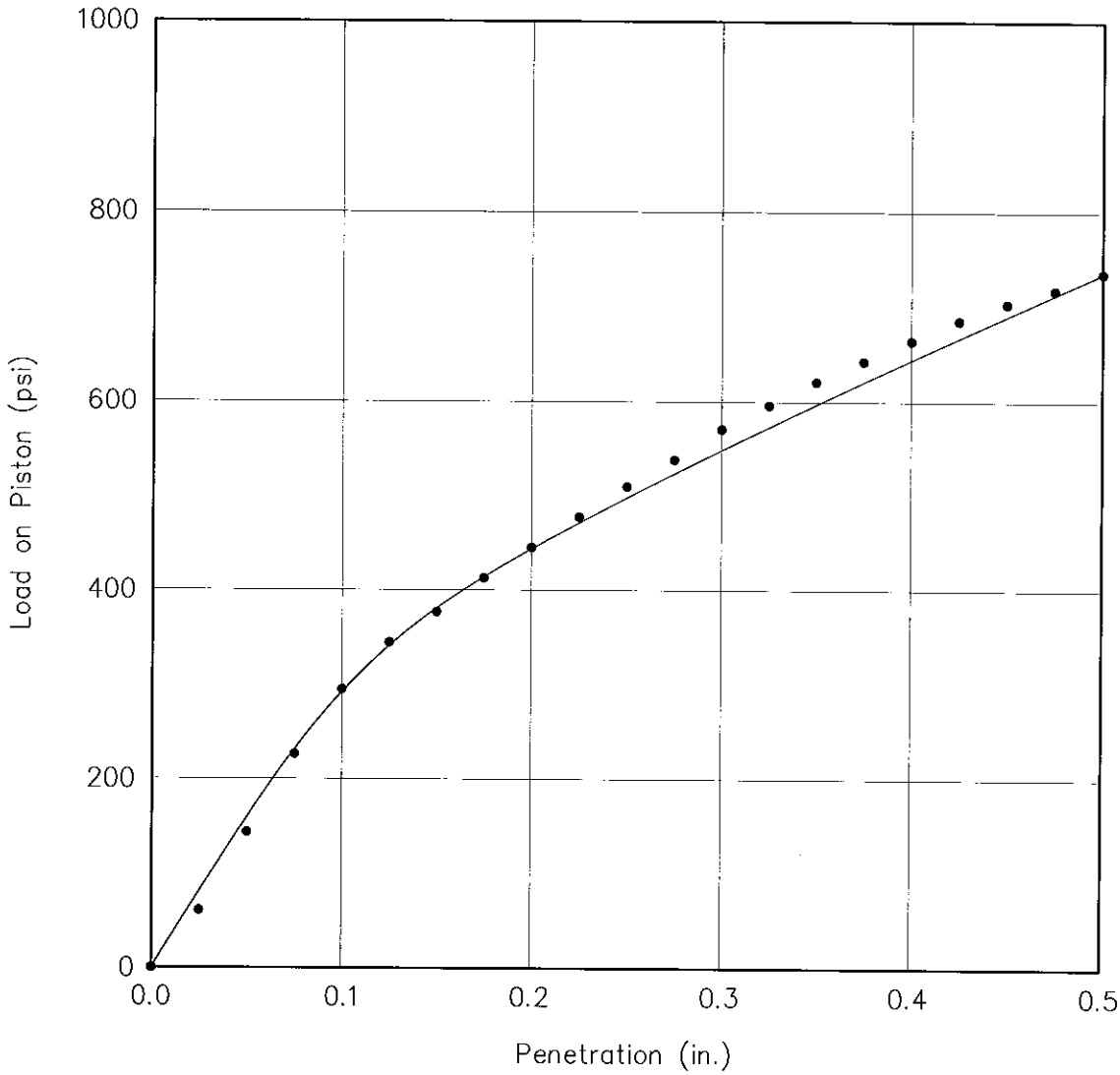
Soil Data

Location:	Boring B20 at near surface
Description:	Brown silty clay with gravel
Sample Dry Density:	102.5 pcf
Sample Moisture Content:	22%

Test Results

CBR Value:	11%
Expansion:	1.6%

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	CBR STRESS PENETRATION CURVE Plate B5.2



Soil Data

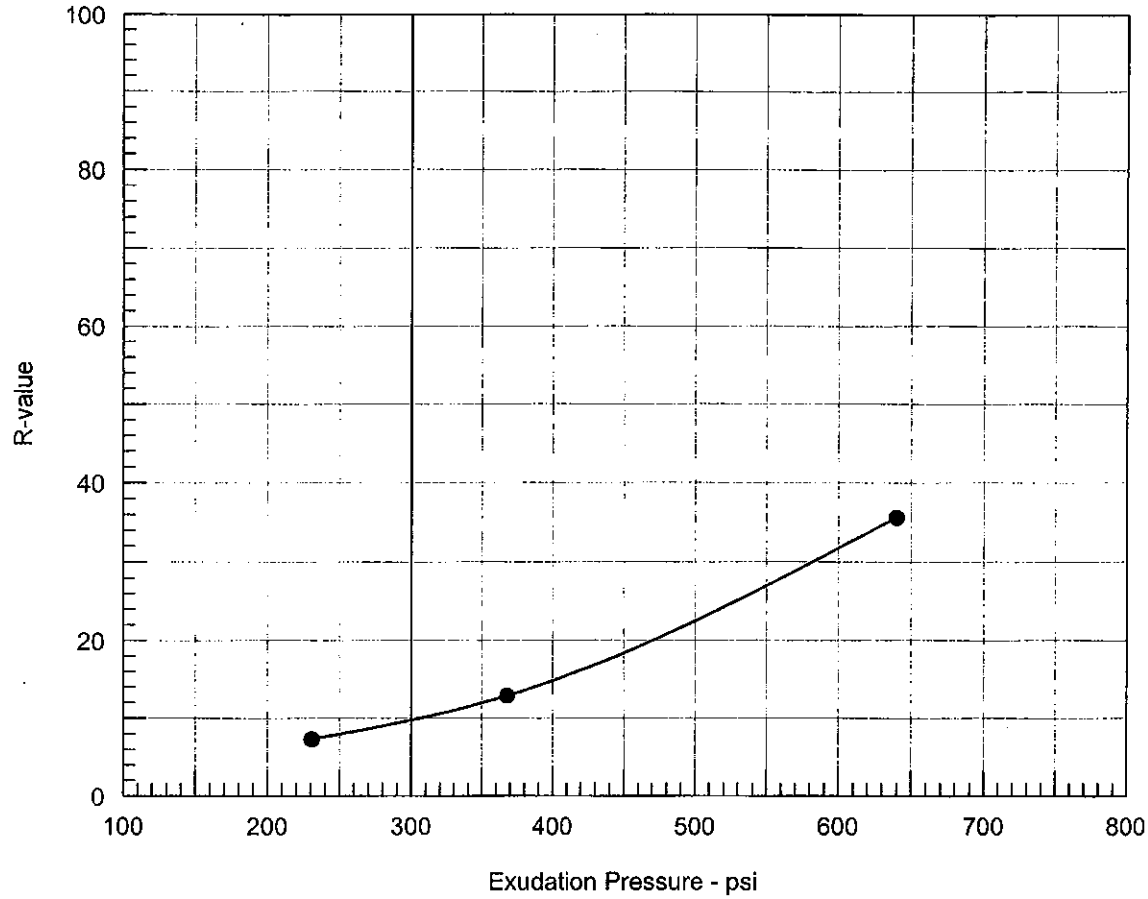
Location:	Boring B29 at near surface
Description:	Reddish brown clayey silt with gravel
Sample Dry Density:	98 pcf
Sample Moisture Content:	23%

Test Results

CBR Value:	29%
Expansion:	0.6%

W.O. 08-4582	Honoapiilani Highway Realignment, Phase 1B-1, Maui
Hirata & Associates, Inc.	CBR STRESS PENETRATION CURVE Plate B5.3

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	70	94.5	28.0	0.33	95	2.48	640	36	36
2	25	89.8	30.7	0.00	132	2.45	368	13	13
3	20	86.9	32.5	0.00	140	2.36	231	8	7

Test Results	Material Description
R-value at 300 psi exudation pressure = 10	Dark reddish brown clay with gravel, B1, sampled received 11/20/2008

Project No.: 0020078
Project:
Location: Lahaina Bypass Rd., WO# 08-4582
Sample Number: L12211-1 **Depth:** 6"-1'
Date: 12/10/2008

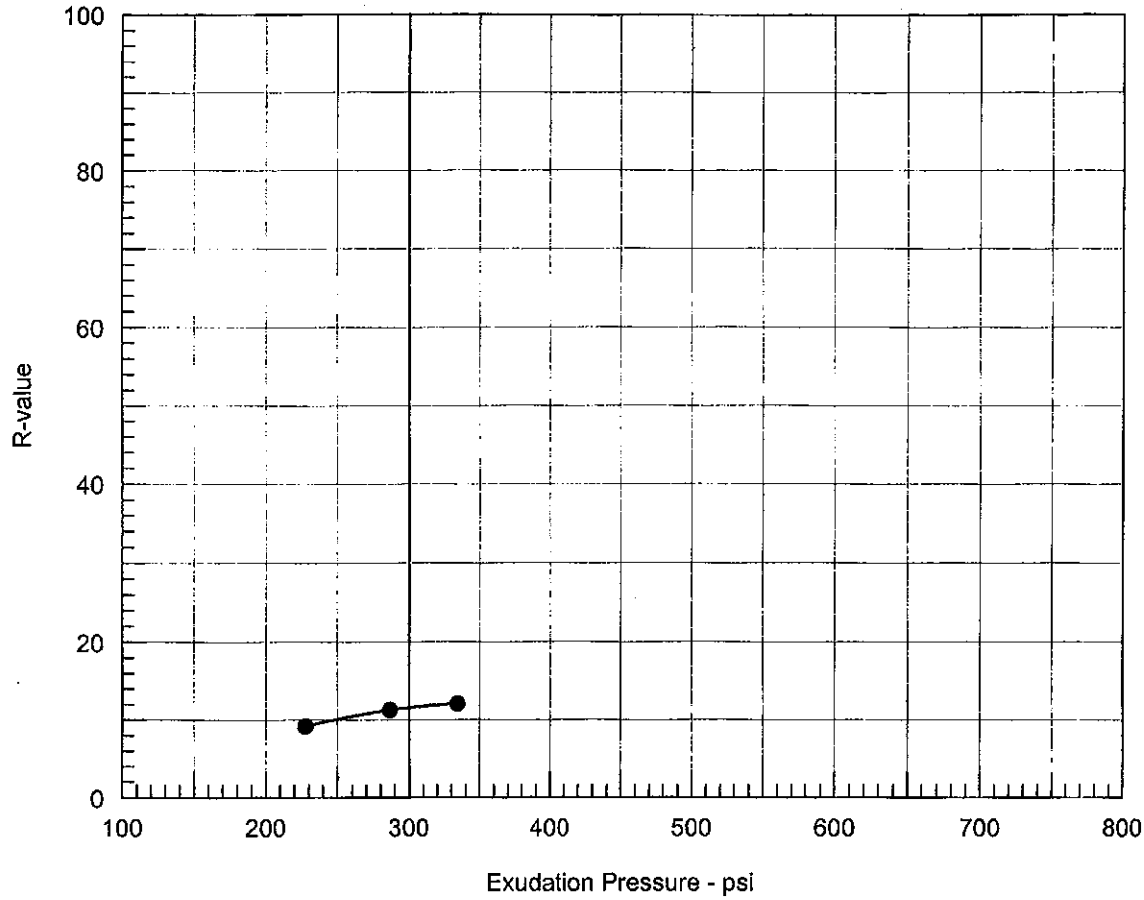
Tested by: DTN
Checked by: LKL
Remarks:
B1

R-VALUE TEST REPORT

SIGNET TESTING LABS, INC.

Figure B6.1

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	80	105.8	23.8	0.00	136	2.46	334	12	12
2	35	103.7	24.7	0.00	142	2.59	228	9	9
3	55	104.9	24.3	0.00	137	2.55	286	11	11

Test Results	Material Description
R-value at 300 psi exudation pressure = 12	Reddish brown clayey silt, B5, sample received 6/2/2009

Project No.: 0020078
Project:
Location: Honoapiilani Hwy Realignement Phase 1B1, WO# 08-4582
Sample Number: L12383-1 (817)
Date: 6/11/2009

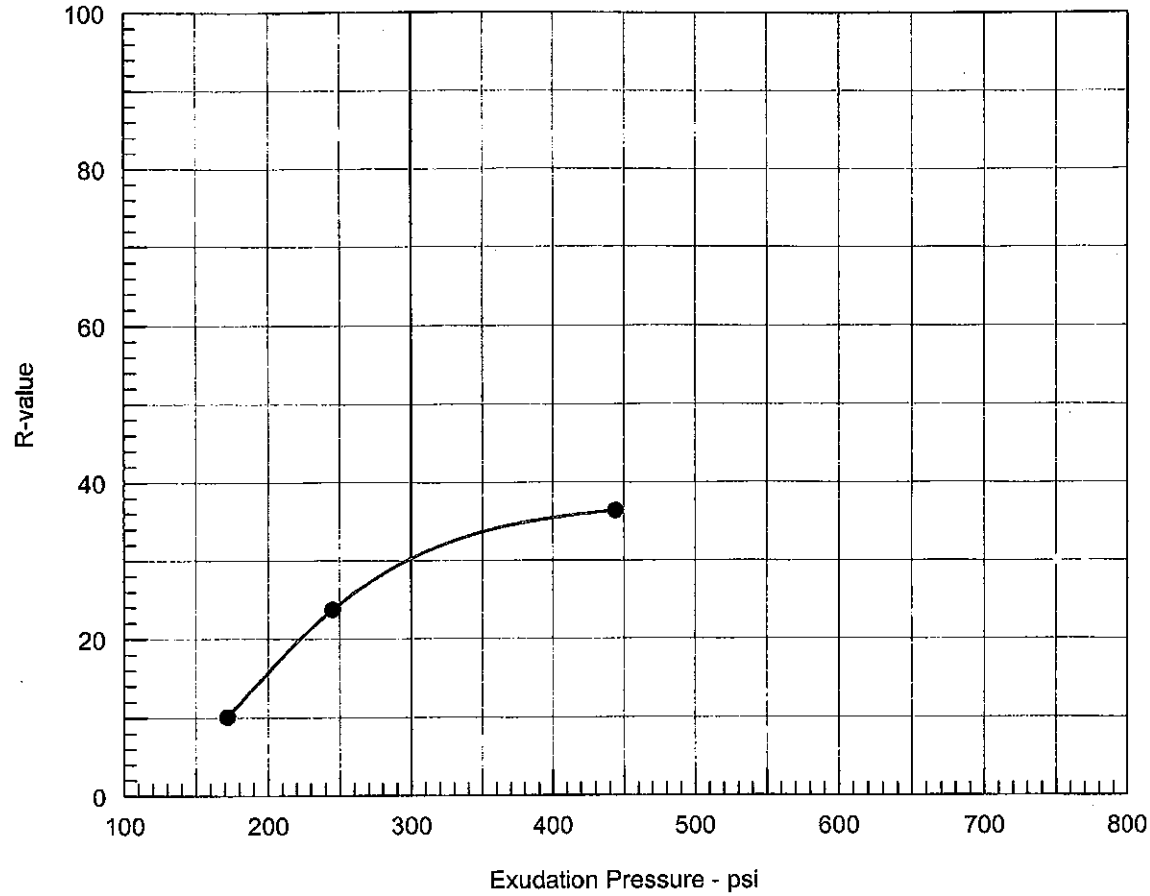
Tested by: DTN/I KL
Checked by: LKL
Remarks:
B5

R-VALUE TEST REPORT

SIGNET TESTING LABS, INC.

Figure B6.2

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	60	100.3	25.5	0.27	100	2.50	444	36	36
2	20	92.8	29.1	0.00	140	2.57	172	10	10
3	30	95.5	27.3	0.00	120	2.64	245	22	24

Test Results	Material Description
R-value at 300 psi exudation pressure = 30	Dark reddsih brown clayey silt with gravel, B13, sample received 6/9/2009

Project No.: 0020078
Project:
Location: Honoapiilani Hwy Realignement Phase 1B1, WO# 08-4582
Sample Number: L12396 (849)
Date: 6/18/2009

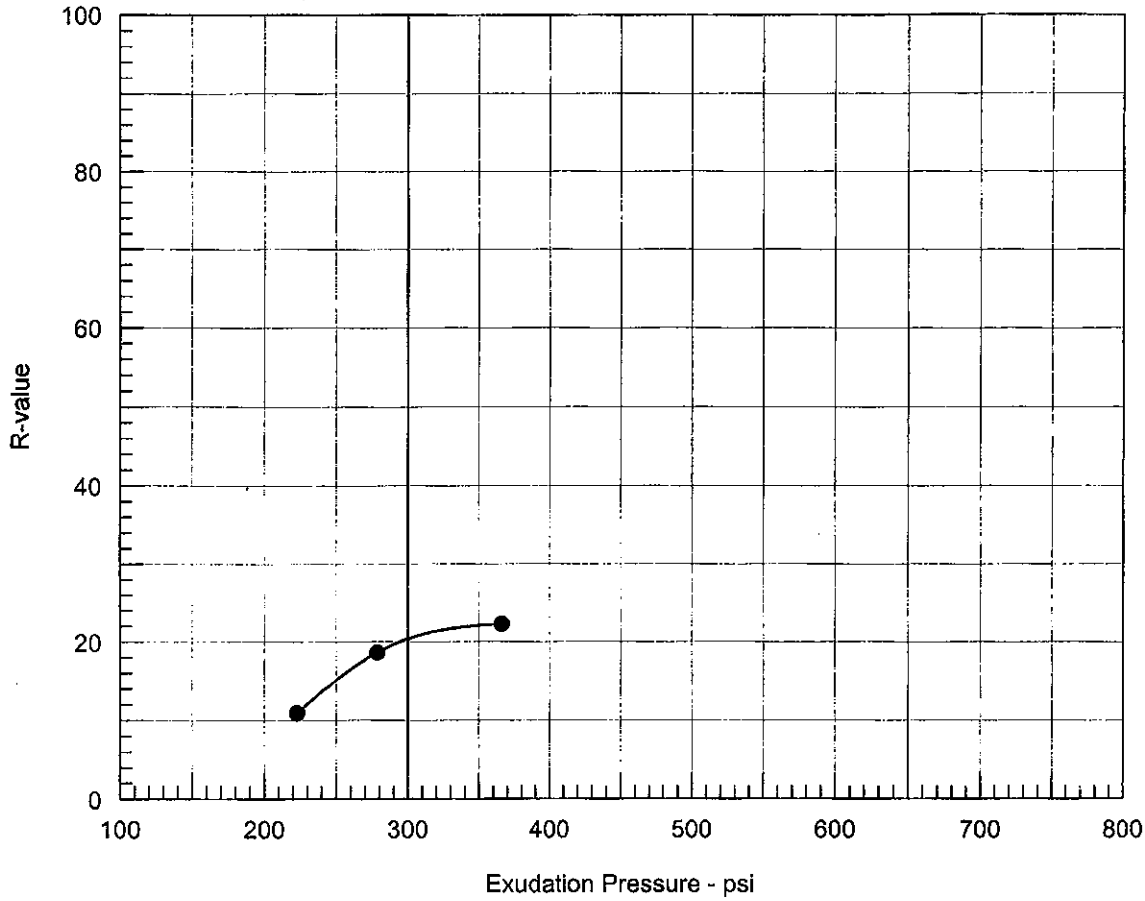
Tested by: DTN
Checked by: LKL
Remarks:
B13

R-VALUE TEST REPORT

SIGNET TESTING LABS, INC.

Figure B6.3

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	50	95.4	28.0	0.00	119	2.53	366	22	22
2	30	94.0	29.0	0.00	125	2.54	279	19	19
3	25	92.0	30.0	0.00	138	2.54	223	11	11

Test Results	Material Description
R-value at 300 psi exudation pressure = 20	Dark brown silt with gravel and some organics, B20, sample received 6/2/2009

Project No.: 0020078
Project:
Location: Honoapiilani Hwy Realignement Phase 1B1, WO# 08-4582
Sample Number: L12383-2 (817)
Date: 6/11/2009

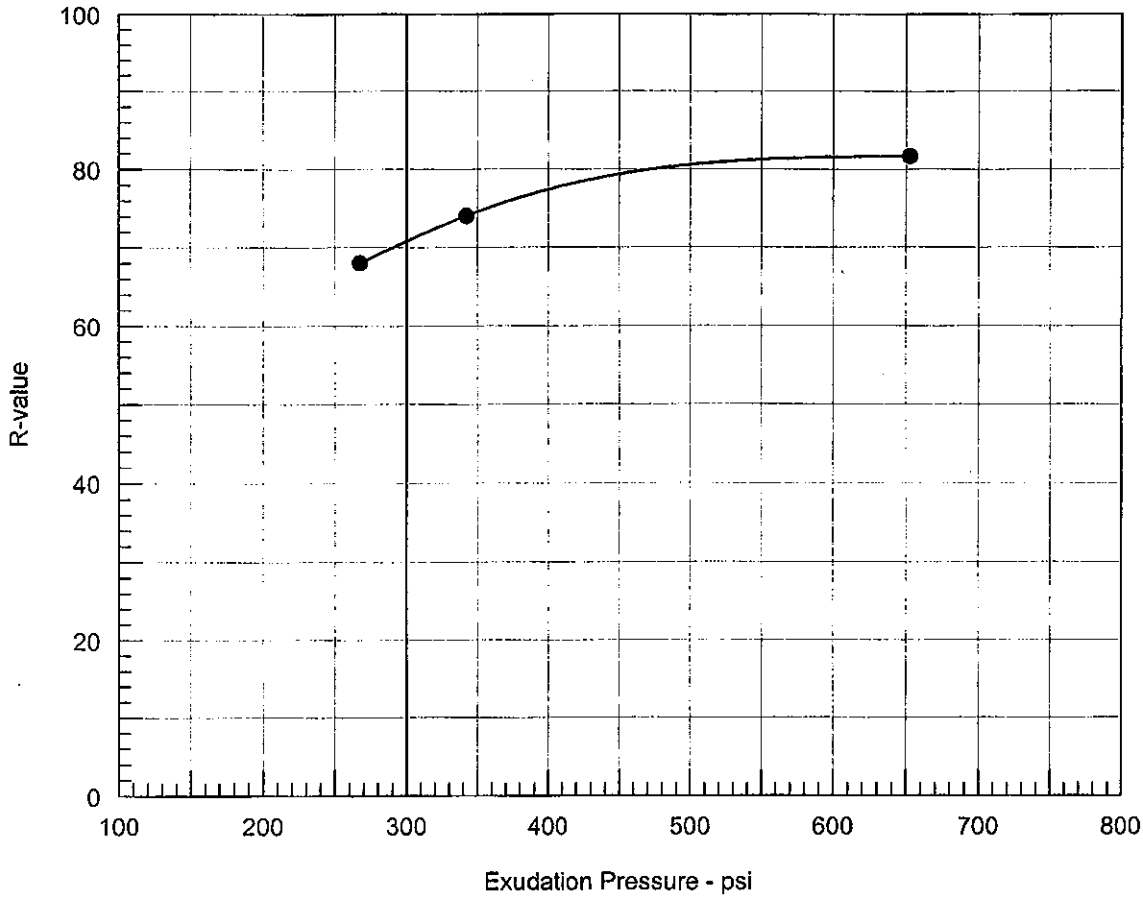
Tested by: DTN
Checked by: LKL
Remarks:
B20

R-VALUE TEST REPORT

SIGNET TESTING LABS, INC.

Figure B6.4

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	125	102.5	22.4	0.00	31	2.51	342	74	74
2	55	101.9	23.3	0.00	38	2.49	267	68	68
3	275	104.1	21.5	0.00	21	2.47	653	82	82

Test Results	Material Description
R-value at 300 psi exudation pressure = 71	Dark reddish brown gravelly silt with clay, B29, sampled received 11/20/2008

Project No.: 0020078
Project:
Location: Lahaina Bypass Rd., WO# 08-4582
Sample Number: L12211-2 **Depth:** 6"-1'
Date: 12/10/2008

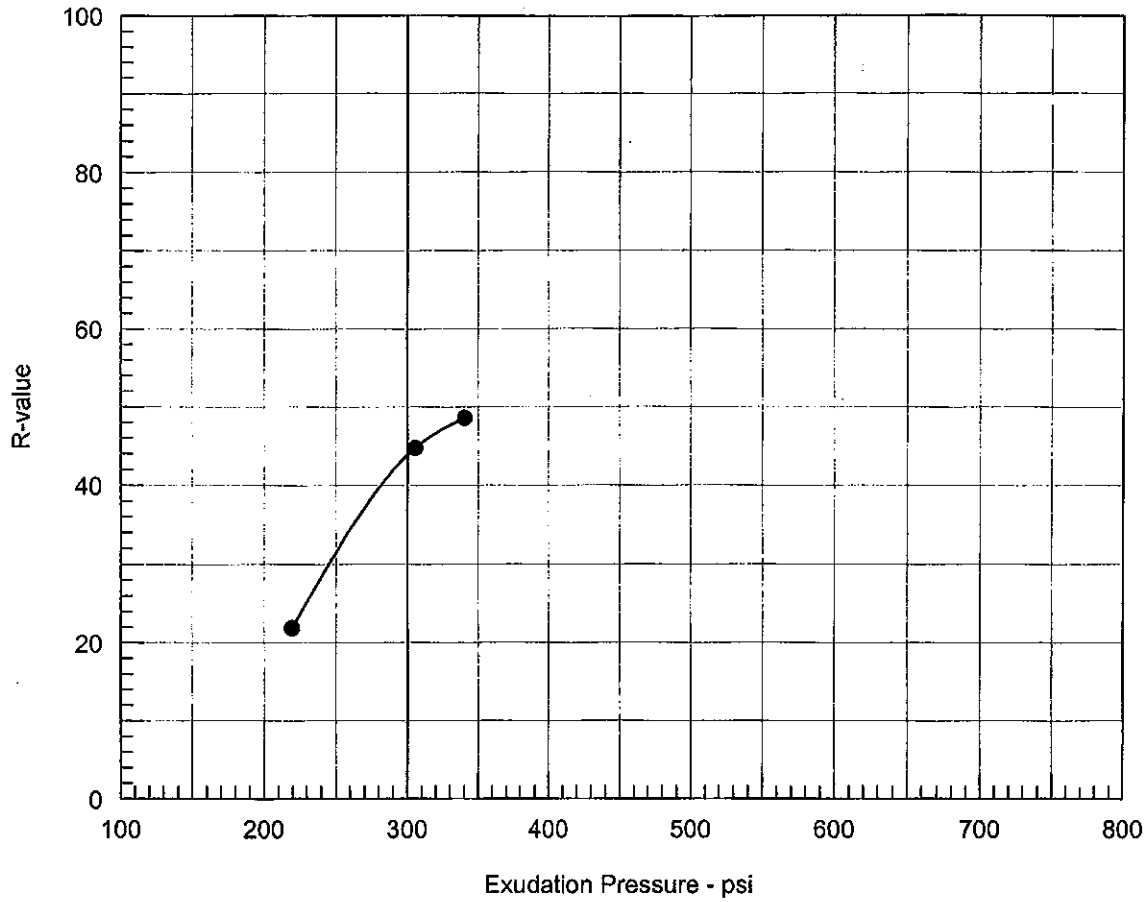
Tested by: DTN
Checked by: LKL
Remarks:
B29

R-VALUE TEST REPORT

SIGNET TESTING LABS, INC.

Figure B6.5

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	135	95.7	26.0	0.21	70	2.51	341	49	49
2	50	92.3	27.9	0.00	118	2.60	220	21	22
3	80	95.3	25.0	0.09	78	2.48	306	45	45

Test Results	Material Description
R-value at 300 psi exudation pressure = 44	Dark reddish brown clayey silt with gravel, B30, sample received 6/2/2009

Project No.: 0020078
Project:
Location: Honoapiilani Hwy Realignement Phase 1B1, WO# 08-4582
Sample Number: L12383-3 (817)
Date: 6/11/2009

Tested by: DTN
Checked by: LKL
Remarks:
B30

R-VALUE TEST REPORT

SIGNET TESTING LABS, INC.

Figure B6.6

Construction Engineering Labs

96 -1173 Waihona St. Suite #B7 Pearl City, HI 96782
Phone (808) 455-1522 FAX (808) 455-1384
E-mail cel@hawaii.rr.com

Ernest K. Hirata & Associates, Inc.
99-1433 Koaha Place
Aiea, HI 96701

Date: June 17, 2009
Report #: 7326.001

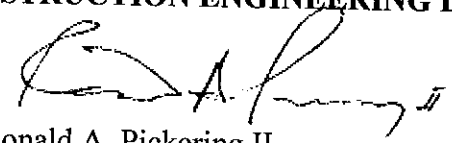
TEST REPORT

Project: Honoapiilani Highway Realignment Phase 1B1	W.O. No. 7326
Client: Ernest K. Hirata & Associates, Inc.	Received: 06/12/09
Description of material: Rock Core Samples	Tech: KP
Source: See Below	Sample #: 7326
Depth: See Below	

Core Identification	Test Method	Compressive Strength (psi)
Boring 5 10'-11'	ASTM D 2938	4957
Boring 5 25'-26'	ASTM D 2938	537
Boring 7 12'-13'	ASTM D 2938	7882
Boring 9 18'-19'	ASTM D 2938	5463
Boring 14 12'-13'	ASTM D 2938	10261
Boring 22 10'-11'	ASTM D 2938	21622
Boring 22 20'-21'	ASTM D 2938	7959
Boring 26 33'-34'	ASTM D 2938	6860

Please contact our office if you have any questions or need more information.

Respectfully,
CONSTRUCTION ENGINEERING LABS, INC.



By: Ronald A. Pickering II
Its: President

CULTURAL SURVEYS HAWAI`I
ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL DOCUMENTATION SERVICES - SINCE 1982

CSH Job Code: Lahaina Bypass 1

Wednesday, December 30, 2009

State Historic Preservation Division
601 Kamokila Blvd.
Kakuhihewa Building, Suite 555
Kapolei, Hawai`i, 96707

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P.O. Box 1114
Kailua, Hawai'i 96734
Ph: (808) 262-9972
Fax: (808) 262-4950

Maui Island
1993 Main Street
Wailuku, Hawai'i 96793
Ph: (808) 242-9882
Fax: (808) 244-1994

Branch Offices:
Hilo, Hawai'i
Kona, Hawai'i
Lāwai, Kaua'i

Subject: **Section 106 NHPA/Chapter 6E-8 Historic preservation review – Archaeological Inventory Level Documentation for Inadvertent Historic Property Discovery for the Lahaina Bypass Phase 1B-1 Project: SIHP #50-50-03-6631, -6632, and -6633, Paunau to Polanui Ahupua'a, Lahiana District, Island of Maui, Hawai'i TMK: (2) 4-6-014:001, 002; (2) 4-6-018:002, 003; (2) 4-7-001:002; (2) 4-7-001:001**

Dear SHPD Staff:

Please find the revised hardcopy and submittal sheet for the subject archaeological report enclosed herein. Requested revisions (SHPD ***Section 106 NHPA/Chapter 6E-8*** Historic Preservation Review LOG NO: ***2009.4696***, DOC NO: ***0912PC60***) were addressed in the following manner:

Revision Number	Page Number	SHPD Comment	Corrective Action
1		Please check the document for missing punctuation and page headers/footers for correct information;	Some formatting corrections have been addressed in the headers/footers as well as missing punctuation.
2		Given the numerous land parcels included in the survey area, please add a table which clearly specifies the TMK (to the parcel) of each identified site/feature:	Table 4 was added to the report showing the TMKs associated with each site/feature.
3		Please state whether individual maps of SIHP # 50-50-03-5950 features were drawn in and if so, include a map of the entirety of the site which clearly shows the spatial position of the features;	Text was added to Section 4.1 explaining "The dimensions of each additional push pile added to SIHP# -5950 is available in Table 5 and their location in relation to the Lahaina Bypass Phase 1B-1 corridor is illustrated Figure 11. Individual field maps for each feature were not composed during this investigation but are available for push piles within the current project corridor in the subsequent addendum to this report (McCurdy and

			Hammatt 2009). In addition, Figure 11 was added to the report showing the location of all 27 features associated with SIHP# -5950 in relation to the current Lahaina Bypass Phase 1B-1 ROW.
4	32	Page 32 (Figure 12): this drawing needs to include a sample of feature heights;	Feature heights were added to Figure 12 (now Figure 13).
5	37, 75	Page 37 (Figure 16/Page 75 (Figure 49): clarify that these figures also show a portion of SIHP # 50-50-03-5950 – it also appears that several; push piles have been identified at feature 24; please correct or add explanation or clarification	Added clarification that Figure 16 (now figure 17) and Figure 49 (now Figure 50) also show a portion of SIHP# 50-50-03-5950 and corrected the multiple designations of Feature 24 in Figure 50.
6	38	Page 38 (Figure 17): this drawing needs to include a sample of upslope/downslope heights of the terraces shown – you might want to insert a tabloid size figure so that the additional information will be eligible;	Feature heights in relation nto the site datum have been added to Figure 17 (now Figure 18) and it has been increased to tabloid size.
7		Page 83 (Figure 50): please add SIHP # 5950 to the tags for the 10 new push piles.	SIHP # 5950 designations have been added to the tags for the 10 new push piles in figure 50 (now Figure 52)

If you have any further questions or comments regarding the revised archaeological report, please feel free to contact me at our Maui Island office (808) 242-9882, or Hal Hammatt at our O‘ahu location (808) 262-9972.

Respectfully,

Respectfully,

Todd D. McCurdy, M.A.
Archaeologist – Maui Office Director for
Hallett H. Hammatt Ph.D. – President
Cultural Surveys Hawai‘i, Inc.

Archaeological Inventory Survey Documentation of Inadvertent Finds Identified during the Honoapiʻilani Highway Realignment

(Lāhainā Bypass), Phase 1B-1,

Paunau Ahupuaʻa to Polanui Ahupuaʻa,

Lāhainā District, Maui Island

TMK: (2) 4-6-014:001,002; (2) 4-6-018:002,003; (2) 4-7-001:002 and (2) 4-7-003:001

Prepared for

Austin, Tsutsumi & Associates, Inc.

REVISED

Prepared by

Todd D McCurdy, M.A.

and

Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaiʻi, Inc.

Kailua, Hawaiʻi

(Job Code: LAHAINABYPASS 1)

September 2009

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Management Summary

Reference	Inventory Survey Documentation of Inadvertent Finds Identified During the Honoapi’ilani Highway Realignment (Lāhainā Bypass), Phase 1B-1, Paunau Ahupua‘a to Polanui Ahupua‘a, Lāhainā District, Maui Island, TMK: (2) 4-6-014:001,002; (2) 4-6-018:002,003; (2) 4-7-001:002 and (2) 4-7-003:001 (McCurdy and Hammatt 2009).
Date	August 2009
Project Number (s)	Cultural Surveys Hawai‘i Inc. (CSH) Job Code: LAHAINABYPASS 1
Investigation Permit Number	Cultural Surveys Hawai‘i Inc. (CSH) Job Code: LAHAINABYPASS 1 The fieldwork component of the archaeological inventory survey documentation was carried out under archaeological permit # 09-20 issued by the Hawai‘i State Historic Preservation Division/Department of Land and Natural Resources (SHPD/DLNR), per Hawai‘i Administrative Rules (HAR) Chapter 13-282.
Project Location	The project corridor begins south of the intersection of Lāhainā‌luna Rd. and Ikena Ave., and ends approximately 244 m south of Hokiokio Place , Paunau Ahupua‘a to Polanui Ahupua‘a, Lāhainā District, Maui Island, TMK: (2) 4-6-014:001-002, 4-6-018:002-003, 4-7-001:002 and 4-7-003:001.
Land Jurisdiction	Private Ownership
Agencies	Federal: Federal Highway Administration (FHWA) State: Hawaii Department of Transportation (HDOT) Hawai‘i Department of Land and Natural Resources/State Historic Preservation Division (DLNR/SHPD)
Project Description	Phase 1B-1, the current project area consists, of a 400 ft (122 m) wide corridor, approximately 3 km. long.
Area of Potential Effect (APE) and Survey Acreage	In order to account for areas of cut and fill, the APE covered during the literature review and field inspection (McCurdy and Hammatt 2008) extends out approximately 200 ft east and west from the Phase 1B-1 Right-of-Way (ROW), approximately 3.9 Hectares (9.1 acres).
Historic Preservation Regulatory Context	At the request of Austin, Tsutsumi & Associates, Inc. CSH conducted this inventory survey level documentation of inadvertent finds encountered during the Honoapi’ilani Highway Realignment (Lāhainā Bypass), Phase 1B-1. In consultation with SHPD, this investigation was designed to fulfill the requirements for an archaeological inventory survey per HAR Chapter 13-13-280 employing the standards of HAR Chapter 13-276.
Fieldwork Effort	The fieldwork component of the archaeological inventory survey documentation of the inadvertent finds identified during the Honoapi’ilani Highway Realignment (Lāhainā Bypass), Phase 1B-1, was accomplished between March 2 and March 19 2009, by CSH archaeologists, Todd McCurdy, M.A. and Robert Hill, B.A., under the general supervision of Hallett H. Hammatt, Ph.D. The fieldwork required approximately 144 person-hours to complete. The inventory survey documentation of the inadvertent finds included site recordation and subsurface testing.

Historic Properties Recommended Eligible to the Hawai‘i Register of Historic Places (Hawai‘i Register)

SIHP (50-50-03-)	Site Type	Function	Age	Significance Criteria
6631 Feature A and B	Dry stacked basalt stone wall	Boundary	Historic	C,D
6632 Features A-Y	Agricultural Complex	Agricultural: Remnant	Pre-Contact to Historic	C,D
6633	Plantation-era irrigation pipe.	Water Diversion	Historic	D

Modern Structures Ineligible to the Hawai‘i Register

Temporary Field Number	Site Type	Function	Age	Significance Criteria
CSH 3	Electrical Transformer	Irrigation Infrastructure	Modern	NA
CSH 5	Concrete drop pipe irrigation system	Water Diversion	Modern	NA

Project Effect and Mitigation Recommendations

The recommendations for SIHP 50-50-03-6631 and SIHP 50-50-03-6632 by Cultural surveys Hawai‘i, Inc. are avoidance and conservation. As a result of the initial Literature Review and Field Inspection (McCurdy and Hammatt 2008) Austin, Tsutsumi & Associates, Inc. elected to re-design the alignment to completely avoid SIHP-6631 and SIHP-6632 (Figure 51 and Figure 52) thus no effect on these historic properties. Inventory level survey documentation has also been completed for SIHP 50-50-03-6631 and Cultural Surveys Hawai‘i, Inc. is recommending no further work.

In addition, it is the recommendation of SHPD that all of the push piles (SIHP-5950) to be impacted within the Phase 1B-1corridor be mechanically tested in a manner similar to that of the Phase 1A portion (Nancy McMahon personal communication 10 July 2009).This would entail employing an excavator with a thumb attachment to dismantle approximately 25% of each of the plantation era push piles while documenting each one with photographs and maps drawn to scale. The results of the mechanical testing will be submitted subsequent to this report under separate cover.

The recommended Historic American Engineering Report (HAER) recording of SIHP 50-50-03-4787 Feature D (Lāhainā Pump Ditch No. 1) was completed by Mason Architects (119 Merchant St # 50 Honolulu, HI 96813-(808) 536-0556) and submitted as a separate report (Mason Architects 2009).

Table of Contents

List of Figures

List of Tables

Section 1 Introduction

1.1 Project Background

The Honoapi‘ilani Highway Realignment, Lāhainā Bypass Project is a State of Hawai‘i Department of Transportation (HDOT) project scheduled to be constructed in three segments (Phases IA through IC). Phase 1B-1 is the second phase of build-out for the Lāhainā Bypass Project. The project area consists of a 400 ft (122 m) wide corridor, approximately 3 km. long, beginning south of the intersection of Lāhaināluna Rd. and Ikena Ave. at the southern terminus of the Lāhainā Bypass Phase 1A corridor and ends approximately 244 m south of Hokiokio Place (Figure 1).

At the request of Austin, Tsutsumi & Associates, Inc. (ATA), Cultural Surveys Hawai‘i, Inc. (CSH) completed an archaeological literature review and field inspection of the original Phase 1B-1 right-of-way between August 18 and September 22 2008 (McCurdy and Hammatt 2008). During the field inspection three previously unrecorded historic properties ([SIHP] 50-50-03-6631, 6632 and 6633) were identified and 10 features of an existing historic property were observed (SIHP 50-50-03-5950, Features 18 to 27) (Figure 2).

Since the historic preservation review process for the Lāhainā Bypass Section of the Honoapi‘ilani Highway Realignment Project had already been completed (December 22, 1992 [Log No.: 7126; Doc No.: 9212AG52]; March 3, 1994 [Log No.: 10704; Doc No.: 9402KD28]; October 6, 1994 [Log No.: 12728; Doc No.: 9409KD32]; June 2, 1994 [Log No.: 11460; Doc No.: 9406RC04]; and June 2, 1994 [Log No: 11459; Doc No.: 9406RC05]), SIHP-6631, 6632 and 6633 were designated as inadvertent finds as per HAR §13-280-3 (b). As per the recommendation of DLNR/SHPD archaeological inventory survey level documentation of the newly discovered historic properties was completed in order to assess the extent and significance of the overall sites the results of which are presented herein.

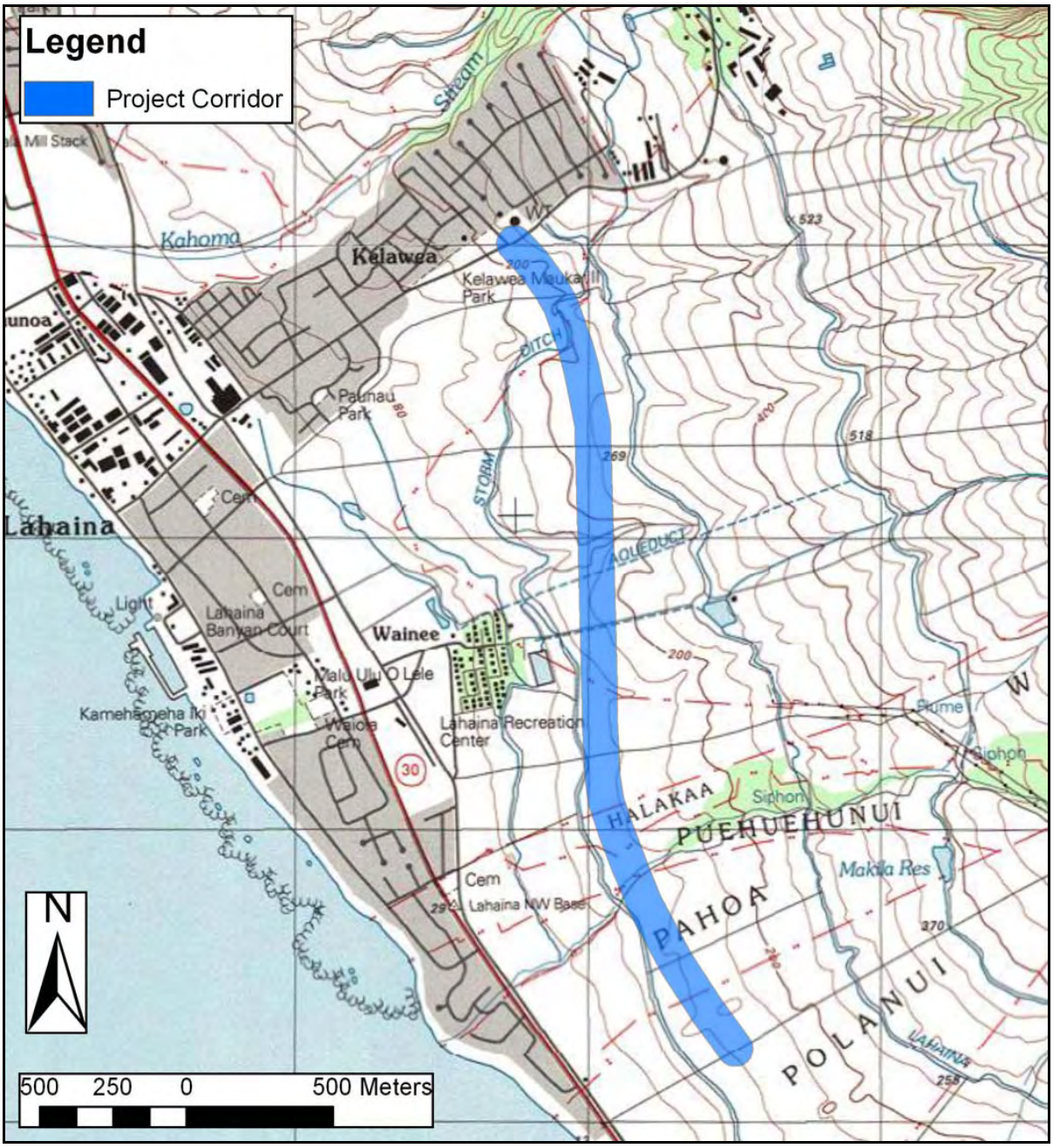

Figure 1. A portion of the USGS 7.5’ topographic map, Lāhainā Quadrangle (1992) showing the Lāhainā Bypass Phase 1B-1 corridor.

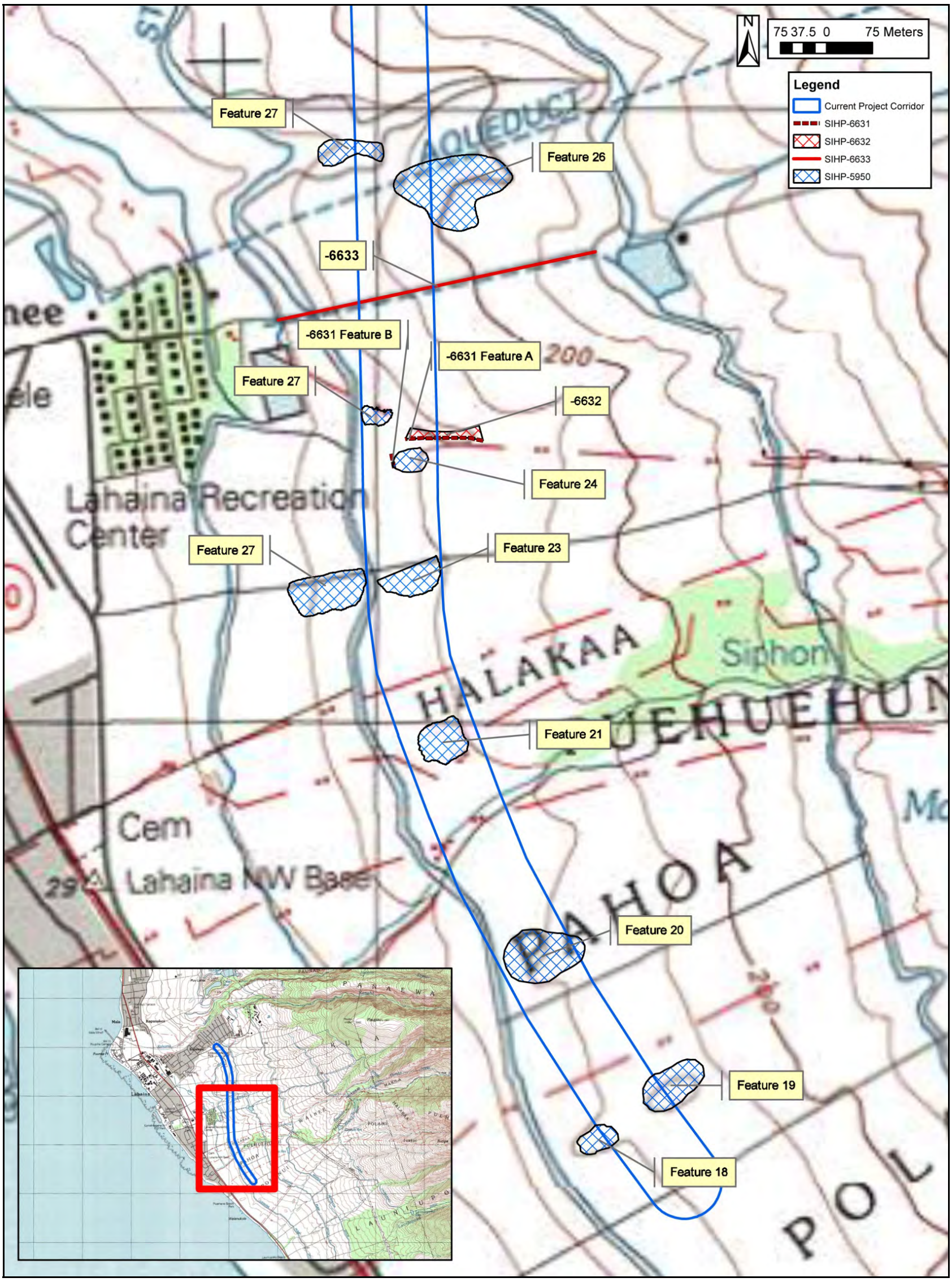

Figure 2. A portion of the USGS 7.5’ topographic map, Lāhainā Quadrangle (1992) showing the location of the sites w/in the Lāhainā Bypass Phase 1B-1 corridor.

1.2 Scope of Work

The following scope of work was carried out to satisfy archaeological inventory survey level documentation of the inadvertent finds per Hawai‘i Administrative Rules (HAR) 13-276-5 (d) – (g):

1. Field documentation that included photographs and maps drawn to scale with an evaluation of function, interrelationships, and significance.
2. Subsurface testing to evaluate soil depth within the terraces and the potential for obtaining good soil samples for charcoal and/or pollen analysis.
3. Geographic location of the site extent using a GPS and GIS Software.
4. Research on historic and archaeological background, including search of historic maps, written records, and Land Commission Award documents. This research focused on the specific area with a general background on the traditional Hawaiian land divisions, *ahupua‘a* and *moku*, emphasizing traditional settlement patterns as well as historic era use of the surrounding lands; and
5. Preparation of a report that would include the following:
    a. A topographic map showing the extent of the inadvertent finds;
    b. Historical and archaeological background sections summarizing pre-Contact and historic era land use as it may relate to the inadvertent finds;
    c. Description of the inadvertent finds with selected photographs, scale drawings, and discussions of function;
    d. Summary interpretation of the historic property and significance evaluation in an archaeological and historic context; and
    e. Recommendations based on the gathered information that will identify what steps should be taken to mitigate impact of development on this historic property - such as data recovery (excavation) or preservation of specific areas.

1.3 Environmental Setting

1.3.1 Natural Environment

The Lāhainā Bypass Phase 1B-1 corridor varies in elevation from approximately 240 ft above mean sea level (amsl) in the northern portion to 120 feet amsl in the southern portion. The distance of the project corridor from the coastline ranges between 0.9 and 0.4 km. The corridor passes through Kaua‘ula Gulch and multiple unnamed shallow swales and gulches.

The soils within the project corridor are generally described as being of the Waiakoa-Keahua-Molokai association. This soil association consists of moderately deep and deep, nearly level to moderately steep, well-drained soils that have a moderately fine textured subsoil on low uplands (Foote et al. 1972:8). More specifically, the soils within the project corridor are a combination of Pulehu Cobbly Clay Loam 3 to 7% slopes (PtB), Stony Alluvial Land (rSM), Wainee Very Stony Silty Clay 3 to 7% slopes (WxB), Wainee Very Stony Silty Clay 7 to 15% slopes (WxC), Wainee Extremely Stony Silty Clay 3 to 7% slopes (WyB), and Wainee Extremely Stony Silty Clay 7 to 15% slopes (WyC) (Foote et al. 1972: 94-95) (Figure 3). For the most part, at the time of the soil survey conducted by Foote et al. (1972) Pulehu and Wainee series soils were utilized primarily for sugarcane with small acreages used as home sites (USDA Natural Resources Conservation Service 2001).

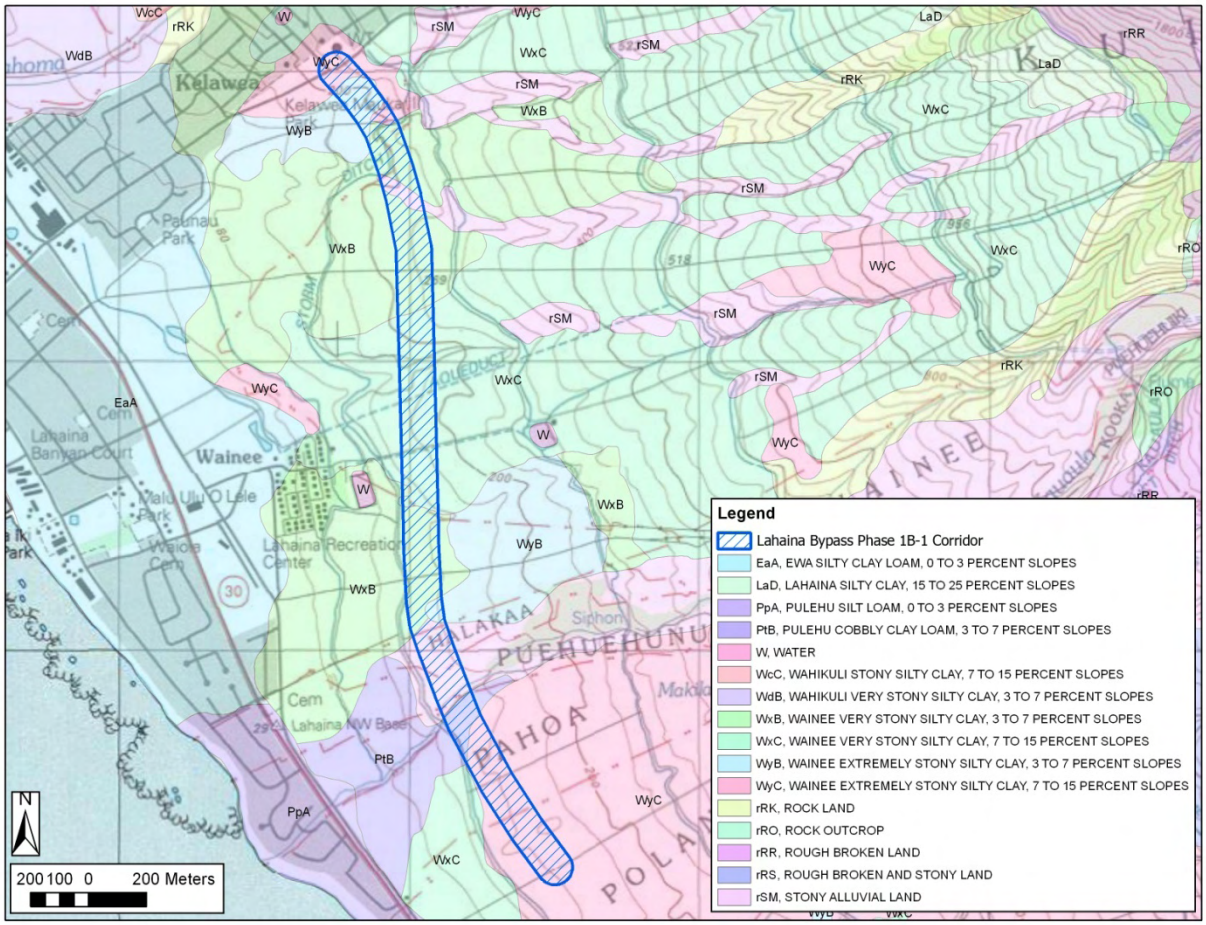

Figure 3. A portion of the 1992 Lāhainā 7.5-minute USGS topographic quadrangles, showing the Lāhainā Bypass Phase 1B-1 project area relative to the local soil series (U.S. Department of Agriculture, Natural Resources Conservation Service 2001)

The average annual rainfall in the general vicinity of the project area is approximately 15 inches. The average temperature in Lāhainā ranges from 65° to 90° F. As expected, the cooler temperatures and heavier rainfall occur in the winter months (October -April) and warmer temperatures and lighter rainfall occur during the summer months (May – September) (Giambelluca and Schroeder 1998:49-59).

During the pre-Contact era, these soils and level of rainfall would likely have supported a lowland dry and mesic forest, woodland, and shrubland. This type of native environment would have provided medicinal plants for *la‘au lapa‘au* (traditional Hawaiian medicine) and hardwoods for building, tool, and carving material, as well as *pili* grass for use in thatching. Some mesic areas were cleared and converted to dryland *kalo* (taro) and *‘uala* (sweet potato) agriculture (Pratt and Gon 1998: 127). After more than a century of sugarcane and banana agriculture, the current natural environment of the project corridor consists entirely of various species of introduced flora. This includes various species of introduced grasses, *kiawe* (*Prosopis pallida*), *koa haole* (*Leucaena leucocephala*), and Century Plants (*Agave americana*).

1.3.2 Built Environment

The general area within and adjacent to the current project corridor has been subjected to over a century of intensive sugarcane cultivation. Remnants dating from this time period are scattered across the landscape and include complex water diversion systems, large push piles, and unimproved/cane haul access roads. The existing corridor mostly traverses fallow fields with the exception of a modern banana plantation near its center (Figure 4).

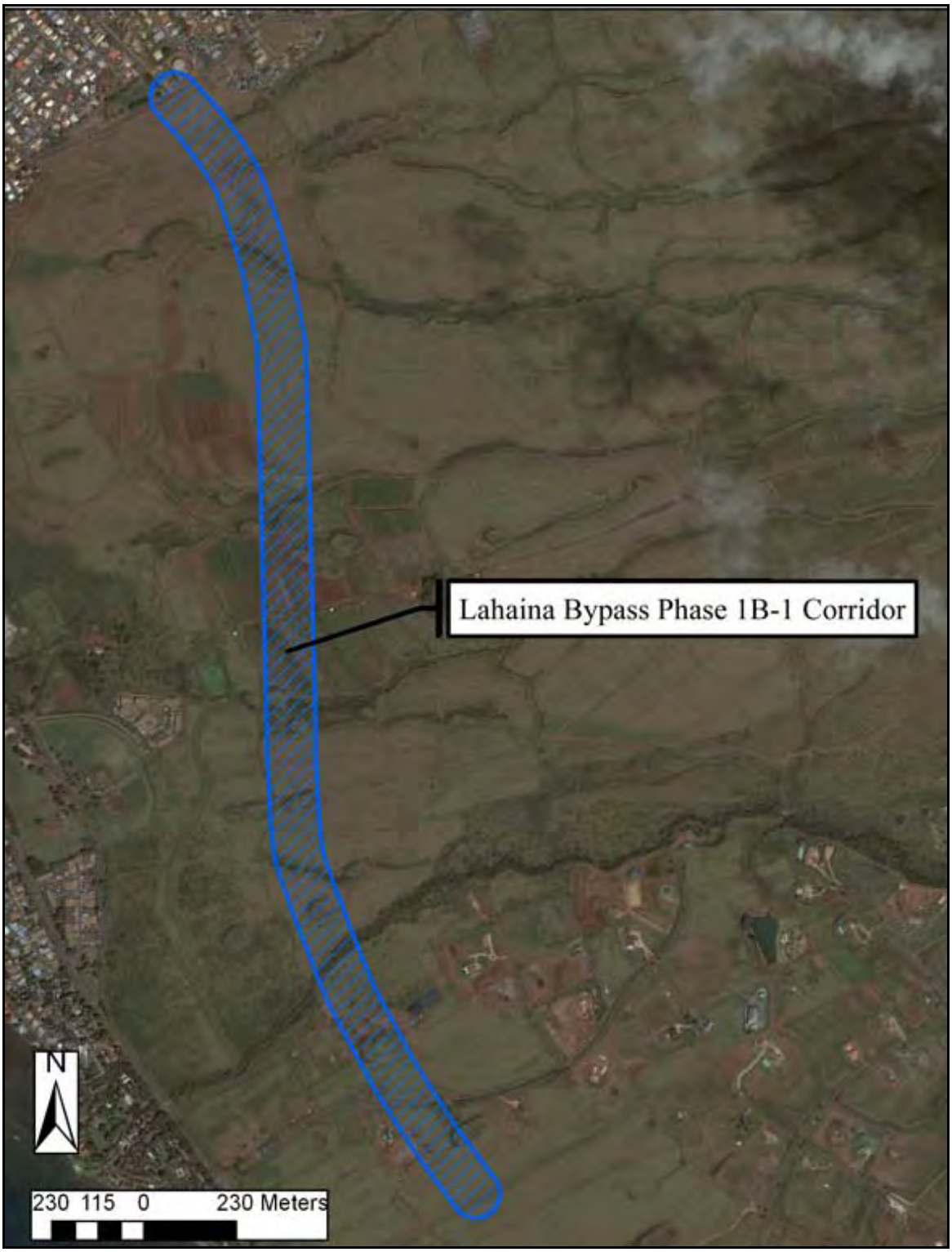

Figure 4. Aerial photo showing the environmental setting in the general area of the Lāhainā Bypass phase 1B-1 project corridor.

Section 2 Methods

This section details the methods used by CSH personnel during fieldwork and the preparation of this document. CSH completed the documentation of the inadvertent finds under state archaeological permit No. 09-20 issued by the State Historic Preservation Division (SHPD), per Hawai‘i Administrative Rules (HAR) Chapter 13-13-282.

2.1 Field Methods

The fieldwork component of the archaeological inventory survey documentation of the inadvertent finds was accomplished between March 2 and September 26, 2009, by CSH archaeologists, Todd McCurdy, M.A. and Robert Hill, B.A., under the general supervision of Hallett H. Hammatt, Ph.D. The fieldwork required approximately144 person-hours to complete. The inventory survey documentation of the inadvertent finds included site recordation and subsurface testing.

2.1.1 Site Recordation

Archaeological documentation included:

1. Mapping to scale using a tape and compass.
2. Detailed written descriptions.
3. Photographic documentation using an Olympus Stylus 780, resolution 7.1 megapixels.
4. Site location through GPS data collection:

2.1.2 Subsurface Testing

1. Hand excavations were conducted in the following manner:
    a. Seven 1m by 1m test units were excavated to the underlying bedrock and/or saprolitic soils.
    b. All excavated sediments were screened through a 1/8-inch wire mesh screen.
    c. Soil stratigraphy was recorded; with soil attributes described using Munsell soil colors and U.S. Soil Conservation Service terminology.
    d. Soil samples were collected for pollen/phytolith analysis.
    e. Each completed excavation unit was then photographed, mapped in plan-view, and backfilled.

2.1.3 Consultation

The project findings were presented on two occasions, January 21, 2009 at a meeting with the Kauaula descendents meeting and at a Public Information meeting April 2, 2009. In addition a walking tour and site visit for the project area was conducted on February 28, 2008.

2.2 Laboratory Methods

2.2.1 Artifacts

All artifacts were collected during the excavation and the provenience information of each artifact was recorded. Subsequently all artifacts were identified and categorized according to type and material. Particular attention was given to those artifacts that could be dated to a certain specific time period.

2.2.2 Soil Samples

Soil samples were sent to Paleo Research Institute, Inc. (Golden, Colorado) for pollen analysis. A chemical extraction technique based on flotation is the standard preparation technique used in this laboratory for the removal of the pollen from the large volume of sand, silt, and clay with which they are mixed. This particular process was developed for extraction of pollen from soils where preservation has been less than ideal and pollen density is lower than in peat.

Hydrochloric acid (10%) is used to remove calcium carbonates present in the soil, after which the samples are screened through 150 micron mesh. The samples are rinsed until neutral by adding water, letting the samples stand for 2 hours, and then pouring off the supernatant. A small quantity of sodium hexametaphosphate is added to each sample once it reaches neutrality, then the samples are allowed to settle according to Stoke’s Law in settling columns. This process is repeated with ethylenediaminetetraacetic acid (EDTA). These steps remove clay prior to heavy liquid separation. The samples are then freeze dried. Sodium polytungstate (SPT), with a density 1.8, is used for the flotation process. The samples are mixed with SPT and centrifuged at 1500 rpm for 10 minutes to separate organic from inorganic remains. The supernatant containing pollen and organic remains is decanted. Sodium polytungstate is again added to the inorganic fraction to repeat the separation process. The supernatant is decanted into the same tube as the supernatant from the first separation. This supernatant is then centrifuged at 1500 rpm for 10 minutes to allow any silica remaining to be separated from the organics. Following this, the supernatant is decanted into a 50 ml conical tube and diluted with distilled water. These samples are centrifuged at 3000 rpm to concentrate the organic fraction in the bottom of the tube. After rinsing the pollen-rich organic fraction obtained by this separation, all samples receive a short (20-30 minute) treatment in hot hydrofluoric acid to remove any remaining inorganic particles. The samples are then acetolated for 3-5 minutes to remove any extraneous organic matter.

A light microscope is used to count the pollen to a total of approximately 200 pollen grains at a magnification of 500x. Pollen preservation in these samples varied from good to poor. Comparative reference material collected at the Herbarium of the Bishop Museum was used to identify the pollen to the family, genus, and species level, where possible.

Pollen aggregates were recorded during identification of the pollen. Aggregates are clumps of a single type of pollen and may be interpreted to represent pollen dispersal over short distances or the introduction of portions of the plant represented into an archaeological setting. Aggregates were included in the pollen counts as single grains, as is customary. The presence of aggregates is noted by an "A" next to the pollen frequency on the pollen diagram. Pollen diagrams are produced using Tilia, which was developed by Dr. Eric Grimm of the Illinois State Museum. Total pollen concentrations are calculated in Tilia using the quantity of sample processed in

cubic centimeters (cc), the quantity of exotics (spores) added to the sample, the quantity of exotics counted, and the total pollen counted and expressed as pollen per cc of sediment.

Indeterminate pollen includes pollen grains that are folded, mutilated, and otherwise distorted beyond recognition. These grains are included in the total pollen count since they are part of the pollen record. The microscopic charcoal frequency registers the relationship between pollen and charcoal. The total number of microscopic charcoal fragments was divided by the pollen sum, resulting in a charcoal frequency that reflects the quantity of microscopic charcoal fragments observed, normalized per 100 pollen grains.

Pollen analysis also includes examination for and identification of starch granules to general categories, if they are present. Starch granules are a plant's mechanism for storing carbohydrates. Starches are found in numerous seeds, as well as in starchy roots and tubers. The primary categories of starches include the following: with or without visible hila, hilum centric or eccentric, hila patterns (dot, cracked, elongated), and shape of starch (angular, ellipse, circular, eccentric). Some of these starch categories are typical of specific plants, while others are more common and tend to occur in many different types of plants.

2.3 Document Review

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 Cultural Surveys Hawai‘i library. Land Commission Award documentation was researched using the Waihona ‘Āina online database and previous reports. Additionally, documents, books and maps were consulted at the Maui Historical Society and Wailuku Public Library. Other sources such as the World Wide Web were utilized when necessary

Section 3 Background Research

This section contains a summary of the rich traditional historic background associated with the District of Lāhainā. In addition, this section details the previous archaeological investigations within and adjacent to the current project corridor. It concludes with a background summary and predictive model.

3.1 Traditional and Historical Background

3.1.1 Mythological and Traditional Accounts

The name Lāhainā traditionally refers to the “cruel sun”, possibly associated with the drought that has impacted the surrounding area from time to time (Pukui et al. 1974:127). Rich in traditional accounts, Lāhainā is associated with the god Kaka‘alaeno, who lived in the present Lāhainā district and the goddess Hina, mother of the demigod Maui among others. In regard to Kaka‘alaeno, Beckwith (1970) explains:

> Many legends mention the name of Kakaalaneo ([alternate spellings] Kukaalaneo, Kaalaneo), who lived in the present Lāhainā district on the hill Keka‘a (Black Rock of Sheraton Maui). He also owned fishponds in the Hana district on the opposite end of the island and planted a famous breadfruit grove in Lāhainā. His wife was the Molokai chiefess whom Eleio found for him and who brought him the first feather cape ever seen on Maui, and by whom he had the mischievous son Kaululaau who killed off the spirits on Lanai. In his day Lāhainā was called Lele.
>
> According to tradition, a group of strangers (*haole*) who later played an active part in court life and whose names (according to Kamakau), kept in memory as late as Captain Cook’s day, arrived on Maui in Kakaalaneo’s time. Kukanaloa and Kaekae (also Kakae) were the leaders of this group. The “last allusion” in this legend is a pun about chief Lolae of Oahu who abducted the pretty chiefess of Maui, Kelea (sister of Pi‘ilani’s father), while she was out surfing and carried her away to Oahu in the uplands of Lihue (now Schofield Barracks). She later deserted him for his cousin Kalamakua of Ewa (and Waikiki), by whom she became mother of the high chiefess Laie-lohelohe (the drooping pandanus vine), who became the wife of her Maui cousin Pi‘ilani. All these names appear in the chant linked with the coming of Ku-kanaloa, together with the names of a wife and son of Kakaalaneo (Beckwith 1970: 384-385).

In W.D. Westervelt’s account of “Hina the mother of Maui” (1910), he presents stories of Hina as the mother of Maui, residing in the West Maui Mountains:

> A version of the Maui stories is met with representing him as the son of Hina-lauae and Hina, residing above Lāhainā̆luna, Maui, which relate his venturing forth on mischievous pranks before birth.
>
> Reference is made to his snaring the sun that Hina might have time to dry her kapas. It says, further, that while absent on his duty Hina bore another son, an owl, which he did not treat with contempt. Setting out one day pole-fishing, Maui was to be placed on the altar the following day as a sacrifice by the king. Hina saw in a vision

> what was being done so she and the owl followed along, Hina staying at a rock by the wayside. The owl flew on to where Maui was guarded and saw that he was tied with cords. The guards were awake, so the owl waited till near dawn, but they would not sleep.
>
> Maui then spoke: “O thou Aina, retard and prolong the night.” The night being prolonged, the guards fell asleep, whereupon the owl entered and struck at Maui’s bonds till they fell off. They then set off to where Hina was waiting, by which time it was daylight. Hiding Maui under the stone, Hina sat outside of him and spread out her sleeping garment and looked for fleas as the searching party came up. To their inquiry for the man which was to be sacrificed by the chief, she said that she had not seen him, having just now arisen, and by the warmth of the sun was looking for fleas. At their departure the owl led Maui forth, and Hina followed till they reached home. Thus was Maui saved (Westervelt 1910).

At least two notable *‘auwai* (irrigation channels), that span multiple *ahupua‘a* between Kaua‘ula and Kahoma, are described in native lore. Roughly datable by the chiefs associated with them, the earliest, in the Lāhaināluna vicinity, known as ‘Auwaiawao, is reportedly named for the Chiefess Wao, sister of Kaululä‘au, who ruled a portion of Maui in ca. 1390. Portions of this ‘*auwai* were subsequently incorporated into the construction of the Lāhaināluna Ditch. The second ‘*auwai*, known as ‘Auwai o Pi‘ilani, is associated with Pi‘ilani, who ruled Maui and the neighboring islands in ca. 1450. The ‘Auwai o Pi‘ilani has its headwaters in the Kaua‘ula Stream and irrigated lands along both sides, with waterways extending to lands below Lāhaināluna. Maly and Maly (2007:4)

3.1.2 Early Historic Period

The *kalana* of Lāhainā was a favored place of residence for the high chiefs of Maui. The entire *moku*, or traditional district of Lāhainā, could boast of a mild climate all year round, plentiful marine and terrestrial resources, and close proximity to Lana‘i and Moloka‘i. Lāhainā was the primary seat of the *ali‘i* of West Maui (Handy et al. 1991:272). Subsequently, Lāhainā served as the center of government for the Kingdom of Hawaii as it was centrally located between O‘ahu and Hawai‘i.

The importance of Lāhainā lands and resources is also reflected in the political and warfare history of the area. During battles fought between Ka-uhi of Maui and Alapa‘i of Hawai‘i, the Hawai‘i Island warriors attacked the food resources of Lāhainā by drying up the streams of Kaua‘ula, Kanaha, and Kahoma, and laying waste to the *lo‘i* fields and brooks. This action by Alapa‘i effectively severed food and freshwater resources from the Maui forces and country people (Kamakau 1992:74).

The "Olowalu Massacre", one of the more infamous early historic accounts specific to the Lāhainā region, reveals how conflicts between early western traders and native Hawaiians were easily provoked as western goods became the focus of Hawaiian needs. The Olowalu conflict began in late January of 1791 when the American Merchantman *Eleanora,* under the command of Simon Metcalfe, landed off the coast of Honua‘ula to barter for food. During the night, natives killed the ship's watchmen and stole a boat tied to the stern of the *Eleanora*, after which it was burned on shore for the iron fittings. When the incident was discovered the next day, Metcalfe

expelled all of the Hawaiian women from of the ship, then fired on the village of Honua‘ula with grapeshot, effectively setting the *hale* (homes) and *heiau* (temples) on fire. The *Eleanora* then set sail for Olowalu where a chief offered in trade the return of the stolen boat and the bones of the killed watchmen. To Metcalfe's dissatisfaction, only a piece of the boat's keel and leg bones of the watchmen were given by the chief. In revenge, the angered Metcalfe and shipmates tricked the Olowalu natives to bring their trade canoes to the ship's starboard and fired upon them all, killing and wounding at least 100 Hawaiians (Daws 1968: 33-34).

The nineteenth century brought to Lāhainā and other portions of the present study area a multitude of commercial, social and religious changes that were encouraged by the burgeoning foreign influx. In 1819 the first whaling ships arrived in Hawaiian waters and Lāhainā became one of the primary harbors for provisioning ships in the islands. The whaling trade flourished until the 1860's and gave impetus to the development and growing population of Lāhainā. Between 1824 and 1861, 4747 whale ship arrivals were recorded for Lāhainā, representing 47 percent of the total arrivals in all ports of the Hawaiian Islands. Figures from an 1846 census of Lāhainā document the following changes brought to the area midway through the nineteenth century: 3,445 Hawaiians, 112 foreigners, 600 seamen, 155 adobe houses, 822 grass houses, 59 straw and wooden houses, and 529 dogs. With an increasing population of foreigners entering Lāhainā, there was a need to increase the traditional agricultural surplus, primarily under the control of the *ali‘i* class, for economic trade.

The first Protestant missionaries and their families arrived in Lāhainā in 1823. The missionary William Ellis, who visited Lāhainā during the 1820's, described the landscape that had entranced both the Hawaiians themselves and the nineteenth century newcomers:

> The appearance of Lāhainā from the anchorage is singularly romantic and beautiful. A fine sandy beach stretches along the margin of the sea, lined for a considerable distance with houses and adorned with shady clumps of kou-trees, or waving groves of cocoa-nuts. . .The level land of the whole district, for about three miles, is one continued garden, laid out in beds of taro, potatoes, yams, sugar-cane, or cloth-plants. The lowly cottage of the farmer is seen peeping through the leaves of the luxuriant plantain and banana tree, and in every direction white columns of smoke ascend, curling up among the wide-spreading branches of the bread-fruit tree. The sloping hills immediately behind, and the lofty mountains in the interior, clothed with verdure to their very summits, intersected by deep and dark ravines, frequently enlivened by waterfalls, or divided by winding valleys, terminate the delightful prospect. (Ellis 1969:76-77)

After the consolidation of the rulership of the Hawaiian Islands by Kamehameha I early in the nineteenth century, Lāhainā became the "capital" of the kingdom until the 1840's when the government moved to Honolulu. The sugarcane Ellis observed in the environs of Lāhainā in the 1820's would become the basis for a commercial venture that would reshape the landscape within much of the present study area during the second half of the nineteenth century.

3.1.3 Mid- to late-1800s

With the unification of the Hawaiian Islands in 1791 and the arrival of the first Missionaries in 1820, western commerce and the Christianization of the Native Hawaiian people swept across Lāhainā. The lands surrounding Lāhainā town were cultivated in commercial sugar (Gilmore 1936:198-203), while the whale trade and the establishment of the Lāhainā Mission Station and Lāhaināluna High School, drew people to the waterfront areas as well as the town itself, ultimately resulting in a population rise (Haun and Henry 2001:12). This trend made Lāhainā one of the main religious and educational centers for the entire island chain (Kamakau 1992:304).

Government censuses during the second half of the 19th century document the diminishing population of West Maui and the Lāhainā District. In 1853 4,833 persons were recorded as living in the Lāhainā District. Twenty-five years later, in 1878, the total district population had dropped to 2,448; by 1896, it was 2,398 (Schmitt 1977:12-13).

The whaling industry in the Pacific Ocean reached its peak in 1859. Prices for whale oil collapsed five years later. Since the 1840's, the Hawaiian economy had been dependent primarily on supplying whale ships during their long layovers in the islands. With the dwindling number of ships arriving during the 1860's, the population of Lāhainā Town and neighboring West Maui *ahupua‘a* dependent on the prosperity of Lāhainā migrated to other parts of Maui and to other islands.

As the Hawaiian population of West Maui declined during the 19th century, missionaries and entrepreneurs moved into the district, reshaping the landscape for western enterprises and pursuits. Reverend Dwight Baldwin (1798-1886) had arrived in the Hawaiian Islands in 1831 and was stationed at Lāhainā between 1835 and 1870. During the early 1850's, Baldwin had been granted 2,675 acres of land in northwest Maui. This land holding would be the basis for enterprises expanding over areas of West Maui undertaken by his son, Henry Perrine Baldwin, during subsequent decades of the 19th century.

Great Māhele

The most significant change in land-use patterns and land allocation came with The Great Māhele and the privatization of land in Hawai‘i. The 1839 establishment by Kamehameha III (Kauikeaouli) of a Bill of Rights for the people of Hawai‘i, followed by a formal constitution in 1840, hastened the shift of the Hawaiian economy from that of a subsistence-based economy to that of a market-based economy. During the Māhele, all of the lands in the Kingdom of Hawai‘i were divided between *mō‘ī* (king), *ali‘i* and *konohiki* (overseer of an *ahupua‘a*), and *maka‘āinana* (tenants of the land) and passed into the Western land tenure model of private ownership. On March 8, 1848, Kauikeaouli further divided his personal holdings into lands he would retain as private holdings and parcels he would give to the government. This act paved the way for government land sales to foreigners, and in 1850 the legislature granted resident aliens the right to acquire fee simple land rights (Moffat and Fitzpatrick 1995: 41-51).

The common people were offered fee-simple titles for their house lots and lands which they cultivated for themselves. *Kuleana* awards for individual parcels within the *ahupua‘a* were subsequently granted through a land commission. These awards were first presented to Native Hawaiian tenants, and subsequently to naturalized foreigners: non-Hawaiians born in the islands; or long-term resident foreigners who could prove occupancy on the parcels before 1845.

Land Commission Awards (LCAs) were granted by ministers representing the Kingdom of Hawaii's Department of the Interior. Native testimony to establish title to real property was recorded by Native Register - wherein claimants would provide traditional proof of ownership - and in like manner foreign testimony by Foreign Register - wherein boundary survey evidence would support traditional claims.

Of the *kuleana* awarded in the Lāhainā District, most land claims were concentrated in the stream valleys along Ukumehame, Olowalu, and Kaua‘ula Stream and scattered throughout the alluvial plains and coastline associated with these streams. The primary uses of the land claims in the upper environs were for agricultural with some used as house lots while the land claims in the coastal regions consisted primarily of house sites with home gardens. Figure 5 reflects this general pattern of *kuleana* claims. While the greater part of Polanui Ahupua‘a was awarded to a single claimant with a small number of LCA awards found along the northern coast, Moffat and Fitzpatrick (1995:75) note that there is a dense concentration of very small *kuleana* awards on the north side of Kaua‘ula Stream as opposed to the south side (Figure 5 and Figure 6). They interpret this pattern as a result of the intensive development of lo‘i agriculture that would have been supported by the waters Kaua‘ula Stream whereas Polanui did not have a stream system exclusive to the ahupua‘a and therefore the LCA distribution is scattered and sparse. There are a total of 18 Land Commission Awards within or adjacent to the current project corridor; these include seven awarded to *Ali‘i* and 11 *kuleana.* Summarized in Table 1, the complete testimonial as presented by Waihona ‘Aina (2000) is available in Appendix A and B.

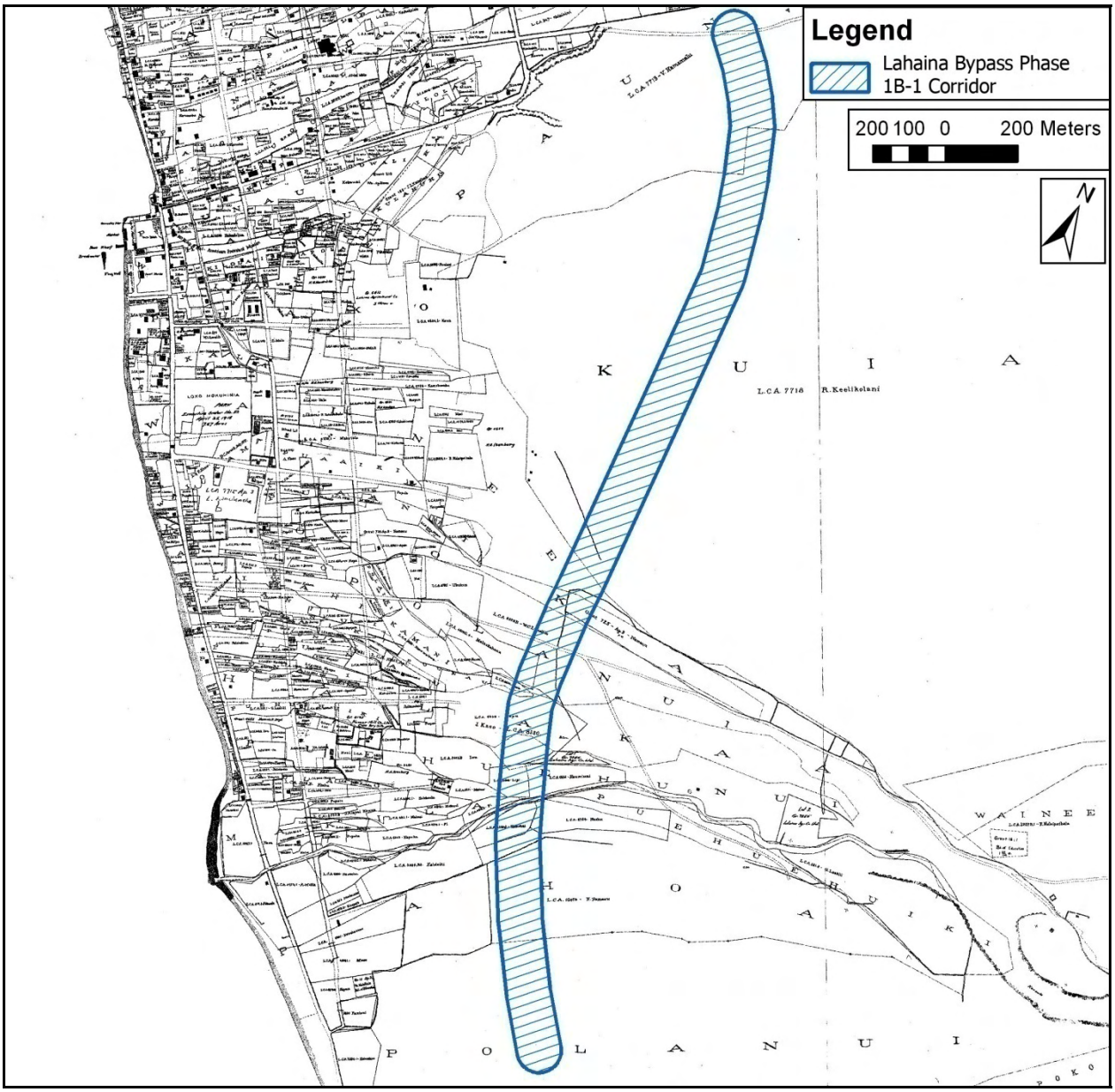

Figure 5. A portion of the 1884 S.E. Bishop map showing the location of Land Commission Awards (LCAs) in relation to the Lāhainā Bypass Phase 1B-1 corridor (adapted from Bishop 1884).

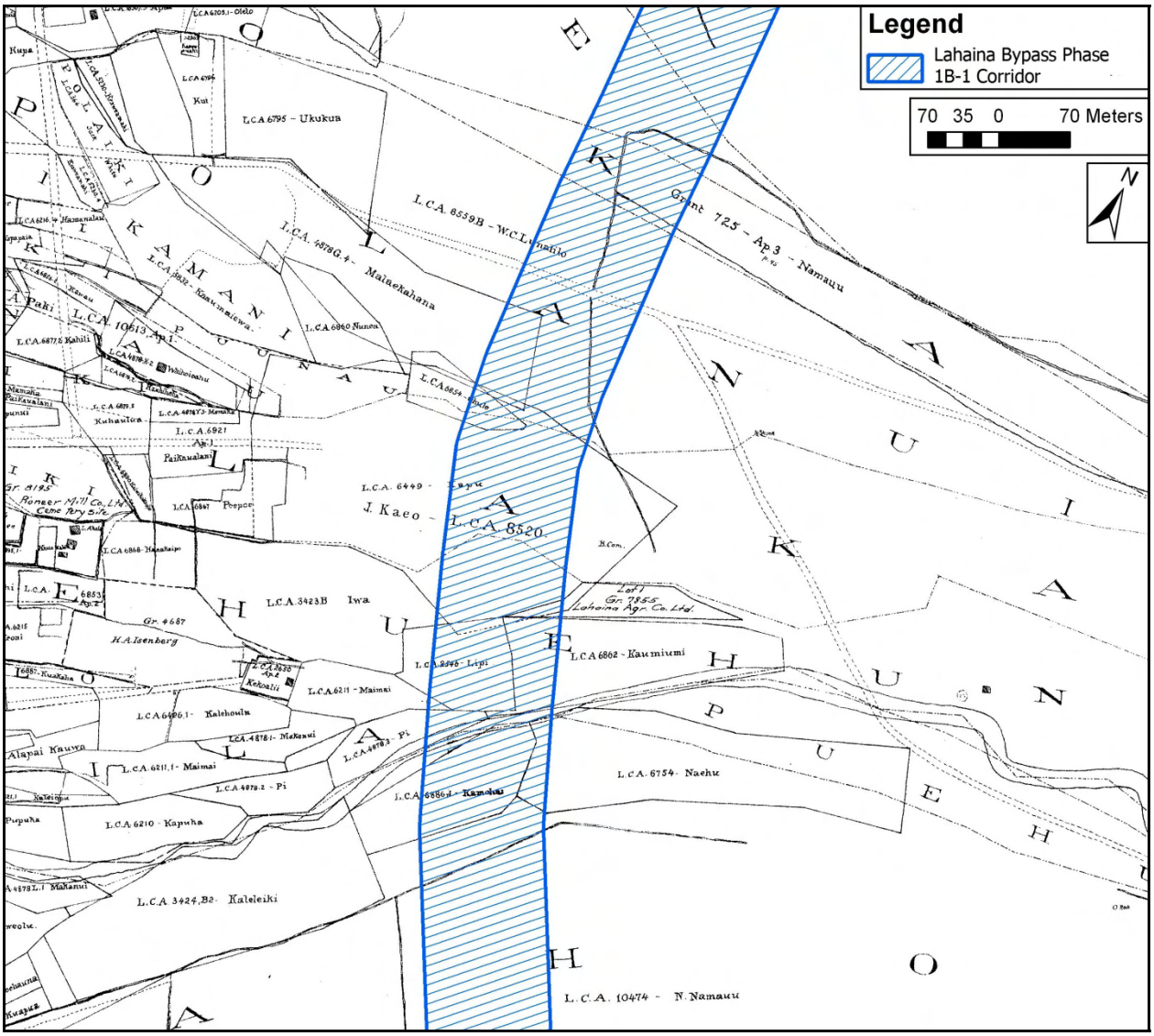

Figure 6 A close-up of the 1884 S.E. Bishop map showing the concentration of Land Commission Awards (LCAs) adjacent to Kaua‘ula Stream (adapted from Bishop 1884).

Table 1. Summary of Land Commission Awards (LCAs) identified within or adjacent to the current project area.

LCA #	Claimant	Ahupua‘a	Location Documentation (Maps of 1916 & 1930) (Maly and Maly 2007)	Land Use
lo‘i (irrigated terrace), *kula* (dryland agriculture area), *kalo* (taro agriculture area), *kīhāpai/pā kanu* (garden),				
725-Ap. 3	L. Namauu	Kooka		
2546	Lipi	Alio, Halakaa, Puehuehunui	Puehuehunui. Kula land. North side of Kauaula Stream. (no Ap.) (Maly and Maly 2007)	Houselot = 1, *lo‘i* = 3, *kula* = 1, and *kīhāpai/pā kanu* = 1 at Puehuehunui (2 acres).
3423 B	Iwa	Puehuehunui	Ap. 1, 2 & 3. Kulu land. North side of Kauaula Stream. (Maly and Maly 2007)	Houselot = 1, *lo‘i* = 1 and *kula* = 1, at Puehuehunui (9.9 acres).
GT. 4684	H.A. Isenberg	Wainee	NA	NA
4878 F-Ap. 3	Pi	Makila	Ap. 1, 2 & 4. Mauka. Kulu. North side of Kauaula Stream. Ditch. (Maly and Maly 2007)	Houselot = 2, and *lo‘i* = 40 at Makila (2.75 acres).
4878 G-Ap. 4	Malaekahana	Polanui	Ap. 1 & 2. Kulu land. North side of Kauaula Stream. (Maly and Maly 2007)	Houselot = 1, *lo‘i* = 1 and *kula* = 2, at Polanui (8 acres).
6211	Maimai	Makila	NA	K*ula* = 1 and *kalo* = 2
6449	Kapu	Halakaa, Polanui, Puehuehunui, Paunau 1&2	Halakaa. Kula land (no Ap.). North side of Kauaula Stream. Ditch. (Maly and Maly 2007)	At Paunau and Puehuehu (34 acres)
6754	Naehu	Pahoa	NA	Houselot = 1
6854	Ohule	Paunauiki & Puaanui	NA	*Lo‘i* = 30 at Puunauiki-Paunau (3.44 acres).
6862	Kaumiumi	Puehuehunui	Ap. 1, 2, 3 & 4. Kulu land. North side of Kauaula Stream. (Maly and Maly 2007)	Houselot = 1, *kula* = 2 and *kalo* = 1 at Puehuehunui (6.25 acres).
6886	Kamohai	Kaulala & Pahoa	Ap. 1 & 2. Kula land. South side of Kauaula Stream. Ditch. (Maly and Maly 2007)	L*o‘i* = 4, *kula* = 1 and *kalo* = 1 at Kauaula.
7713	V. Kamamalu	Paunau	NA	NA
7716	Ruta Keelikolani	Kuia	Ap. 11. Ahupua‘a. North side of Kauaula Stream. (Maly and Maly 2007)	NA

LCA #	Claimant	Ahupua‘a	Location Documentation (Maps of 1916 & 1930) (Maly and Maly 2007)	Land Use
7855	Lāhainā Agr. Co. ltd.	Haleu, Lāhainā	NA	NA
8520	Iosua Kaeo	Haalakaa & Puou	Lot 1 & 4. Kulu land. North side of Kauaula Stream. Ditch. Ap. 2. Kula, Olowalu side of Kauaula Stream. (Maly and Maly 2007)	122 acres at Haalakaa and Puou.
8559 B	W. C. Lunalilo	Polanui, Paunau, & Wainee	Paunau. Lot 2, 3, 4, & 6. Kula land. South side of Kauaula Stream. Ditch. Kula land (no Ap.). North side of Kauaula. Polanui. Ap. 1. Kula land. North side of Kauaula Stream. Ditch. Ap. 2. Kula land. North side of Kauala Stream (Maly and Maly 2007).	NA
10474	N. Namauu	Pahoa & Puunau	Pahoa. Ap. 1 & 2. Kula land. South side of Kauaula Stream. Ap. 3. Kahakai. North side of Kauaula Stream (Maly and Maly 2007).	NA

3.1.4 Early Sugar Cultivation

Ko (sugarcane) is believed to have been brought to the islands during their initial settlement by the Polynesians. Although there is no reference to its introduction to the islands in the rich oral tradition of Hawai‘i, the diversity of the cultigens suggests that it has been here a long time (Handy et al. 1991:183-89).

As foreign entrepreneurs looked to expand their exportable crops and increase their profits sugar became the answer. Farmers first started meeting the demand for sugar brought on by the California gold rush, and by the early 1850’s Chinese and Japanese contract labors were brought to Maui to farm the fields (Kupau 2001:3). In 1854, Captain P. Edwards brought in two varieties of sugarcane, one from Tahiti and one from Cuba, which flourished. However, the Tahitian variety outperformed the Cuban variety and was named Lāhainā (Lee-Greig and Hammatt 2006:37).

In 1849 Judge A.W. Parsons was operating a mill in Lāhainā but the demand for sugar would wane as the gold rush ended (Lee-Greig and Hammatt 2006: 37).With the onset of the American Civil War, the demand for sugar once again skyrocketed as the northern states were now without their southern suppliers, creating a high demand for the commodity. In 1862 the first steam driven mill was constructed on Maui which increased production. Over the next 20 years the sugarcane industry exploded in Hawaii with over 22 plantation or mills operating on the island of Maui by 1884 (Wilcox 1997:2-5). The West Maui Sugar Company and Pioneer Mill Company were the leading operations in the Lāhainā District.

West Maui Sugar Company

King Kamehameha V ventured into the sugar industry, creating the West Maui Sugar Company in 1864 along with two established sugar entrepreneurs, F. W. Hutchison and James Makee. Hutchinson owned interest in the Lāhainā Sugar Company and Makee owned the Rose Ranch sugar plantation. The King leased the crown lands in Olowalu and Ukumehame to the West Maui Sugar Company. However, without a mill the crop was sent to the Pioneer mill for processing. The mill was steam driven and could process 1200 tons of sugar yearly (Olowalu Town 2008:127).

Late in the 1860’s the West Maui Sugar Company took Z.S. Spalding as a partner. As manager, Spalding acquired the Lāhainā Sugar Company mill to relieve the reliance on the Pioneer mill for processing. As sugar prices declined in the 1870’s, King Kamehameha V held Spalding responsible, ultimately leading to his dismissal. In 1872 King Kamehameha V died, and with his death the land leases under his name were transferred to the West Maui Sugar Company. Within two years the West Maui Sugar Company was sold to the Pioneer Mill Company (Wilcox 1997:127).

Pioneer Mill Company

In 1860 James Campbell started a sugar plantation, growing and milling cane for small farmers with his mule powered mill. Two years later Campbell joined with Henry Turton and James Dunbar establishing the Campbell and Turton Company. In 1865 Dunbar pulled out and Campbell and Turton changed the name to the Pioneer Mill Company (University of Hawaii HSPA Plantation Archives 2004). The original lands acquired for the venture belonged to

Thomas Phillip in Launiupoko Ahupua‘a (Lee-Greig and Hammatt 2006:41). The company expanded quickly after acquiring the West Maui Sugar.

Using gravity flow water from mountain streams, the Pioneer Mill Company produced 500 tons of sugar in 1866. Production reached 1,000 tons annually by 1872. By the turn of the century, the Pioneer Mill Company was producing over 10,000 tons of sugar a year (Thrum 1901).

With increasing acreage under cultivation resulting in higher crop yields, the Pioneer Mill Company was one of the first to put in a rail system for hauling cane from the fields to the mill. As the company grew so did the town of Lāhainā; by 1910 the company employed over 1600 workers and cultivated over 8,000 acres of cane. In order to maintain production and the successful growing of sugarcane along the west coast of Maui, further development of water resources was required.

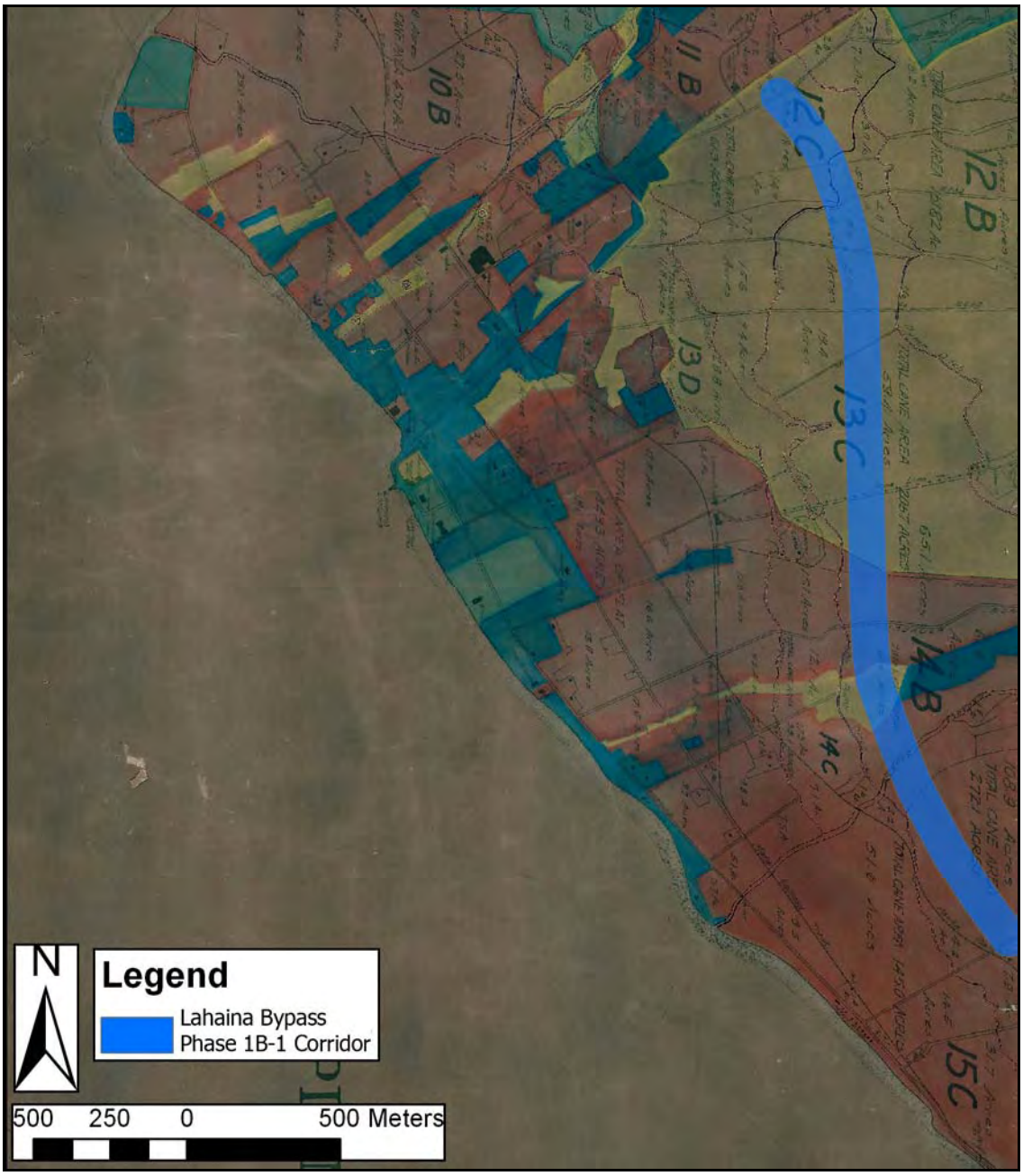

Figure 7. A portion of a 1918 map illustrating lands under cultivation by the Pioneer Mill Company in relation to the Lāhainā Bypass Phase 1B-1 project area, fields delineated alpha-numerically (adapted from Wright and Awana 1918) Pioneer Mill Co. lands in red, Government lands in Green, Bishop Estate lands in yellow, leasehold and lands under other ownership in blue.

3.1.5 1900s to the Modern Era

By the late 1920's, the Pioneer Mill Company developed a complex of irrigation systems including flumes used to transport cane to railroad "car loading stations". In May of 1931 the Pioneer Mill Company expanded its cane enterprise as far as Ukumehame to the east with the acquisition of the Olowalu Sugar Company (Condé and Best 1973:254-264).

A dramatic technological change to cane production of the Pioneer Mill occurred in 1946 when it became more economical to use trucks to transport the harvested cane instead of railroad carts. As reported in a Pioneer Mill Co. annual, the year of 1953 marked the final elimination of railroad use in the Pioneer Mill Company (in Condé and Best 1973:255). An exhaustive study by the combined staffs of Pioneer Mill Company, and American Factors, Ltd., Plantation Division, resulted in the elimination of the railroad system altogether by 1952. All sugarcane would be hauled by trucks, with the ability to haul 45-65 tons per load, on a shift basis.

After World War II heavy equipment and mechanized farming were introduced, and from the years 1948 to 1951 Pioneer Mill Company started a rock removal program to increase production. The program used heavy equipment to clear the fields of rocks, which were stacked into large piles. These plantation push piles still dot the landscape today.

The Pioneer Mill Company thrived throughout major dips in the American economy; however, all ventures are susceptible to market change and the Pioneer Mill Company was no exception. Faced with foreign competition, which had lower land and labor cost, the company closed down in 1999 (Kubota 1999). Today, fallow fields, the smoke stack, and a six-mile segment of the track are all that remain of the Pioneer Mill Company. In 1970, the Kaanapali & Pacific Railroad used the six-mile segment of track to create a tourist Sugarcane Train ride *mauka* of Lāhainā Town. Although the sugarcane industry has disappeared from this area of Maui, the impact of the industry changed the landscape of West Maui and the rest of Hawai‘i forever.

3.2 Previous Archaeological Research

This section provides a brief overview of the research and findings of previous archaeological investigations in the general area surrounding the current project (Figure 8). Investigations including the current project area are discussed next followed by a summary of those conducted nearby (Table 2).

Formal archaeological research began on Maui early in the twentieth century when Thomas Thrum began recording the *heiau* of Maui the Hawaiian Annual from 1909 through 1918. At the conclusion Thrum had located 121 *heiaus* on Maui (Thrum 1909-1918). The first attempt at a systematic island –wide survey was undertaken by Winslow Metcalf Walker from 1928 to 1929. The survey was commissioned by the Bishop Museum and focused on large sites and *heiau* around the island.

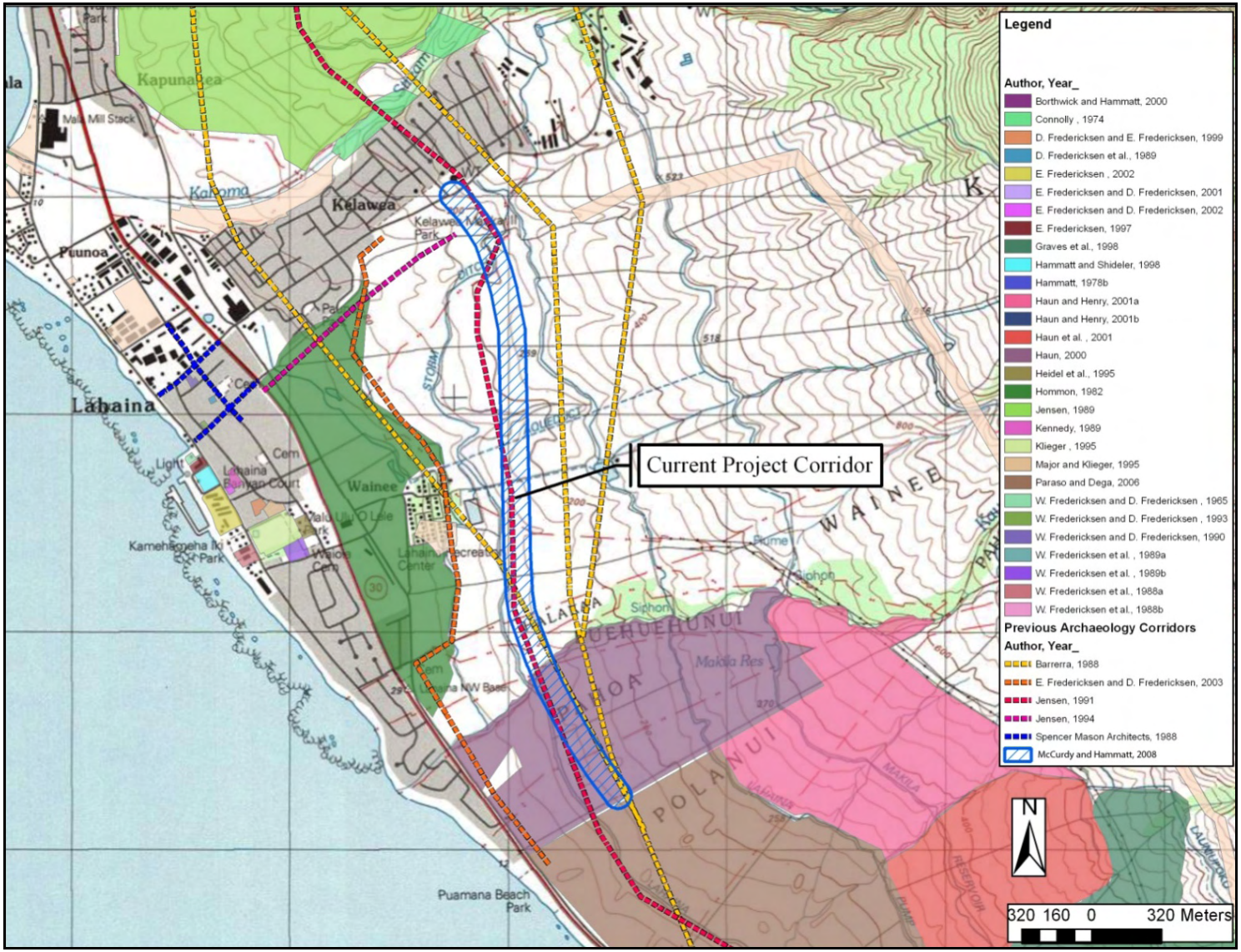

Figure 8. Showing the Current Project Corridor in relation to previous archaeological studies.

Walker identified four *heiau* in the vicinity of the current project area. These include Wailehua, Halekumukalani, Apahua, and Waiie *heiaus*. Wailehua heiau, now destroyed, was located in the *ahupua‘a* of Makili, at the shore. According to Thrum (1909) it was built by Kauhi-ai-moku-kama, son of Kekaulike, around 1738. The heiau measured 130 x 80 ft. Subsequently its location served as the residence of the manager of the Pioneer Mill Co. (Walker 1931:64).

Halekumukalani was a small sacrificial *heiau*. Described by Walker (1931:64) as being located in the cane lands of Puehuehunui in the *ahupua‘a* of Halekaa, it was likely located in the *ahupua‘a* of Puehuehunui. Halekumukalani *heiau* had been destroyed prior to 1931. Apahua *heiau* was located above the cane fields of Wainee. Completely destroyed, its construction was credited o Hua-nui. Waiie heiau located in the Kapaulu district south of Lāhainā luna Rd. was destroyed prior o Walkers survey (Walker 1931).

3.2.1 Previous archaeological investigations within the current project area

Prior to this report Cultural Surveys Hawaii completed an Archaeological Literature Review and Field Inspection of the Lahiana Bypass Phase 1B-1 corridor at the request of Austin, Tsutsumi & Associates, Inc. (ATA). Two previously recorded historic properties (State Inventory of Historic Properties ([SIHP] 50-50-03-5950 and 50-50-03-4787) and three newly discovered historic properties ([SIHP] 50-50-03-6631, -6632, and -6633) were identified and serve as the focus of this archaeological investigation. SIHP-6631 is the remnants of a dry stacked basalt stone wall associated with Land Grant 725 (Namauu). SIHP-6132 is a pre-Contact agricultural complex that includes a minimum of 21 terraces and SIHP-6633 is a plantation era irrigation pipe no longer in use.

At the request of Michael T Muneykiyo Consulting, Paul H Rosendahl, Inc. (PHRI) conducted an archaeological inventory survey for the Honoapi‘ilani Highway Realignment Project, Lāhainā Bypass Section-Modified Corridor Alignment (Jenson 1991). This investigation consisted of a 7 mile long corridor, 200 feet wide, and included the current project. Four sites were identified within or adjacent to the PHRI study corridor. Three of the sites were previously identified (SIHP -2484, -2489, and -2490) and one was a new discovery (SIHP -2487). SIHP -2487 is identified as rubble walled enclosure. SIHP -2489 consists of agricultural terraces, foot path, possible habitation features and a potential burial. SIHP -2490 includes walled terraces, a walled enclosure, and agricultural terra remnants. SIHP -2484 is a partial rock enclosure or L-shaped wall. None of these properties are located within or in close proximity to the current project corridor.

PHRI conducted an archaeological inventory survey of approximately 230-acres in Polanui, Puehuehu Iki, and Pahoa Ahupua‘a (Haun 2000) at the request of Kauaula LLC. A total of three historic properties were identified, two of which are associated with late pre-Contact to early historic agricultural activities (SIHP -4789 and SIHP -4795), as well one property that was attributed to Pioneer Mill sugar operations (SIHP -4787). The current project corridor bisects the western portion of this study area. None of the identified properties are located within the project corridor. Twelve backhoe trenches (BTs) were excavated along the coastal extent of the project area in the approximate locations of six *kuleana* awards that were recorded as houselots and *kula* gardens (BTs 4-9 were situated in Polanui Ahupua‘a). No cultural deposits were encountered during the backhoe testing program.

Haun and Associates conducted the archaeological documentation of SIHP -5401 (Haun 2004) for the Makila Land Co., LLC. This historic road associated with the Pioneer Mill was constructed between 1883 and 1916. Because the original road has been subjected to approximately a century of erosion and maintenance with earthmoving equipment, the integrity of the property's design, materials and workmanship have been compromised. For this reason SIHP -5401 was assessed as significant under criterion "D" only with no further work or preservation recommended.

Scientific Consultant Services (SCS) conducted an archaeological inventory survey on 633 acres of undeveloped land in Launiupoko and Polanui Ahupua'a, [TMK (2) 4-7-01:2 por.] for the West Maui Land Company, Inc. (Paraso and Dega 2006). A total of ten historic properties were identified. Five of the ten are associated with the sugar plantation era (SIHP -4787, -5950, -5951, -5952, and -5957). Two (SIHP -2665 and -5954) are rock walls associated with the cattle ranching era. One (SIHP -5953) is a scatter of slag fragments and cores interpreted as a historic work area. The function and age of SIHP -5955 and -5966 are indeterminate and are referred to as activity areas. The Lāhainā Bypass Phase 1B-1 corridor extends approximately 250 m into the northern portion of this study area. None of the aforementioned sites are within the current project corridor.

Table 2. Previous archaeological investigations near the current project area.

Reference	Year	Location	Summary of Work
Walker	1931	Island Wide	Walker identifies four heiau in the vicinity of the current project area. These include Wailehua, Halekumukalani, Apahua, and Waiie heiaus
W. Fredericksen and D. Fredericksen	1965	Paunau	Data Recovery: Confirmed the location and construction techniques of the “Brick Palace” of Kamehameha I.
Connolly	1974	Kahoma Stream	Inventory Survey of Kahoma Stream Flood-Control Project Area, which identifies the “Kahoma Stream Terrace System Complex” of 33 agricultural terraces and a second complex at a higher elevation: the “Haia Terrace System” that is located outside of the project area.
Hommon	1982	Waine‘e	Reconnaissance: No significant finds.
Barrera	1988	Multiple Ahupua‘a	Archaeological Reconnaissance: Identified historic properties associated with agricultural pursuits.
Spencer Mason Architects	1988	Lāhainā Town	Architectural Survey: Identification of 15 historic-era structures along Lāhaināluna Road and Wainee Street, including the intersection, in excellent to fair condition.
W. Fredericksen et al.	1988b	Panaewa Ahupua‘a	Inventory Survey: Excavations of a portion of the “Aus Site” 50-03-1797 were conducted. Based on the scarcity of cultural material remains, initial analysis of the area indicated that it was a low use area.
W. Fredericksen et al.	1988a	Waine‘e Ahupua‘a	Inventory Survey: Phase I inventory survey at Hale Pi‘ula. Did not identify features positively associated with Hale Pi‘ula (unfinished stone palace of Kamehameha III); however, 2 oblong structures of an indeterminate function and a portion of the foundation from the old armory building was documented
D. Fredericksen et al.	1989	Panaewa	Data Recovery/ Monitoring: 10 early post-contact to modern-era refuse pits.
Jensen	1989	Wahikuli	Inventory Survey: Documentation of 20 agricultural terraces, 13 burial and possible burial features, seven walled habitation enclosures, one temporary shelter, one historic road, one petroglyph panel, and one platform representing both pre-Contact and historic-era use of the area.
Kennedy	1989	Paunau	Limited Subsurface Testing: Artifacts with a time range of early post-contact to modern era.
W. Fredericksen et al.	1989a	Panaewa	Inventory Survey: Sparse historic-era cultural materials in a disturbed context.
W. Fredericksen et al.	1989b	Paunau	Inventory Survey: Determined that the parcel was open space/lakeshore and that a portion was likely submerged under Loko o Mokuhinia
W. Fredericksen and D. Fredericksen	1990	Panaewa	Monitoring/ Data Recovery: Out-of-context indigenous artifact. No significant finds.
Jensen	1991	Panaewa	Inventory Survey: Four pre-Contact historic properties containing 28 component features associated with

Reference	Year	Location	Summary of Work
			agriculture, habitation, and burial interment and ceremony.
W. Fredericksen and D. Fredericksen	1993	Lāhainā Town	Inventory Survey: Documentation of three historic era disposal pits.
Jensen	1994	Hanakao‘o and Paunau	Inventory Survey: No significant findings.
Heidel et al.	1995	Waine‘e	Inventory Survey: No significant findings.
Klieger	1995	Lower Wane‘e Moku‘ula	Data Recovery: Verified the location and condition of the inland island, and royal residence of Moku‘ula, verified the nature of the surrounding fresh water pond of Loko o Mokuhinia, documented modifications to the inland island and nature of cultural material remains associated with the occupation of Moku‘ula.
Major and Klieger	1995	Pakala	Inventory Survey: Identified two historic properties SIHP 50-50-03-4118, a subsurface deposit potentially related to pre-Contact to early historic habitation of the parcel by Lāhainā *konohiki* Pikanele, and 50-50-03-4119, a historic-era dwelling
E. Fredericksen	1997	Pioneer Inn	Monitoring Report: No significant finds.
Graves et al.	1998	Launiupoko	Forty-seven sites with 67+ associated features were identified. Thirty-nine of the sites were assessed as significant under criterion “d” only, of these, no further work was recommended on 33 and data recovery was recommended on the other six. The remaining eight sites were assessed under multiple criteria with recommendations of preservation and interpretation.
Hammatt and Shideler	1998	Lāhainā Courthouse	Archaeological Monitoring: Identified historic era fill deposit and pig remains. The presence of pig remains is indicative of a possible pre-Contact cultural deposit.
D. Fredericksen and E. Fredericksen	1999	Puako	Inventory Survey: Identification of SIHP 50-50-03-4682, a post-contact boundary wall, and -4690, a discontinuous pre-Contact cultural deposit, as well as gleyed deposits indicating a probable fishpond deposit associated with the occupation of Moku‘ula.
Haun	2000	Pūehuehu Iki, Pāhoa, and Pola Nui	Inventory Survey: A total of three historic properties associated with both traditional and commercial agricultural endeavors from the later pre-Contact era to early historic era for the former (SIHP -4789 and -4795), and historic to late historic for the latter (SIHP -4787).
Borthwick and Hammatt	2001	Lāhainā Courthouse	Subsurface Archaeological Investigation: Documented a pre-Contact subsurface cultural deposit (SIHP 50-50-03-4754) at approximately 1-1.2m below surface.
E. Fredericksen and D. Fredericksen	2001	Puako	Archaeological Monitoring: Four pre-Contact to early post-contact historic properties consisting of traditional Native Hawaiian burial interments and cultural deposits with subsurface features indicative of habitation.
Haun and Henry	2001	Launiupoko	Inventory Survey that identified four sites consisting of six component features. One of the sites (SIHP-4787) was previously recorded by PHRI (2000). The other three were new discoveries. SHHP-5187 consisted of two linear rockpiles, SIHP-5188 is a series of low terraces associated with a concrete and mortared stone

Reference	Year	Location	Summary of Work
			ditch and the final site consisted of a terrace interpreted as *lo‘i* based on appearances and proximity to Kaua‘ula Stream. No cultural material was observed during subsequent testing.
Haun and Henry	2001		Inventory survey that identified six sites consisting of seven component features. Two of the sites were previously recorded by PHRI. SIHP-2665 by Graves et al. (1998) and SIHP-4787 in PHRI (2000). SHIP-5049 and 5050 are cattle walls, SIHP 5051 is a historic roadbed, and SIHP-5052 consisted of linear rock mounds or terraces.
E. Fredericksen	2002	Paunau, King Kamehameha III Elementary	Archaeological Monitoring: No significant finds.
E. Fredericksen and D. Fredericksen	2002	Puako	Inventory Survey: One historic property consisting of four post-contact trash pits and one “backyard” water worn pavement.
E. Fredericksen and D. Fredericksen	2003	Multiple Ahupua‘a	Inventory Survey: One pre-Contact human burial identified below the plow zone (50-50-03-5238).
Paraso and Dega	2006	Polanui and Launiupoko	Inventory Survey: Identified a total of 10 historic properties, five are associated with historic era commercial sugar cultivation (50-50-03-4787 [Lāhainā Pump Ditch No. 1]; -5950 [17 field clearing mounds]; -5951 [water control features]; -5952 and -5957 [terraces associated with manual sugar cultivation]), two are rock walls associated with historic era ranching activities (50-50-03-2665 and -5954); one is a historic slag scatter (50-50-03-5953); two are activity areas of an indeterminate age (50-50-03-5955 [modified outcrop and coral fragments] and -5956 [cultural material scatter of indigenous and historic era materials])
McCurdy and Hammatt	2008	Multiple Ahupua‘a	Literature Review and Field Inspection that identified two previously recorded historic properties (State Inventory of Historic Properties ([SIHP] 50-50-03-5950 and 50-50-03-4787) and three previously unrecorded historic properties ([SIHP] 50-50-03-6631, -6632, and -6633). SIHP-6631 is the remnants of a dry stacked basalt stone wall associated with Land Grant 725 (Namauu). SIHP-6132 is a pre-Contact agricultural complex that includes a minimum of 21 terraces and SIHP-6633 is a plantation era irrigation pipe no longer in use.

3.3 Background Summary and Predictive Model

The background research presented above indicates that intensive traditional agricultural cultivation along the slopes and within the stream valleys occurred on lands within and adjacent to the Lāhainā Bypass Phase 1B-1 corridor. While most surface indications of these activities have been destroyed or modified during the major land clearing and cultivation activities of the sugar industry, subsurface deposits associated with pre-Contact subsistence practices as well as temporary habitation still occur within the area.

Historic-era properties associated with sugarcane cultivation are expected within the project area. These include remnant irrigation canals and other features associated with industrial water development in the area (e.g. water gates, pump remnant, etc.) as well as the push piles that have since crossed the 50-year historic determination threshold.

Section 4 Results of Fieldwork

The initial field inspection of the Lāhainā Bypass Phase 1B-1 corridor (McCurdy and Hammatt 2008) identified features of two previously recorded historic properties (State Inventory of Historic Properties [SIHP] 50-50-03-5950 and 50-50-03-4787) and five newly discovered potential historic properties (designated as CSH 1-5) within the initial Lāhainā Bypass Phase 1B-1 Corridor (Table 3).

At the conclusion of the current investigation 10 features were added to SIHP 50-50-03-5950, (Features 18-27). For the sake of consistency it is the recommendation of SHPD that all of the push piles to be impacted within the Phase 1B-1 corridor be mechanically tested in a similar manner similar to that of the Phase 1A portion (Nancy McMahon personal communication 10 July 2009). This would entail employing an excavator with a thumb attachment to dismantle approximately 25% of each of the plantation era push piles while documenting each one with photographs and maps drawn to scale. The results of the mechanical testing will be submitted subsequent to this report under separate cover.

A level 2 Historic American Engineering Record (HAER) recording of SIHP 50-50-03-4787 Feature D (Lāhainā Pump Ditch No. 1) was completed by Mason Architects (119 Merchant St # 50 Honolulu, HI 96813-(808) 536-0556)(Mason Architects 2009). Three of the newly discovered potential historic properties were assigned SIHP numbers and documented at an Inventory Survey level (CSH 1 (SIHP-6631), CSH 2 (SIHP-6632), and CSH 4 (SIHP 6633)) (Figure 9). The remaining two potential historic properties observed during the previous Archaeological Literature Review and Field Inspection (CSH 3 and 5) were determined to be modern structures warranting no further documentation. A total of 37 artifacts were recovered during the subsurface excavations and one was collected from the surface during clearing. Table 4 summarizes the potential historic properties and the TMK’s associated with them.

Table 3 Summary of results.

Temporary Field Number	SIHP (50-50-03-)	Site Type	Function	Age
NA	5950 Features 18-27	Irregularly Shaped Push pile	Agricultural: Remnant of Mechanized Field Improvement Activity	Historic
NA	4787 Feature D	Plantation-era Irrigation Ditch	Water Diversion	Historic
CSH-1 Feature A and B	6631 Feature A and B	Dry stacked basalt stone wall	Boundary	Historic
CSH-2 Features A-Y	6632 Features A-Y	Agricultural Complex	Agricultural: Remnant	Pre-Contact to Historic
CSH 3	NA	NA	NA	Modern
CSH 4	6633	Plantation era irrigation pipe	Water Diversion	Historic
CSH 5	NA	NA	NA	Modern

Table 4. Summary of potential historic properties and associated TMKs.

Temporary Field Number	SIHP (50-50-03-)	Feature (s)	TMK (2)
NA	5950 Features 18-27	Features 18-20	4-7-003:001
		Feature 21	4-6-014:002
		Features 22-25	4-6-018:002
		Features 26 and 27	4-6-018:003
NA	4787	Feature D	4-7-003:001-002, 4-6-003:888, 4-6-014:001-002-004, 4-6-018:002-003
CSH-1 Feature A and B	6631 Feature A and B	Features A and B	4-6-018:002
CSH-2 Features A-Y	6632 Features A-Y	Features A-Y	4-6-018:003
CSH 3	NA	NA	NA
CSH 4	6633	NA	4-6-018:003
CSH 5	NA	NA	NA

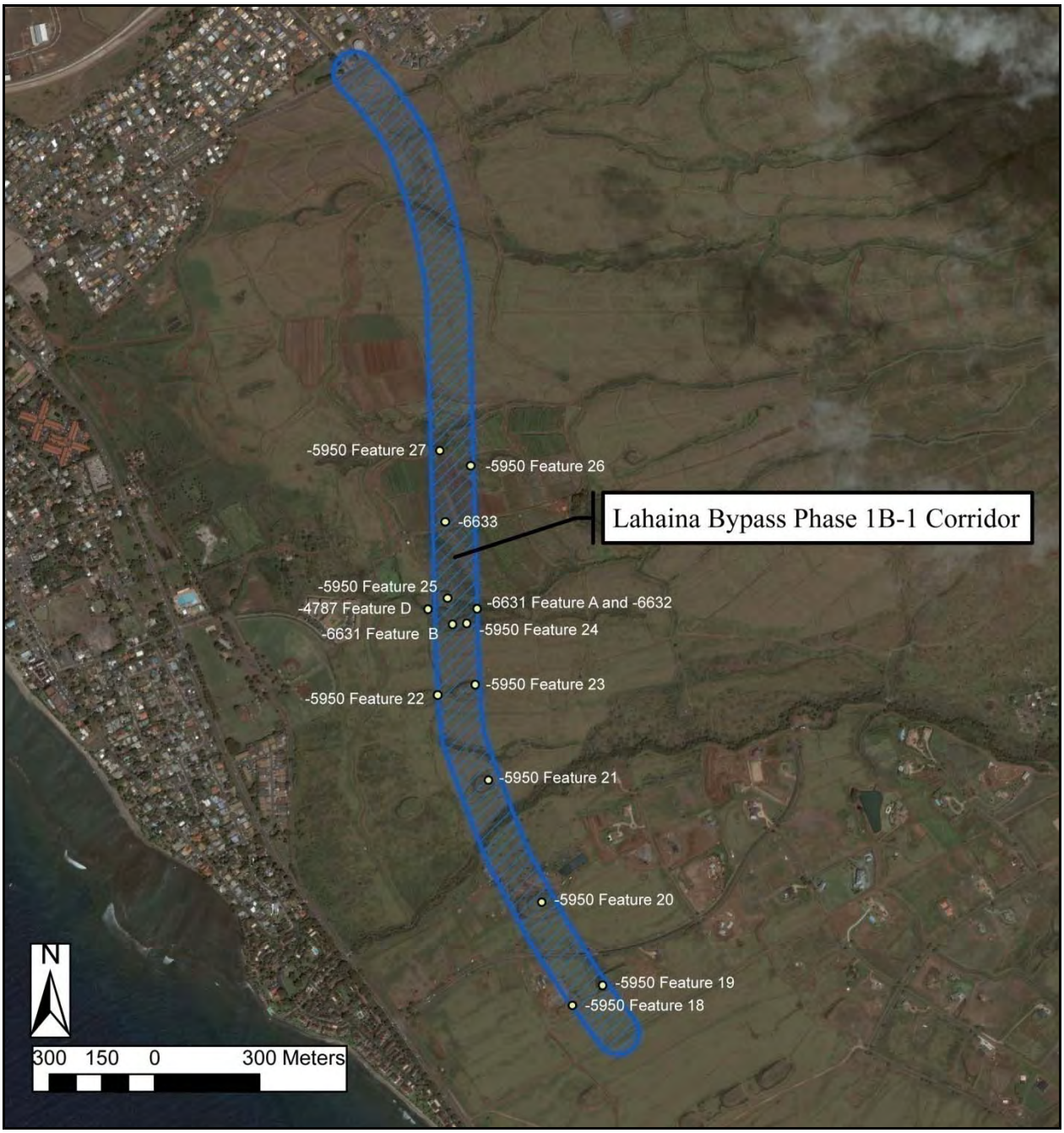

Figure 9. Aerial photograph showing the location of historic properties within the Lāhainā Bypass Phase 1B-1 corridor.

4.1 Historic Property Descriptions

4.1.1 SIHP 50-50-03-5950 Features 18-27

Function: Agriculture

Type: Agricultural Pushpile

Total Features: 27

Dimension: Ranging from 44 to 1180 m in length and 22 to 107 m in width

Condition: Good

Age: Historic

Significance Criteria: D

Description: SIHP -5950, was previously recorded by Paraso and Dega (2006) as a group of 17 large "plantation era clearing mounds" (Figure 10) southeast of the current project area. Ten additional "plantation era clearing mounds" were identified in the Lāhainā Bypass Phase 1B-1 corridor and designated as SIHP -5950, Features 18 to 27. The dimensions of each additional push pile added to SIHP# -5950 is available in Table 5 and their location in relation to the Lahaina Bypass Phase 1B-1 corridor is illustrated Figure 11. Individual field maps for each feature were not composed during this investigation but are available for push piles within the current project corridor in the subsequent addendum to this report (McCurdy and Hammatt 2009). The mounds, a result of Post-World War II field improvement activities associated with the Pioneer Mill Co. and commercial sugar cultivation, are generally constructed with the steepest face of the pile facing downslope while the upslope terminus is flush with the ground surface (Lee-Greig and Hammatt 2008:47-53). Several of the "clearing mounds" have been used as dumpsites for domestic garbage and abandoned automobiles.

Similar features have been mechanically tested during the Phase 1A portion of the Lāhainā Bypass (Lee-Greig and Hammatt 2008). The push piles generally consisted of loose medium to large boulders within a silt loam matrix underlying a thin A-horizon (0.36m to 0.60m thick) of loose silt loam. Cultural materials observed during the excavation consisted of historic to modern trash including metal cable, PVC pipe and concrete (Lee-Greig and Hammatt 2008:54-61). For the sake of consistency it is the recommendation of SHPD that all of the push piles to be impacted within the Phase 1B-1 corridor be mechanically tested in a similar manner similar to that of the Phase 1A portion (Nancy McMahon personal communication 10 July 2009). This entailed employing an excavator with a thumb attachment to dismantle approximately 20-25% of each of the push piles while documenting each one with photographs and maps drawn to scale. The results of the mechanical testing will be submitted subsequent to this report under a separate cover.

Figure 10. Showing the general topography of the current project corridor, including SIHP -5950 Feature 20, facing north from Hokiokio Place.

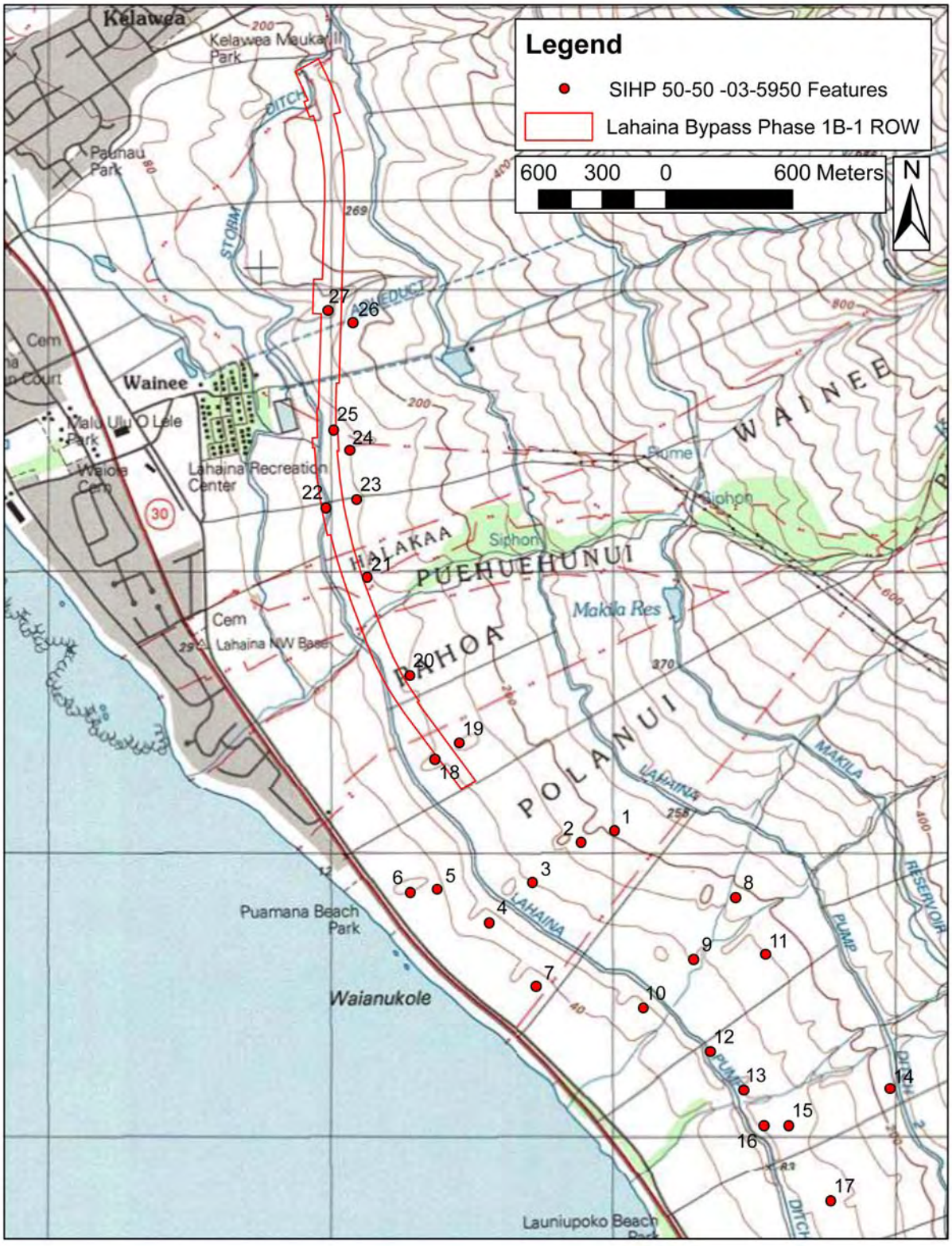

Figure 11. Showing the features of SIHP 50-50-03-5950 in relation to the Lahaina Bypass Phase 1B-1 ROW.

Table 5. SIHP 50-50-03-5950 approximate dimensions.

SHIP -5950 Feature #	Max. Length (m)	Max. Width (m)	Height (m)	Approx. Area (m^2)	UTM
18	50	33	4-5	1238	E: 743368.8 N: 2308329.2
19	100	38	5	2850	E: 743455.3 N: 2308387.9
20	85	55	15	4675	E: 743280.9 N: 2308625.8
21	60	48	3-4	2880	E: 743128.6 N: 2308975.7
22	109	47	4-5	6889	E: 742982.5 N: 2309220.1
23	86	42	5	3612	E: 743091.2 N: 2309249.4
24	60	33	4	1980	E: 743066.3 N: 2309425.1
25	53	42	7	2226	E: 743010.5 N: 2309496.7
26	145	101	7-8	11173	E: 743077.9 N: 2309877.3
27	93	35	4	2442	E: 742989.4 N: 2309920.4

4.1.2 SIHP 50-50-4787 Feature D

Function: Water diversion

Type: Irrigation ditch

Total Features: 1

Dimension: Approximately 4 km in length and 1.2 m in width

Condition: Good

Age: Historic

Significance Criteria: D

Description: SIHP -4787, previously identified by PHRI, consists of nine historic features associated with the Pioneer Mill's sugarcane cultivation operation (Haun 2000:22). Four of the features (Features A, C, D, and G) are irrigation ditches. The remaining features are: Mākila Reservoir (Feature B), a railroad bridge (Feature F), a linear mound of stones (Feature E), an area of linear walls or low mounds (Feature H), and an irrigation gate (Feature I). Portions of Feature D, are within and adjacent to the Lāhainā Bypass Phase 1B-1 corridor. Lāhainā Pump Ditch No. 1, Feature D, also referred to as the Lāhainā Mill Ditch (Figure 12) extends along approximately 1600 m of the 1B-1 corridor at the 95-ft. contour line. Feature D is oriented primarily north/south with occasional natural drain swale intersections extending *mauka*/*makai*. The ditch is lined with formed concrete walls that slant slightly inward. Feature D is approximately 122 cm wide at the top and 80 cm deep.

A Historic American Engineering Record (HAER) recording of SIHP 50-50-03-4787 Feature D (Lāhainā Pump Ditch No. 1) will be completed by Mason Architects (119 Merchant St # 50 Honolulu, HI 96813-(808) 536-0556) and submitted as a separate report (Mason Architects 2009).

Figure 12. Picture showing a portion of Lāhainā Pump Ditch No. 1 where intersects with a natural drain swail, facing east

4.1.3 SHIP 50-50-03-6631

Function: Boundary marker

Type: Stone wall

Total Features: 2

Dimension: Approximately 130 m in length, 1 m wide and 1.5 m in tall

Condition: Good

Age: Historic

Significance Criteria: C, D

Description: SIHP-6631 consists of two remnants, designated Features A and B, of a dry stacked basalt wall that is constructed up to eight courses high in places (Figure 13). Feature A is located adjacent to Puamana Stream, oriented E/W. Approximately 130m long, 50 m of this feature is located within the Lāhainā Bypass Phase 1B-1 project corridor and includes an eastern outside of the corridor that appears intact (Figure 14). This portion measured about 9m in length. 1 m in height, and 80 cm wide. Otherwise, only small portions of the wall displayed facing, although most of the length displays a coherent and formal foundation course of basalt cobbles and boulders. A 4m long portion of the wall has appears to have been mechanically disturbed but Feature A is easily discerned from the surrounding terrain.

During clearing operations wooden and metal fenceposts were observed running adjacant to SIHP-6631 Feature A. In addition, no less than ten large metal right angle braces were also observed on the surface (See Section 5.1), likely remnants of a historic era flume or similar water diversion structure.

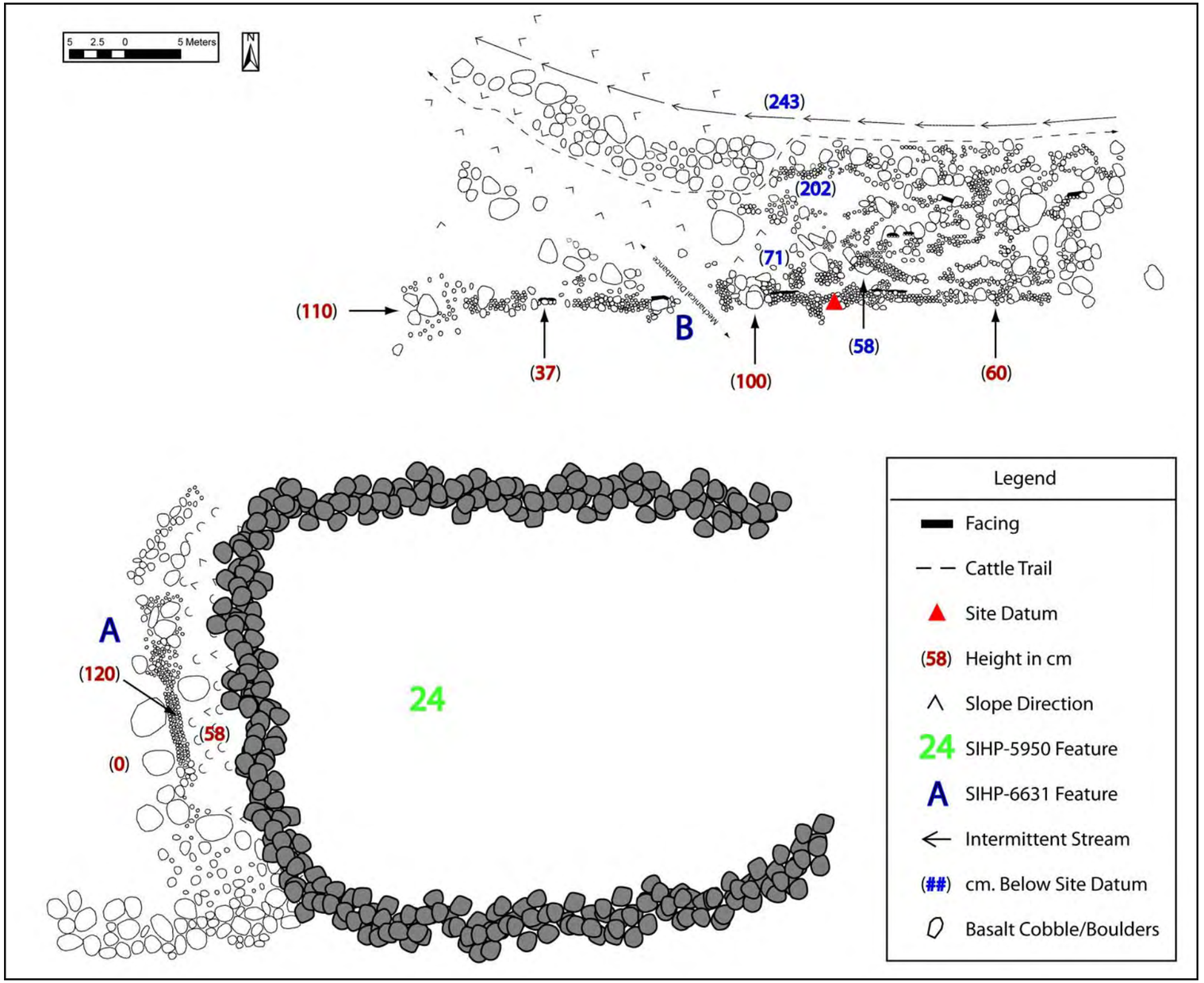

Figure 13. Field drawing of SIHP-6631

Figure 14. SIHP-6631 Feature A, view to the northeast.

The second portion, Feature B, is approximately 20 m in length and located about 30 m SW of Feature A at the western base of SIHP -5950 Feature 24. Oriented north/south this entire section is within the initial Lāhainā Bypass project corridor (Figure 15). The wall is 1.5 m in height, approximately 1 m wide, with collapsed portions and destroyed sections along the alignment. Figure 13 is a field drawing of the portion of SIHP-6631 within the initial Lāhainā Bypass Phase 1B-1 Corridor. Features associated with SIHP-6631 are portions of a boundary wall associated with Land Grant 725 (Namauu) indicated on an 1884 S.E. Bishop (Figure 16). While the walls do not overlap perfectly, there is often variation between older and newer maps. A summary of the SIHP-6631 is in Table 6.

Figure 15. SIHP -6631 Feature B, view to the east.

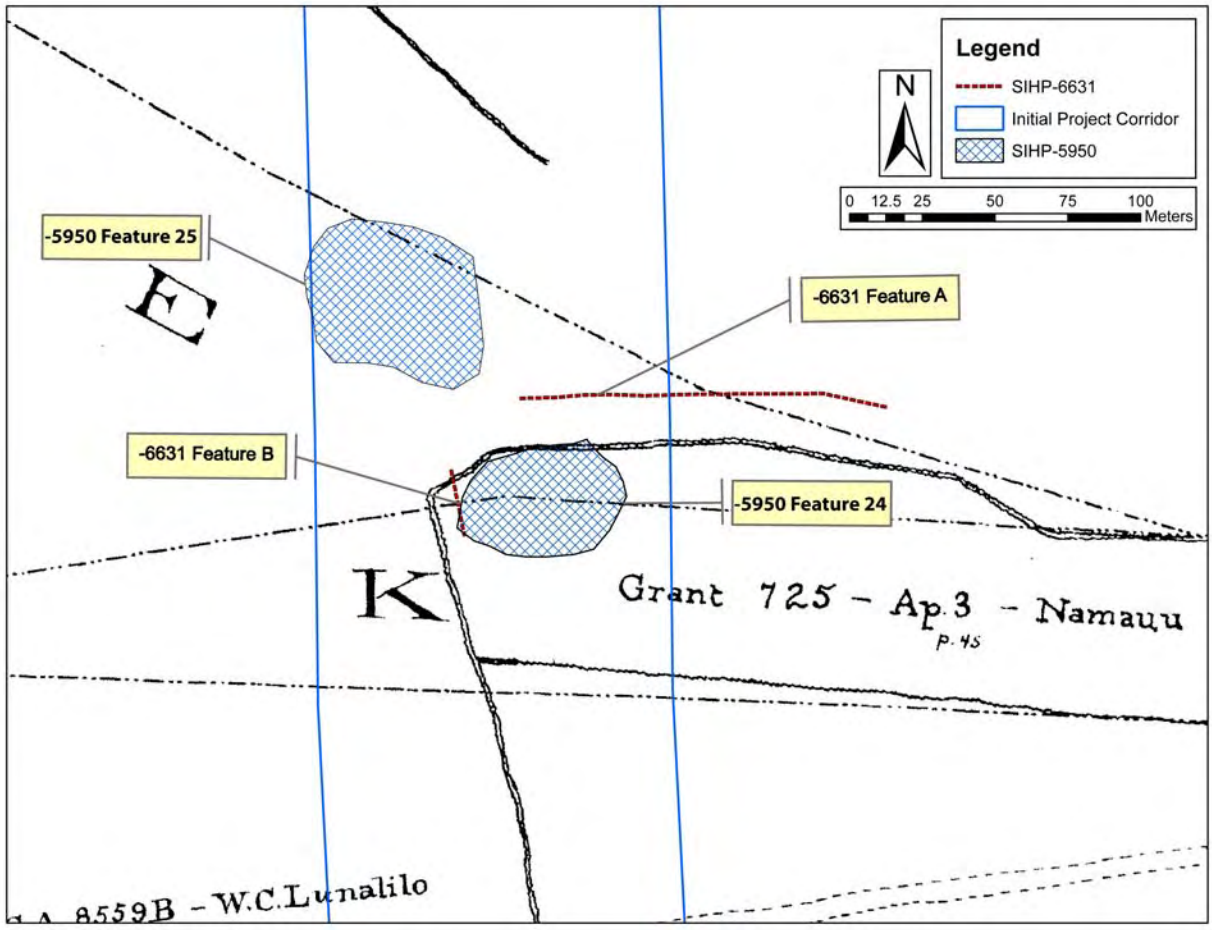

Figure 16. A portion of the 1884 S.E. Bishop map showing the location of SIHP -6631 and Features of SIHP -5950 in relation to a stone wall associated with Land Grant 725 (Namauu).

Table 6. SIHP 50-50-03-6631 summary

SHIP -6631 Feature #	Max. Length (m)	Max. Width (m)	Height (m)	UTM
A	130	1	1.5	E: 743081.1 N: 2309462.4
B	20	1	1.5	E: 743024.2 N: 2309413.2

4.1.4 SIHP 50-50-03-6632

Function: Agriculture

Type: Agricultural complex

Total Features: 25+

Dimension: Approximately 130 m in length and 50 m wide

Condition: Good

Age: Pre-Contact

Significance Criteria: C, D

Description: SIHP-6632 is a pre-Contact agricultural complex on the south bank of Puamana stream adjacent to SIHP-6631 Feature A (Figure 17). This complex extends approximately 130 m *mauka* and is aligned along the gully slope from the crest to the alluvial flat. Approximately 50 m of the property is located within the project corridor including a minimum of four rock pile features (Features A-D) and no less than 21 agricultural terraces (Features E-Y) (Figure 18). The construction consists mainly of sub-angular and water-rounded basalt cobbles and boulders (Figure 19). Evidence of damage, presumably by larger plantation equipment, was observed on some of the larger boulders.

Preliminary observations during the field inspection that preceded this report suggested the presence of desiccated taro specimens. Upon further investigation these were determined to be *Leonotis nepetifolia*, commonly referred to as Lions Ear, a plant native to tropical and subtropical Africa that in now naturalized over the world in appropriate climates (Christman 2004). Table 7 summarizes the features associated with SIHP -6632.

As the construction and design of the agricultural terraces are consistent with pre-Contact practice, CSH conducted subsurface excavations in hopes of gaining more insight into the utilization of this area. A sight datum was established at SIHP -6632 utilizing an existing concrete pillar/benchmark located near SIHP-6631 Feature A. The results of the subsurface excavations are presented below.

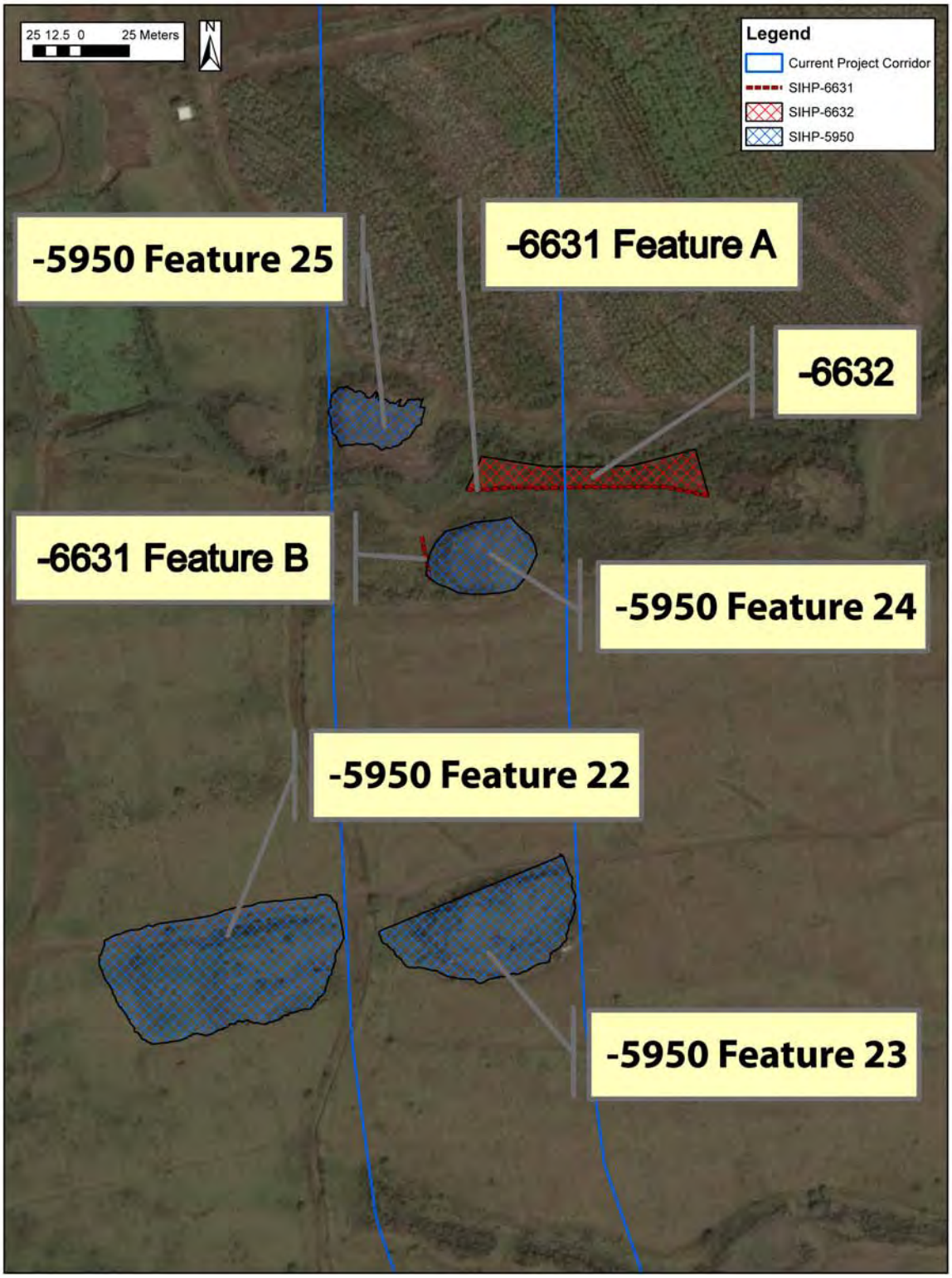

Figure 17. Aerial view showing the location of SIHP #s -6632 and 6631 in relation to the current project corridor and Features of SIHP# -5950.

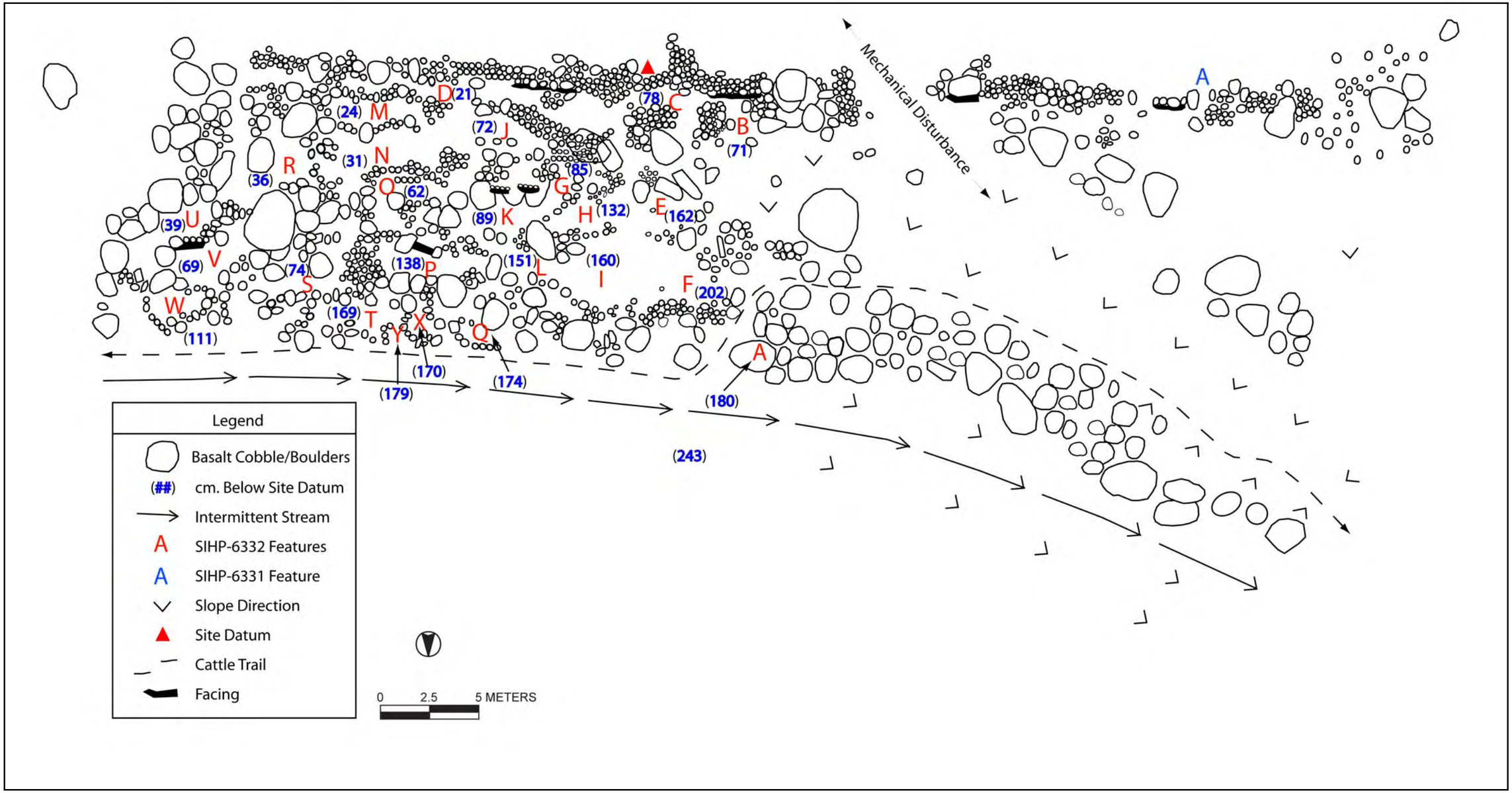

Figure 18. Field map of the portion of SIHP-6632 within the initial project corridor.

Figure 19. SIHP -6632 Features U and V.

Table 7. Summary of features associated with SIHP 50-50-03-6632

SHIP -6632 Feature #	Feature Type	Length (m)	Width (m)	UTM
A	Rock pile	5	2	E: 743074.6 N: 2309473.2
B	Rock pile	1.5	1.5	E: 743079.6 N: 2309463.4
C	Rock pile	2.5	2.5	E: 743082.6 N: 2309464.2
D	Rock pile	2	2	E: 743093.7 N: 2309464.2
E	Terrace	4	2	E: 743082.5 N: 2309467.4
F	Terrace	5	3	E: 743083 N: 2309468.4
G	Terrace	4	1.5	E: 743087.2 N: 2309465.9
H	Terrace	4	2	E: 743087 N: 2309467.2
I	Terrace	5	3.5	E: 743086.8 N: 2309468.6
J	Terrace	4.5	3	E: 743091.4 N: 2309464.7
K	Terrace	5	2	E: 743091.9 N: 2309466.2
L	Terrace	3.5	2	E: 743090.9 N: 2309468.9
M	Terrace	5	1.5	E: 743095.8 N: 2309464.2
N	Terrace	6	2	E: 743094.6 N: 2309465.6
O	Terrace	4	2	E: 743094.4 N: 2309466.9
P	Terrace	7	2	E: 743093.9 N: 2309468.3
Q	Terrace	3	1	E: 743093.7

				N: 2309470.8
R	Terrace	6	2	E: 743104 N: 2309465.3
S	Terrace	5	2	E: 743101.8 N: 2309468.3
T	Terrace	5	2	E: 743101 N: 2309470.8
U	Terrace	4	2	E: 743106.9 N: 2309467.3
V	Terrace	2	2	E: 743106 N: 2309469.5
W	Terrace	3	1.5	E: 743107.4 N: 2309469.7
X	Terrace	2	1.5	E: 743091.7 N: 2309473.9
Y	Terrace	1.5	1	E: 743093.2 N: 2309474.4

Subsurface Excavation Results.

A total of seven 1x1 m test units were excavated during this investigation (Figure 20). Each test unit was excavated in 10 cm arbitrary levels unless a natural change in stratigraphy was observed until either sapprolite or bedrock was encountered. For the sake of consistency each unit datum, unless noted, was 10 cm above the ground surface in the SW corner. A total of 38 artifacts were collected during the current investigation. These include 33 wire nails, two milled lumber fragments, a small threaded bolt and a thin curved shard of clear glass. No less than ten large metal right angle braces were observed on the surface during clearing, one of which was collected as a representative sample. This section summarizes the subsurface excavations conducted at SIHP-6632. A summary of the artifacts collected is available in Section 5.1.

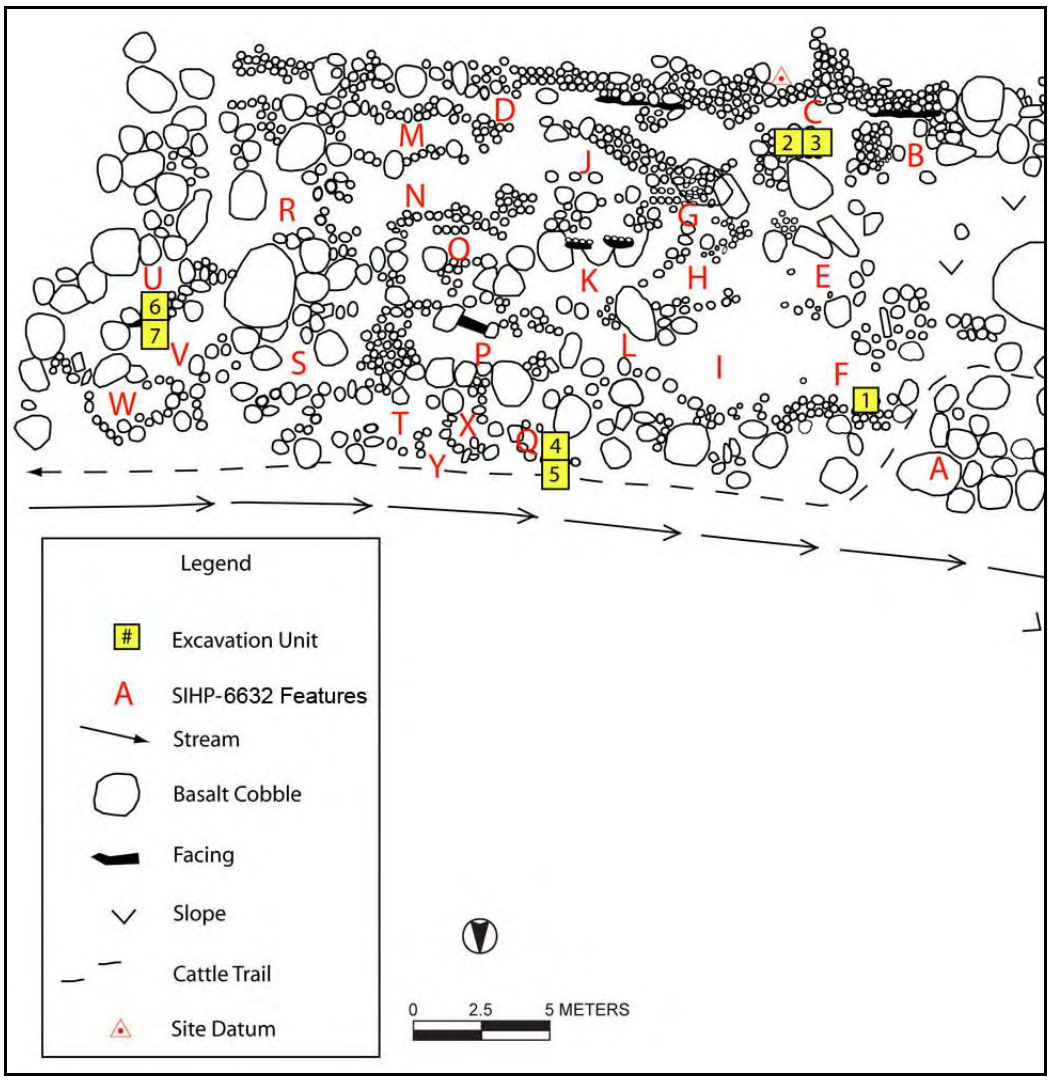

Figure 20. Showing the location of the seven subsurface test excavation units at SIHP-6632.

4.1.4.1.1 Test unit 1 (TU-1)

TU-1 was located on the northern boundary of Feature F in the western portion of SIHP-6632. The excavation unit was positioned in a manner that allowed sampling the soils within the terrace while providing insight into the terraces construction (Figure 21). The test unit was excavated to depth of 50 cm below unit datum (cmbud) (Figure 22).

Three separate strata were observed during excavation (Figure 23). Stratum I, an O Horizon (Organic), consisted predominantly of leaf litter, and root mat. Very little soil was observed in Stratum I. Stratum II appears to be a cultural A Horizon associated with the utilization of the terrace; it is a distinct soil layer conforming to the shape of the terrace. A soil sample was collected from Stratum II for pollen analysis. The results of the pollen analysis are available in Section 5.2. Stratum III is a C Horizon containing sapprolite and decomposing basalt. No artifacts were collected from TU-1. A stratigraphic summary is available in Table 8.

Figure 21. Pre-excavation view of TU-1, view to the west.

Figure 22. TU-1 base of excavation and west profile, view to the west.

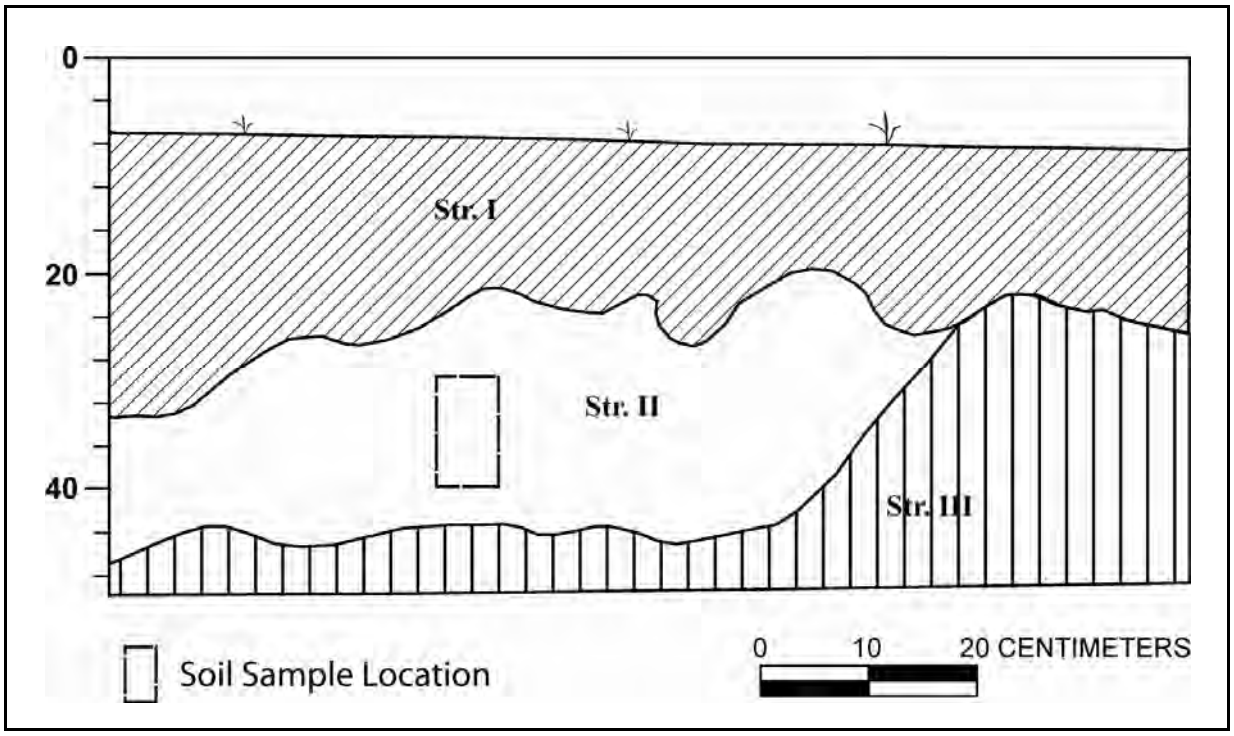

Figure 23. West profile TU-1.

Table 8. Stratigraphic Summary for TU-1

Stratum I: 10-33 cmbd	O Horizon; 7.5YR 3/2, Dark Brown; silt; structureless, fine, crumb structure; loose dry consistency; non-sticky wet consistency; slightly plastic; weak cementation; diffuse wavy lower boundary; dry silt very powdery.
Stratum II: 22-45 cmbd	A Horizon; 10 YR 4/2, dark grayish brown; silt loam; moderate, medium, blocky structure; hard dry consistency; very friable moist consistency; non-sticky wet consistency; slightly plastic; strong cementation; clear granular blocks of soil-blocky peds difficult to break apart.
Stratum III: 24-50 cmbd	C Horizon; 5YR 4/3, reddish brown silt loam; moderate, medium, blocky structure; hard dry consistency; very friable moist consistency; non-sticky wet consistency; slightly plastic; strong cementation.

4.1.4.1.2 Test unit 2 and 3 (TU 2-3)

Feature C is the most formal of four rockpiles observed within the boundaries of SIHP-6632. TU 2-3 were excavated adjacent to one another and simultaneously into Feature C to gain further insight as to its function (Figure 24). The site datum was utilized for horizontal control during the disassembly/excavation of TU 2-3 because it was less than 2 m away.

The rock pile was systematically disassembled down to the underlying soils that were subsequently excavated. TU 2-3 was disassembled/excavated to a terminal depth of 100 cm below site datum (Figure 25). Two separate strata were identified. Stratum I generally represented deposition that had filtered down through the construction of Feature C and Stratum III was saprolitic rock and lateritic soils (Figure 26). The cultural A Horizon (Stratum II) observed in TU-1 was not present in TU 2-3 suggesting the rocks were piled directly atop Stratum III.

Thirty-six artifacts were collected during the excavation of TU 2-3. These include 33 wire nails, 2 milled lumber fragments and a small bolt. All artifacts were collected from Stratum I.

Figure 24. Pre-excavation view of TU 2-3, views to the north.

Figure 25. TU 2-3 base of excavation, view to north.

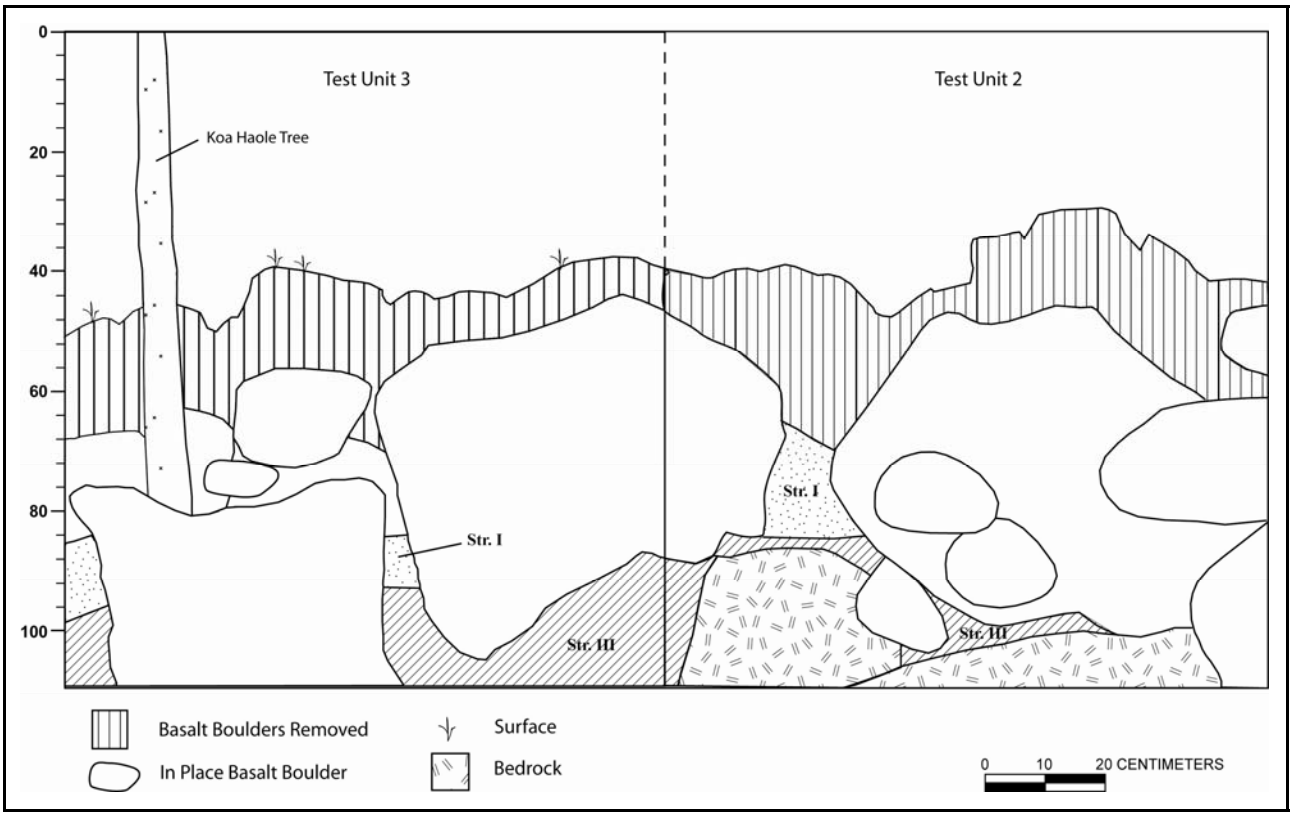

Figure 26. North profile TU 2-3

Table 9. Stratigraphic summary for TU 2-3

Stratum I: 68-84 cmbd	O Horizon; 5YR 5/3, reddish brown; silt; structureless, fine, crumb structure; loose dry consistency; non-plastic; no cementation; diffuse aeolian deposit-mixed with humus contains grass roots-rootlets.
Stratum III: 82-100 cmbd	C Horizon; 7.5YR 3/3, Dark Brown; silt loam; moderate, medium, crumb structure; slightly hard dry consistency; non-plastic; weak cementation; unknown laterite-decomposing soil from saprolitic basalt.

4.1.4.1.3 Test units 4 and 5 (TU 4-5)

TU-4 was placed within Feature Q and TU-5 was located on the bank near the streambed in the northern portion of SIHP-6632 (Figure 27 and Figure 28). Test units 4 and 5 were not only intended to sample Feature Q, the terrace nearest the streambed, but to also assess the potential for additional subsurface features beneath the sediment deposited by the stream. Because the test units were adjacent to one another the datum for test unit 5 was used for both.

For the most part the stratigraphy observed in TU 4-5 is relatively consistent with what we observed at TU-1. Test Unit 4 was excavated to a terminal depth of 50 cmbud (Figure 29 and Figure 30). Four distinct strata were observed (Figure 31 and Figure 32). Stratum I is a humic layer/O horizon similar to that recorded in TU-1 but with more sediment, presumably because of Feature Q's proximity to the stream. Stratum II is a cultural A horizon representing the cultivated area within the terrace. Stratum IIa is the original A horizon that was not utilized. Stratum III is a C horizon containing saprolitic rock and lateritic soils. In TU-5, only Stratum I and III were observed (Figure 33).

The absence of a cultural horizon in TU-5 suggests the presence of additional terraces closer to the streambed is unlikely. A soil sample was collected from stratum II of TU-4 for pollen analysis. The results of the pollen analysis are available in Section 5.2. A stratigraphic summary of TU 4-5 is available in Table 10. A single artifact was recovered from the top of Stratum II in TU-4: a small thin piece of slightly curved clear glass. No artifacts were recovered from TU-5.

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Figure 27. TU-4 pre-excavation, view to the south.

Figure 28. TU-5 pre-excavation, view to the south.

Figure 29. TU-4 post-excavation, view to the south.

Figure 30. TU-5 post-excavation, view to the south.

Figure 31. TU-4 east profile

Figure 32. TU-5 east profile

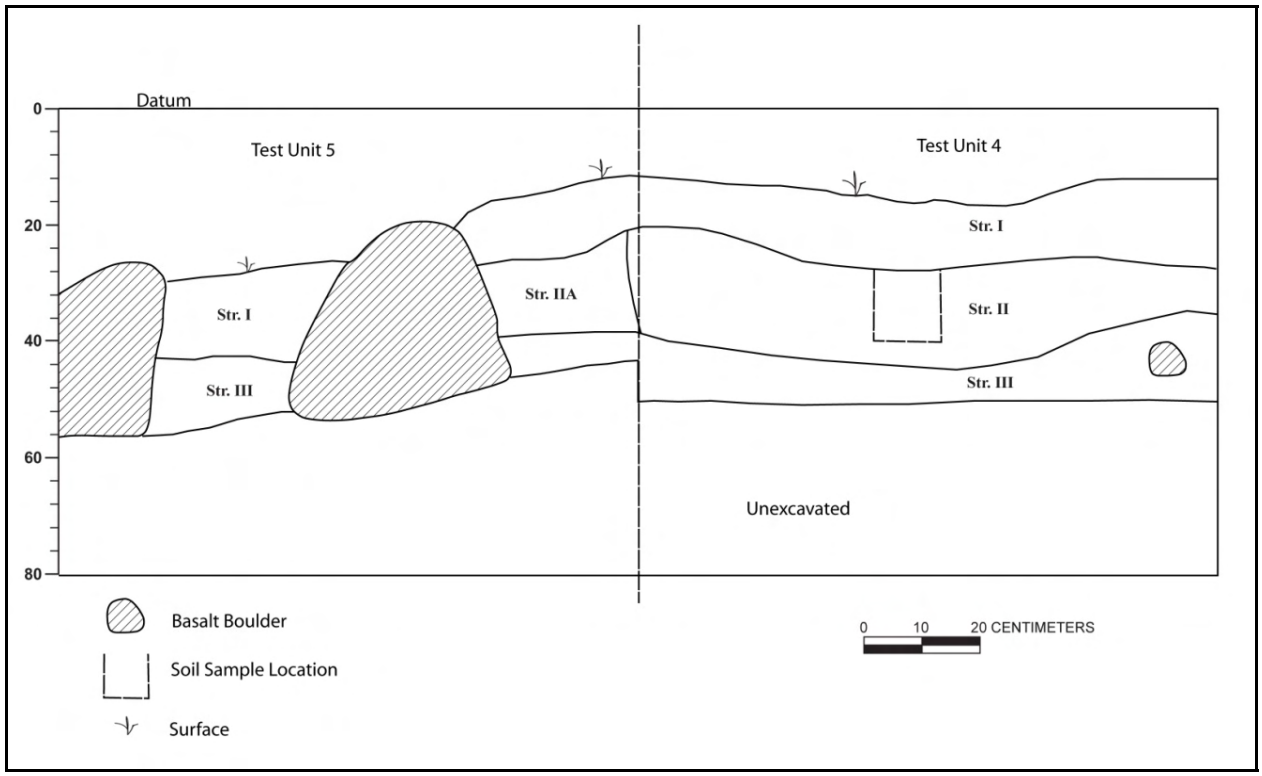

Figure 33. East profile Test Units 4 and 5.

Table 10. Stratigraphic summary of Test Units 4 and 5

Stratum I: 11-26 cmbd	O Horizon; 5YR 3/3, Dark reddish brown; silt; structureless, fine, single grain structure; loose dry consistency; non-plastic; no cementation; clear wavy lower boundary.
Stratum II: 16-43 cmbd	A Horizon; 5 YR 3/3, Dark reddish Brown; silt; moderate, fine, crumb structure; slightly hard dry consistency; non-sticky wet consistency; non-plastic; no cementation; clear smooth lower boundary.
Stratum IIa: 20-28 cmbd	A Horizon; 5YR 3/4, dark reddish brown; silt; moderate, fine, crumb structure; slightly hard dry consistency; non-sticky wet consistency; non-plastic; no cementation; clear smooth lower boundary.
Stratum III: 25-50 cmbd	C Horizon; 5YR 4/3, reddish brown; silt; moderate, fine, crumb structure; hard dry consistency; non-sticky wet consistency; non-plastic; no cementation; clear smooth lower boundary.

4.1.4.1.4 Test units 6 and 7 (TU6-7)

Test Units 6 and 7 sampled two terraces (Features U and V) in the eastern portion of the site within the current project corridor (Figure 34). The initial intent was to excavate both units and dismantle the wall to gain more insight into the terraces' construction. Upon further investigation CSH observed a notched/fitted stone (Figure 35) and how the terrace was also supported by the surrounding matrix. At this point a decision was made to leave the terrace intact for fear of compromising its integrity. Because the test units were adjacent to one another the datum for Test Unit 6 was used for both.

Test Unit 6 was excavated to a terminal depth of 50 cmbud and TU-7 was excavated to a depth of 90 cmbud (Figure 36 and Figure 37). The stratigraphy of TU 6-7 is similar to the stratigraphy observed during the excavation of other terraces at SIHP-6632 containing three distinct strata (Figure 38 and Figure 39). Stratum I is an Organic horizon consisting predominantly of leaf litter and root mat. Stratum II is a cultural A horizon associated with the utilization of the terrace and Stratum III is a C horizon consisting of saprolitic rock and lateritic soils (Figure 40).

A soil sample was collected from Stratum II of TU-6 for pollen analysis. The results of the pollen analysis are available in Section 5.2. No artifacts were recovered from TU 6-7. A stratigraphic summary for TU 6-7 is available in Table 11.

Figure 34. TU 6-7 pre-excavation, view to the west.

Figure 35. Notched stone in Feature U, view to the south.

Figure 36. TU-6, post-excavation, view to north

Figure 37. TU-7, post-excavation, view to south

Figure 38. TU-6 east profile.

Figure 39. TU-7 east profile.

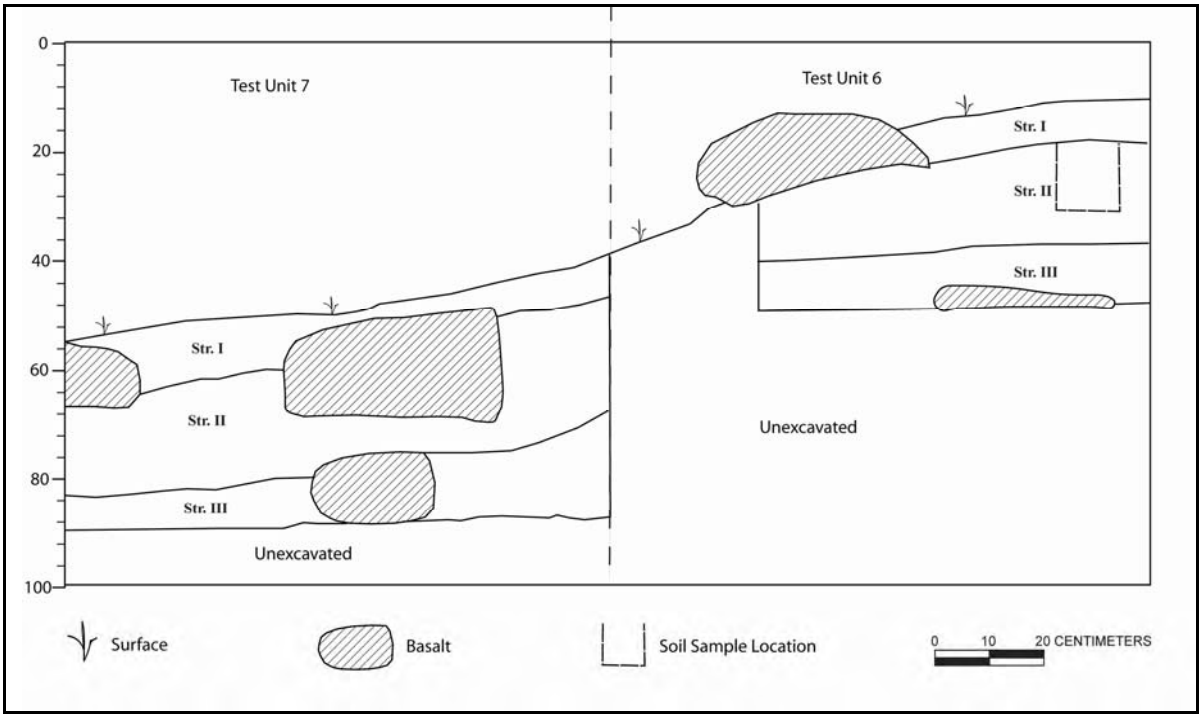

Figure 40. East profile Test Units 6 and 7.

Table 11. Stratigraphic summary of Test Units 6 and 7

Stratum I: 12-65 cmbd	O Horizon; 5YR 3/2, Dark reddish Brown; silt; structureless, fine, single grain structure; loose dry consistency; non-plastic; no cementation; clear smooth lower boundary.
Stratum II: 20-84 cmbd	A Horizon; 5YR 3/2, dark reddish brown; silt; moderate, crumb structure; slightly hard dry consistency; non-plastic; no cementation; clear smooth lower boundary.
Stratum III: 39-90 cmbd	C Horizon; 5YR 3/4, dark reddish brown; sandy clay loam; moderate, fine, columnar structure; hard dry consistency; sticky wet consistency; slightly plastic; no cementation; clear smooth lower boundary.

Summary of Test Units

The terraces are constructed in a manner consistent with pre-Contact architecture and a distinct cultural A Horizon was identified within the excavated terraces (Stratum II). Soil samples were collected from this stratum for pollen analysis in order to gain further insight as to the utilization of these terraces. A single artifact was collected from test units employed to sample the terraces. It was a small, thin, curved piece of glass recovered from the Stratum I/II interface of TU-4. The remaining artifacts were collected from TU 2-3 which sampled a rockpile near SIHP 6331 Feature A. The absence of historic artifacts in Stratum II further suggests that these terraces are pre-Contact.

4.1.5 SIHP 50-50-03-6633

Function: Water Diversion

Type: Water Pipe

Total Features: 1

Dimension: Approximately 1040 m in length and 1 m wide.

Condition: Good

Age: Pre-Contact

Significance Criteria: D

Description: SIHP-6633 is a 24-inch, steel-welded seam, creosote-covered irrigation pipe oriented *mauka*/*makai* (Figure 41 and Figure 42). Sections of welded pipe vary in length from 5-8 m and some connections are reinforced with stainless steel bands. These pipes were replaced by both conventional (steel) and tubular concrete pipes. This pipe is associated with a pipe line that pumped water from the Lāhainā Steam Pump Ditch No. 1 to a *mauka* reservoir seen on Figure 43. SIHP -6633 is not likely the original pipe; sections of an older riveted 24-inch pipe were observed atop SIHP -5950 Feature 26 (Figure 44). Although displaced, these are potentially sections of the original pipe line seen on the 1918 map. Based on the steel-welded seam construction and condition of the pipe likely dates between 1920 and 1940.

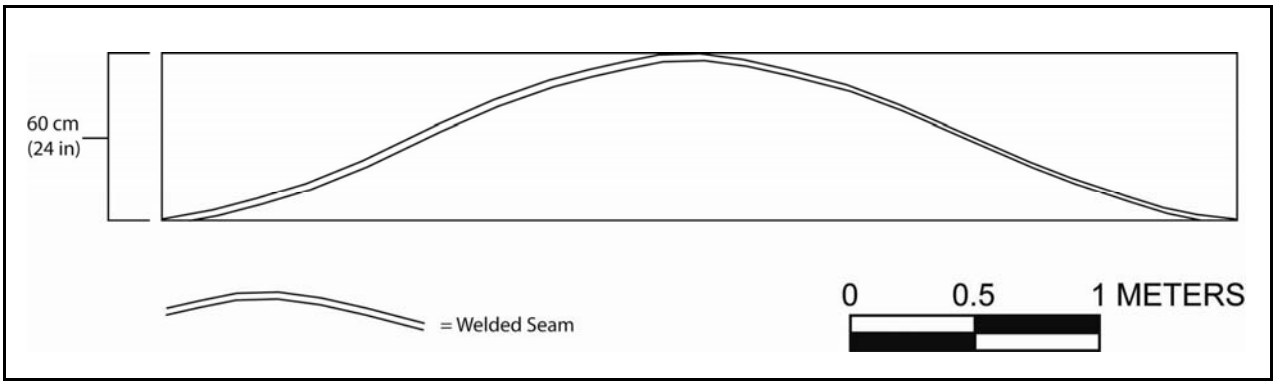

Figure 41. Creosote-covered irrigation pipe.

Figure 42. Picture showing the 24-inch creosote covered irrigation pipe (CSH 4).

Figure 43. A portion of a 1918 Pioneer Mill Company map indicating the pipe line associated with CHS 4 (adapted from Wright and Awana 1918)

Figure 44. Picture showing a section of 24-inch riveted pipe located atop Site -5950 Feature 26.

4.2 Modern Structures

4.2.1 CSH 3

CSH 3 is an electrical transformer mounted on a concrete slab in the open air (Figure 45). Three rungs of barbed-wire are strung atop a smooth-wire fence. Access to the transformer is through a locked gate (since broken). The transformer is oil-insulated, self cooled, 3-phase pad-mounted distribution-type and is abandoned in place. Electrical service is by way of a utility pole located eight feet (2.5m) away. The transformer and utility pole are abandoned structures of the Pioneer Mill Co. (last harvest 1999). As the transformers are normally required to match the service required for the modern pump house motors it can be assumed that the transformer is modern as well. The transformer, although considered a modern structure and no longer a potential historic property, may still necessitate a Hazmat assessment by the Hawaiian Office of Hazard Evaluation and Emergency Response (HEER) or similar agency.

Figure 45. Picture showing CSH 3, the Niagara Transformer electrical transformer view to the west.

4.2.2 CSH 5

CSH 5 is a series of 16-inch concrete irrigation pipes that are likely a modern variation of the drop-pipe system employed during the mid 1930’s (Alexander et al. 1936:142). There are at least five of these pipelines, oriented *mauka*/*makai*, crossing the portion of the corridor south of Kaua‘ula Stream (Figure 46). This pipe system was used to irrigate the field and subsequently removed during harvesting. It is likely that these pipes were placed here during the late 1990’s and abandoned after the final harvest of the Pioneer Mill Co in 1999. Considering the brittle nature of concrete and the fact they were moved around frequently it is hard to imagine the usable lifespan of these pipes being more than 20 years, reinforcing the determination that these are modern structures.

Figure 46. Picture showing a section of the 16-inch concrete pipe (CSH 5).

Section 5 Results of Laboratory Analysis

5.1 Artifact Analysis

A total of 38 artifacts were collected during the current investigation. These include 33 wire nails, two milled lumber fragments, a small threaded bolt and a thin curved shard of clear glass. No less than ten large metal right angle braces were observed on the surface during clearing, one of which was collected as a representative sample (Figure 47).

All of the wire nails and milled lumber fragments were collected from TU 2-3 while sampling one of four rockpiles (Feature C) features within the SIHP-6632 boundaries. Feature C is located less than 2 m away from SIHP-6632 Feature 1 and the artifact assemblage is likely associated with a historic fence or other plantation-era structure, considering that 23 (70%) of the nails were bent and likely they were intentionally discarded. Wire nails have been mass produced since the 1890’s replacing cut nails. They were more cost efficient to produce and remain virtually unchanged to this day. The presence of wire nails is not surprising considering the historic utilization of the area.

The small threaded bolt collected from TU-3 is identical to one still attached to a large metal right angle brace (Figure 47). Each side of the brace is 35 cm long and 10 cm wide. It may be associated with a historic-era flume or similar structure. A thin curved shard of clear glass was collected from TU-4 at the base of Stratum I/top of Stratum II. The glass is likely a broken light bulb fragment.

In summary all of the artifacts are historic in nature and consistent with materials associated with plantation/ranching structures and operations. A complete summary of the artifacts collected is available in Appendix C.

Figure 47. Metal right angle brace.

5.2 Soil Sample Analysis

Two pollen samples, collected at SIHP -6632 from TU-4 and TU-6 within Stratum II, were examined for evidence of agriculture (Table 12). Both samples were heavily dominated by Poaceae pollen (Table 13 and Figure 48), which was accompanied by many aggregates and a few anther fragments, indicating growth of grasses on the terrace in these areas. These two pollen samples were very similar in their content. In addition to grasses, local vegetation appears to have included a variety of members of the sunflower family, represented by Low-spine Asteraceae, High-spine Asteraceae, and Liguliflorae pollen. Cheno-am pollen in both samples represents growth of weedy plants on the terrace or growth of shrubby *Chenopodium oahuense* in the general vicinity. *Sida* pollen was noted in abundance, particularly in sample 3, recovered from TU-6, suggesting growth of this plant on the terraces. Small quantities of Anacardiaceae, *Artocarpus*, *Rauwolfia*, *Syzygium*-type, *Euphorbia*, *Kadua*, rubiaceae, *Scaevola*, and *Waltheria* pollen were observed in one or both of these samples. *Artocarpus* pollen represents breadfruit and recovery of this pollen in sample 2 suggests growth of a breadfruit tree, or perhaps several breadfruit trees. A variety of fern spores were noted in these samples, indicating local growth of ferns. Charred Asteraceae tissue fragments were observed occasionally and microscopic charcoal was abundant which is not surprising considering the burning associated with sugarcane cultivation. Total pollen concentration was high in these samples, varying between approximately 3500 and 6000 pollen per cubic centimeter of sediment.

Table 12. Provenience Data for Soil Samples Collected During Excavation

Sample No.	Test Unit	Feature No.	Depth (cmbud)	Stratum	Provenience/Description	Analysis
0002	4	Q	28-40	II	Soil Sample from agricultural terrace	Pollen
0003	6	U	20-30	II	Soil Sample from agricultural terrace	Pollen

Table 13. Pollen Types Observed in the Soil Samples.

Scientific Name	Common Name	Nat	Pol	End	Ind
TREES:					
Anacardiaceae	Mango family	x		x	
Artocarpus	Breadfruit		x		
Leucaena	*Kao-haole, 'ekoa, lilikoa*	x			
Rauwolfia sandwicensis	*Hao*			x	
Syzygium-type	Java plum		x		
SHRUBS & HERBS:					
Low-spine Asteraceae	Sunflower family, includes ragweed, and others	x		x	x
High-Spine Asteraceae	Sunflower family, includes Bidens	x		x	x
Liguliflorae	Sunflower family, Lactuceae tribe	x			
Chenopodium	Goosefoot, pigweed, lamb's quarters, Mexican tea, worm seed, *'aheahea, 'ahea, 'ahewahewa, alaweo, alaweo huna, 'aweoweo, kaha'iha'i*	x		x	
Cheno-am	*Achyranthes, Chenopodium oahuense, Amaranthus, Charpentiera*, etc.	x		x	
Euphorbia	Spurge, *kaliko*, Mexican fireplant, wild poinsettia	x		x	
Hedyotis (*Kadua*) *cordata*	*Au, pilo, 'Awiwi, kio'ele*, etc.	x		x	
Poaceae	Grass family	x		x	x
Rubiaceae	Coffee family	x		x	x
Scaevola	*Naupaka*			x	x
Sida	*Ilima*, prickly sida	x			x
Waltheria	*'Uhaloa, 'ala'ala pu loa*				x
Indeterminate	Too badly deteriorated to identify				
SPORES:					
Dicksoniaceae	Tree fern			x	x
Lycopodium cernuum	Fern			x	
Monolete bumpy/smooth	Fern			x	x
Trilete smooth/spiny	Fern				
OTHER:					
Charred Asteraceae	Charred tissue from a plant in the sunflower family				
Foraminifera	Forams				
Scolecodont	Worm jaw fragments				

Plant names and information derived from (Wagner et al. 1990)

Fern (spore) names derived from (Selling 1946)

Nat = Naturalized

Pol = Polynesian introduction

End = Endemic

Ind = Indigenous

Pollen identifications to species were made based on the fact that only 1 species is reported by (Wagner et al. 1990). Species identification was not made based on morphologic characteristics observed under the microscope.

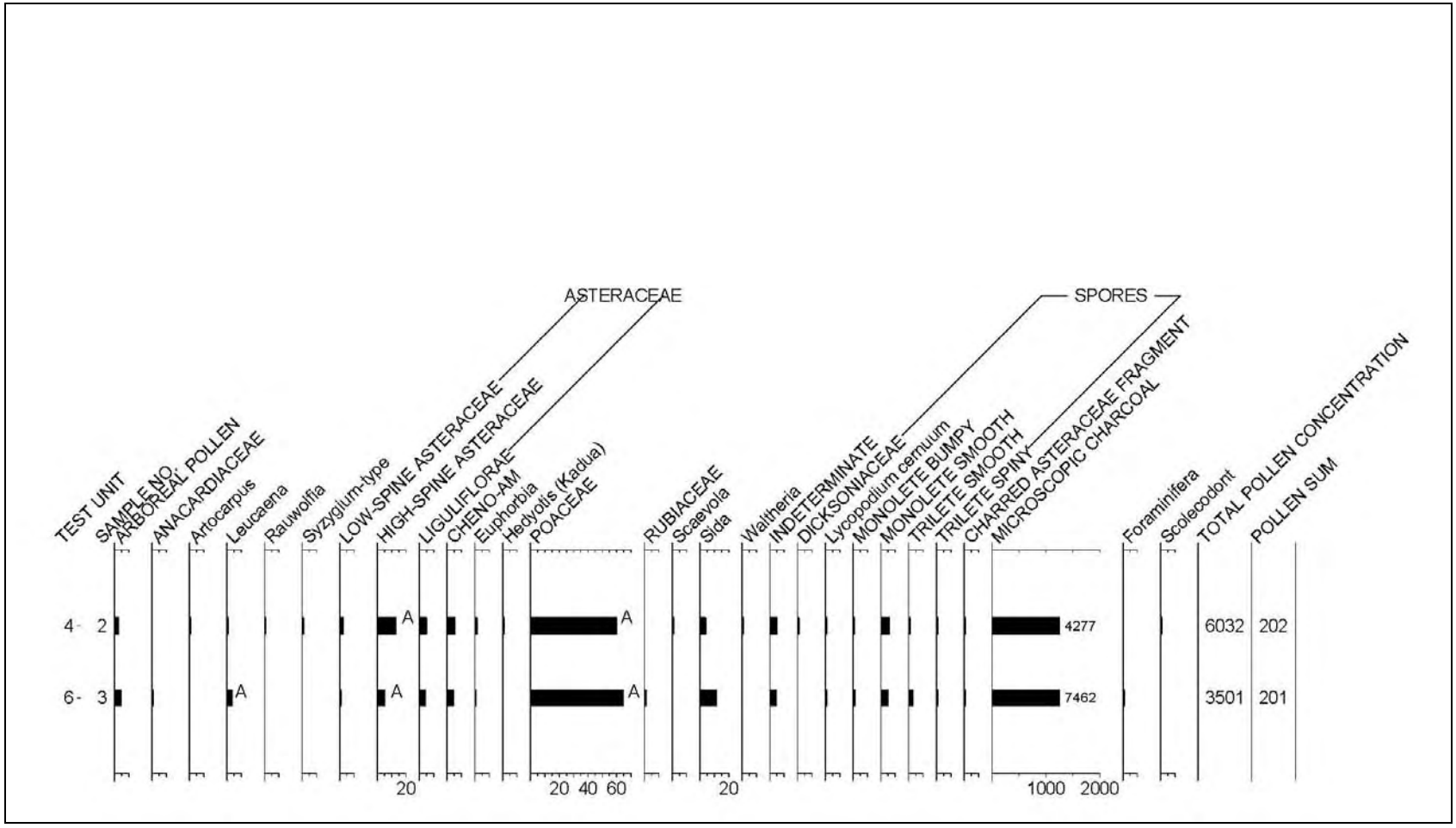

Figure 48. Pollen Diagram for SIHP 50-50-03-6632

Section 6 Summary and Interpretation

Features of two previously recorded historic properties (SIHP 50-50-03-5950 Features 18-27 and SIHP 50-50-03-4787 Feature D) and five newly discovered potential historic properties (CSH 1-5) were identified during a literature review and field inspection for the Lāhainā Bypass Phase 1B-1 ROW (Right–Of-Way) (McCurdy and Hammatt 2008). As a result inventory survey level documentation was recommended for the inadvertent finds to assess their potential eligibility for the Hawai‘i Register of Historic Places. At the conclusion of the investigation three of the new discoveries were designated as historic properties (SIHP #s -6631-6633) and two were determined to be modern structures (CSH 3 and 5).

The fieldwork component of the archaeological inventory survey documentation of the inadvertent finds was accomplished between March 2 and March 19, 2009, by two CSH archaeologists, Todd McCurdy, M.A. and Robert Hill, B.A., under the general supervision of Hallett H. Hammatt, Ph.D. Fieldwork required approximately 144 person-hours to complete. The inventory survey documentation of the inadvertent finds included site recordation and subsurface testing.

6.1 Summary of Historic Properties and Features Identified within the Current Project Area

6.1.1 Previously recorded historic Properties

SIHP 50-50-03-5950

SIHP -5950 was previously recorded by Paraso and Dega (2006) as a group of 17 large “plantation era clearing mounds (Figure 49) southeast of the current project area. Ten additional “plantation era clearing mounds” were identified in the Lāhainā Bypass Phase 1B-1 corridor and designated as SIHP -5950, Features 18 to 27. The mounds, the result of Post-World War II field improvement activities associated with the Pioneer Mill Co. and commercial sugar cultivation, were generally constructed with the steepest face of the pile facing downslope while the upslope terminus remained flush with the ground surface (Lee-Greig and Hammatt 2008:47-53). Several of the “clearing mounds” have been used as dumpsites for domestic garbage and abandoned automobiles.

SIHP 50-50-03-4787

SIHP -4787, previously identified by PHRI, consists of nine historic features associated with the Pioneer Mill’s sugarcane cultivation operation (Haun 2000:22). Four of the features (Features A, C, D, and G) are irrigation ditches. Portions of Feature D are within and adjacent to the Lāhainā Bypass Phase 1B-1 corridor. Lāhainā Pump Ditch No. 1, Feature D, also referred to as the Lāhainā Mill Ditch (Figure 49) is lined with formed concrete with walls that slant slightly inward and extends along approximately 1600 m of the 1B-1 corridor at the 95-ft. contour line.

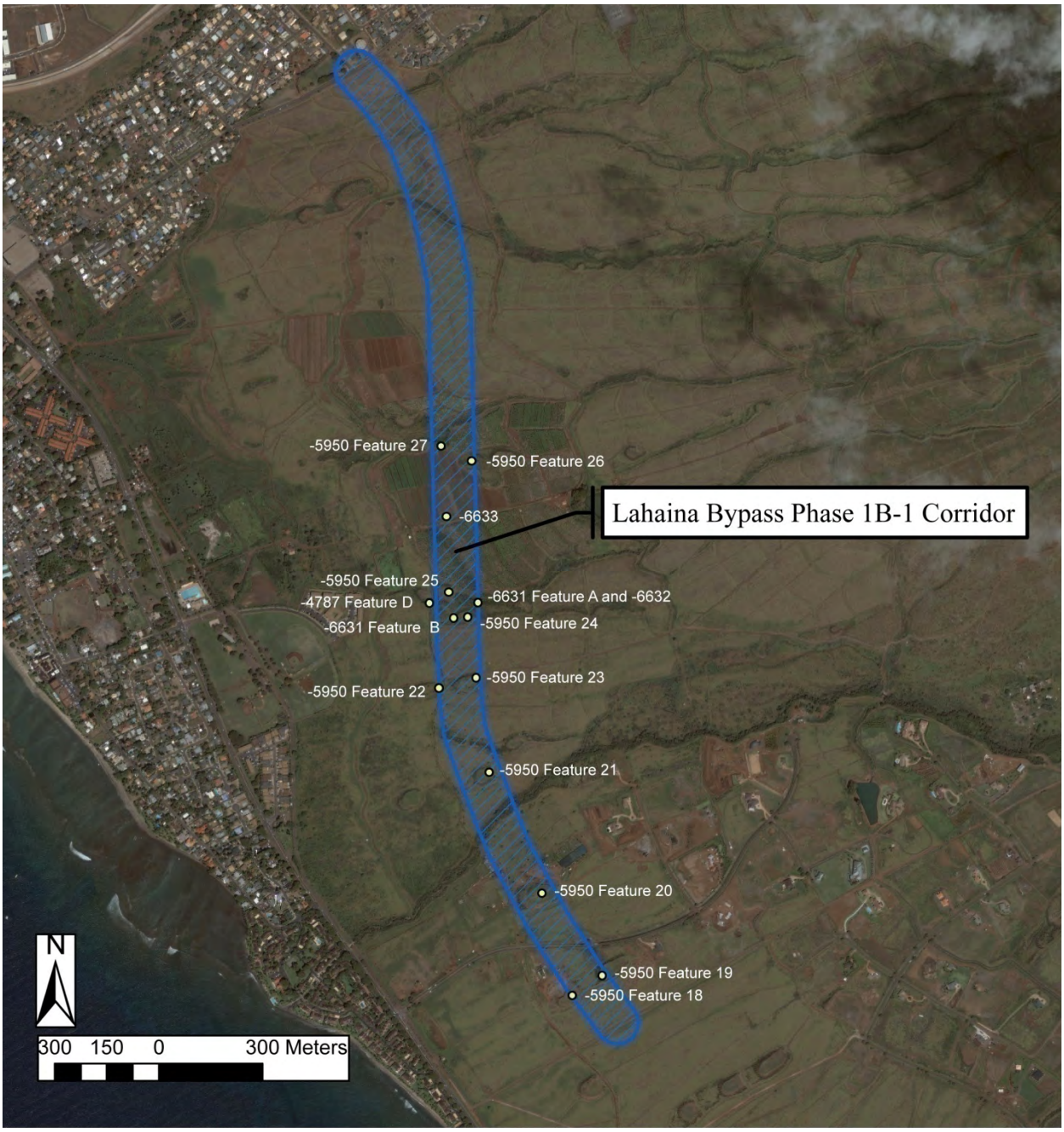

Figure 49. Aerial photograph showing the location of historic properties within the Lāhainā Bypass Phase 1B-1 corridor.

6.1.2 Previously Unrecorded Historic Properties

SIHP 50-50-03-6631

SIHP-6631 consists of two remnants, designated Features A and B, of a dry-stacked basalt wall constructed up to eight courses high in places (Figure 50). Feature A is a wall remnant located adjacent to Puamana Stream oriented E/W. Feature A is approximately 130m long; 50 m of this feature is located within the Lāhainā Bypass Phase 1B-1 project corridor. Feature B is a wall remnant approximately 20 m in length and is located about 30 m SW of Feature A at the western base of SIHP -5950 Feature 24.The features associated with SIHP-6631 are portions of a boundary wall associated with Land Grant 725 (Namauu) that is indicated on an 1884 S.E. Bishop (See section 4.1.3).

SIHP 50-50-03-6632

SIHP-6632 is a complex of agricultural terraces constructed in a manner consistent with pre-Contact architecture on the south bank of Puamana stream adjacent to SIHP-6631 Feature A (Figure 50). This complex extends approximately 130 m *mauka* and is aligned along the gully slope from the crest to the alluvial flat. Approximately 50 m of the property is located within the project corridor including a minimum of four rock pile features (Features A-D) and no less than 21 agricultural terraces (Features E-Y).

A total of seven 1x1 m test units were excavated at SIHP-6632 during this investigation. A distinct cultural A Horizon was observed within the individual terraces ranging from 20 to 30 cm thick indicative of the utilization of the terraces. A distinct cultural A Horizon was identified within the excavated terraces (Stratum II). A single artifact was collected from test units employed to sample the terraces. It was a small, thin, curved piece of glass recovered from the Stratum I/II interface of Test Unit 4. The remaining artifacts were collected from TU 2-3 which sampled a rockpile near SIHP 6331 Feature A. The absence of historic artifacts in Stratum II further suggests that these terraces are pre-Contact.

Two pollen samples, collected from the cultural A Horizon in TU-4 and TU-6 (SIHP-6632) were examined for evidence of agriculture. Both samples were heavily dominated by Poaceae pollen indicating growth of grasses on the terrace in these areas. These two pollen samples were very similar in their content. In addition to grasses, area vegetation included a variety of members of the sunflower family, weedy plants and. *Sida* pollen, which was noted in abundance. A variety of fern spores were noted in these samples, indicating a regional growth of ferns. Charred Asteraceae tissue fragments were observed occasionally and microscopic charcoal was abundant which is not surprising considering the burning associated with sugarcane cultivation. The recovery of *Artocarpus* pollen in sample 2 suggests growth of a breadfruit tree, or perhaps several breadfruit trees in the vicinity.

There are a number of traditional references for the growing of breadfruit trees in Lāhainā. According to Fornander (1916), the planting of breadfruit occurred during the reign of Kaka‘alaneo, king of the island of Maui. Kaka‘àlaneo and Kanikani‘ula, the queen, dwelt together as husband and wife in Lele (Lāhainā). Prior to this time, the Lāhainā region was referred to as “Keka‘a,” the large promontory at the shoreline of Kā‘anapali.

> In due course of time the queen gave birth to a baby boy and he was called Kaululaau. All the children that were born on the same day on Maui were brought to the king and reared with the prince Kaululaau.
>
> As Kaululaau grew to manhood, so also grew his playmates, and as he grew older he became more and more mischievous. In those days it was customary for the boys with him to climb the breadfruit trees and pick the fruit; and when the fruit got fewer and beyond their reach, Kaululaau would then pull up the trees with his hands. This was done so often that the trees became scarce in the district of Lele (Fornander 1916:486).

According to Tabrah (1976), the breadfruit tree had many valuable uses:

> Kakaalaneo’s pride, and the pride of all the Lāhainā people, were their flourishing breadfruit trees. The great leaves spread their green hands, shading the fruit from which the people, in the style of the Marquesans, made their *poi* [steamed food]. The dry leaves of the breadfruit were gently abrasive. They put a fine finish on sacred carvings, and smoothed into beauty the trim on a special canoe. From the bark, the people could pound a sturdy *tapa* [bark cloth]. In the *imu* [underground oven], ripe breadfruit [was] baked with special feasts of pig, dog and fish.
>
> While Kakaalaneo’s son worried his father and annoyed the Lāhainā people with his ordinary mischief, it was when the boy broke off branches and deliberately broke down breadfruit trees that he earned both his name and his fate. Kaululaau, they named him: the one who pulled up the breadfruit trees (Tabrah 1976:23).

Lele was the name given to Lāhainā at the introduction of breadfruit. When Kaka‘alaneo was reigning over West Maui, it was said that there were many people there.

> One time this chief and his people planted breadfruit trees. Some of these trees, southwest of the Lāhainā fort, were called the breadfruit trees of Kauheana (Fornander 1918:542).

A total of 38 artifacts were collected during the current investigation. These include 33 wire nails, two milled lumber fragments, a small threaded bolt and a thin curved shard of clear glass. No less than ten large metal right angle braces were observed on the surface during clearing, one of which was collected as a representative. In summary all of the artifacts are historic in nature and are consistent with materials associated with plantation/ranching structures and operations. The method of construction used on the agricultural terraces (SIHP-6632) is consistent with pre-Contact architecture. In addition, the presence of a distinct cultural A horizon containing breadfruit pollen and devoid of historic artifacts further reinforces the determination that SIHP-6632 is a pre-Contact agricultural complex.

SIHP50-50-03-6633

SIHP-6633 is a 24-inch diameter steel-welded seam, creosote-covered irrigation pipe oriented *mauka*/*makai*. Sections of this welded pipe vary in length from 5-8 m, with some connections reinforced with stainless stell bands. This irrigation pipe is associated with a pipe line that pumped water from the Lāhainā Steam Pump Ditch No. 1 to a *mauka* reservoir.

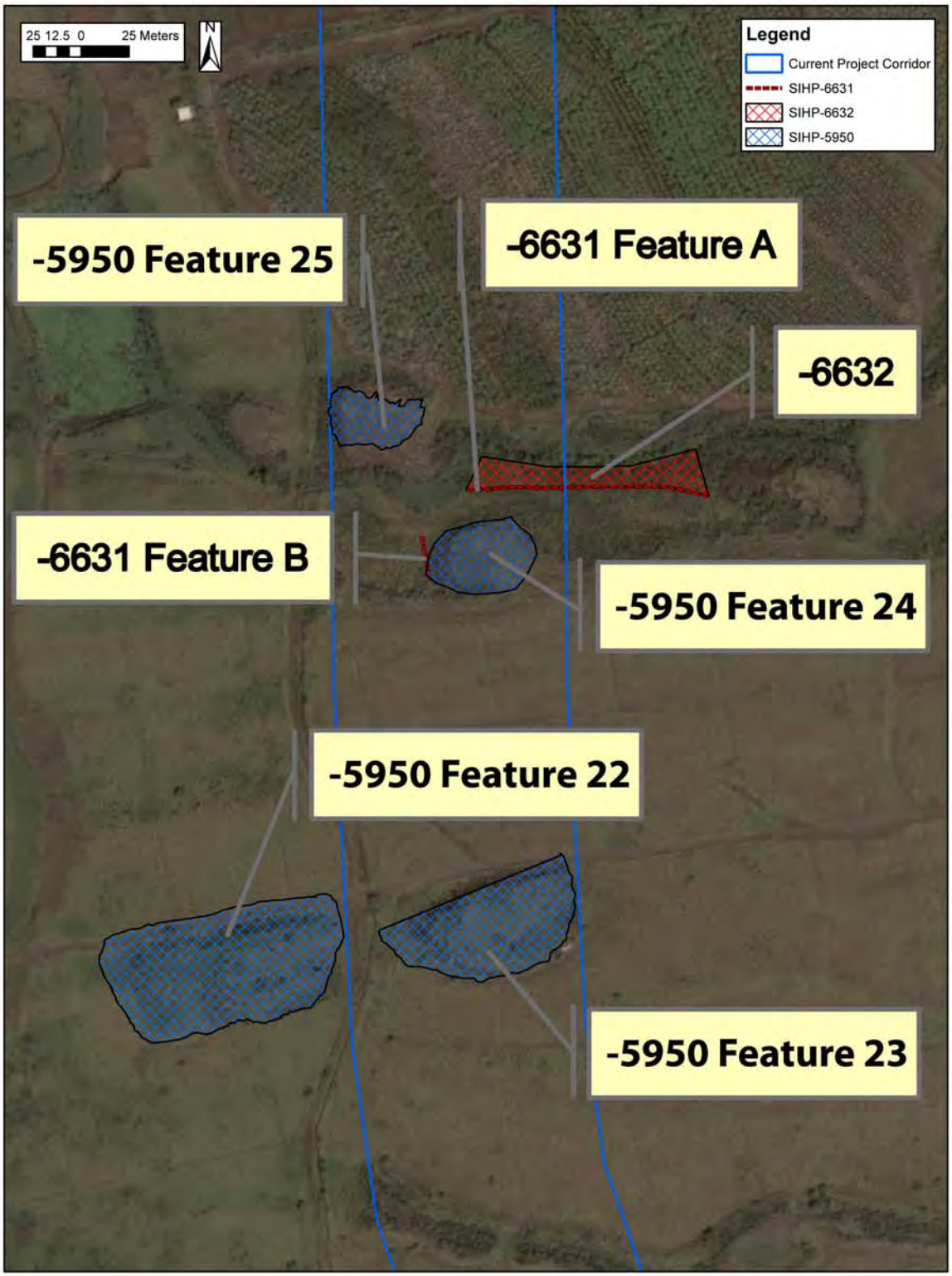

Figure 50. Aerial view showing the location of SIHP#s -6632 and 6631 in relation to features of SIHP# -5950 and the initial Lāhainā Bypass Phase 1B-1 corridor

6.2 Interpretation

Lāhainā is a sea port well known for its colorful history and royal residents. Traditional habitations and intensive irrigated agriculture were also widespread in coastal Lāhainā. Small, dense, irrigated complexes were located in the larger valley systems with permanent stream flow. Within these valleys, concentrated agricultural pursuits, such as the growing of taro, native sugar, and sweet potato are found. Surface indications of these activities have been mostly destroyed or modified during the major land clearing and cultivation activities that accompanied the successful sugar industry dramatically altering the physical and cultural landscape of Lāhainā.

One hundred thirty years of commercial sugarcane cultivation have erased nearly all physical manifestations of the traditional occupation and utilization on the Lāhainā countryside. Sugar operations in the Lāhainā region evolved from small farms within LCAs and Land Grants, and eventually culminated in the Pioneer Mill Company which included some 10,000 acres. SIHP -6631, two sections of a former boundary wall, exists as a reminder of the land division that occurred during the Great Māhele and SIHP -6632, a pre-Contact agricultural complex, remains as a good example of traditional agricultural practices prior to commercial sugarcane cultivation. The remnants of plantation-era infrastructure including SIHP -5950, -4787, and -6633 that dominate the fallow fields *mauka* of the town proper serve as testament to the dynamic history and character of this area.

Section 7 Significance Assessments and Recommendations

Significance assessments have been made in accordance with the State Department of Land and Natural Resources (DLNR) Chapter 13-284, Hawai‘i Administrative Rules (HAR), entitled “Rules Governing Procedures for Historic Preservation Review to Comment on Section 6E-42, Hawai‘i Revised Statutes (HRS), Projects”; Chapter 13-284-6 entitled “Evaluation of Significance”, states:

a. Once a historic property is identified, then an assessment of significance shall occur. The agency shall make this initial assessment, or delegate this assessment, in writing, to the SHPD. This information shall be submitted concurrently with the survey report, if historic properties are found in the survey.

b. To be significant, a historic property shall possess integrity of location, design, setting, materials, workmanship, feeling, and association and shall meet one or more of the following criteria:

   A. Sites that are associated with events that have made a significant contribution to broad patterns of our history; or

   B. Sites that are associated with the lives of persons significant in our past; or

   C. Sites that embody the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or that represents a significant or distinguishable entity, whose components may lack individual distinction; or

   D. Sites which have yielded, or may be likely to yield, information important in prehistory or history; or

   E. Sites which have an important value to the native Hawaiian people or to another ethnic group of the State due to associations with cultural practices once carried out, or still carried out, at the property or due to associations with traditional beliefs, events, or oral accounts- these associations being important to the groups’ history and cultural identity.

7.1 SIHP 50-50-03-6631

7.1.1 Criterion of Significance C

The location of SIHP -6631 is its most distinctive characteristic, representing a period and method of construction that is rarely observed in an area that has been subjected to over 130 years of intensive sugarcane cultivation. Portions of the wall are not only good examples of dry-stacked basalt rock wall construction but are also indicative of the land division occurring as a result of the Great Māhele as it appears to be a well preserved portion of the boundary wall for Land Grant 725 awarded to L. Namauu in 1852 (See Appendix B). For these reasons SIHP-6631 is considered significant under Criterion C.

7.1.2 Criterion of Significance D

This Land Grant boundary wall has yielded information important to the understanding of the transition to private land ownership in Lāhainā resulting from the Great Māhele. In addition it has yielded information about the method of construction of dry-stacked basalt stone walls. For these reasons SIHP -6631 is considered significant under Criterion D.

Based on the above significance evaluation of 50-50-03-6631, Cultural Surveys Hawai‘i, Inc. is recommending avoidance and conservation.

7.2 SIHP 50-50-03-6632

7.2.1 Criterion of Significance C

The method of construction utilized at SIHP -6632 displays a distinctive style consistent with traditional Hawaiian agriculture that is very uncommon in areas subjected to the destructive and land altering nature of commercial sugarcane cultivation. It serves as a good example of traditional agricultural practices during a period that pre-dates the sugar industry in Lāhainā and provides further insight into the resilient engineering of pre-mechanized agriculture in the area. For these reasons SIHP-6632 is considered significant under Criterion C.

7.2.2 Criterion of Significance D

The agricultural complex associated with SIHP -6632 has yielded information important to the understanding of agricultural methods utilized prior to mechanized agriculture. It has also yielded insight into the construction of traditional agricultural terraces. For these reasons SIHP -6632 is considered significant under Criterion D.

Based on the above significance evaluation of 50-50-03-6632, Cultural Surveys Hawai‘i, Inc. is recommending avoidance and conservation.

7.3 SIHP 50-50-03-6633

7.3.1 Criterion of Significance D

This portion of plantation infrastructure has yielded information important to the understanding of water diversion techniques and structures employed by the Pioneer Mill Company. For this reason, SIHP -6633 is considered significant under Criterion D. Sufficient information concerning SIHP-6633 was collected during this investigation.

Based on the above significance evaluation of 50-50-03-6633, Cultural Surveys Hawai‘i, Inc. is recommending no further work.

7.4 SIHP 50-50-03-5950, Features 18-27

SIHP -5950 was identified as being significant under Criterion “D”, yielding or likely to yield information important for research on prehistory or history. Archaeological monitoring is required during dismantling. In addition, it is the recommendation of SHPD that all of the push piles to be impacted within the Phase 1B-1 corridor be mechanically tested in a similar manner similar to that of the Phase 1A portion (Nancy McMahon personal communication 10 July 2009). This would entail employing an excavator with a thumb attachment to dismantle approximately 25% of each of the plantation-era push piles while documenting each one with

photographs and maps drawn to scale. The results of the mechanical testing will be submitted subsequent to this report under separate cover.

7.5 SIHP 50-50-03-4787 Feature D

SIHP -4787 was identified as significant under Criterion “D”, having yielded information important for understanding historic plantation agriculture. The PHRI inventory survey (Haun 2000) recommended Historic American Building Survey (HABS) Level 2 recording if, in the future, destruction was proposed for elements of the irrigation system. This recommended recording would include written and photographic documentation by a qualified architectural historian. Level 2 documentation also requires written history (Haun 2000:41).

A Historic American Engineering Record (HAER) recording of SIHP 50-50-03-4787 Feature D (Lāhainā Pump Ditch No. 1) was completed by Mason Architects (119 Merchant St # 50 Honolulu, HI 96813-(808) 536-0556) and submitted as a separate report (Mason Architects 2009).

Table 14. Summary of Recommendations

SIHP (50-50-03-)	Site Type	Function	Age	Significance Criteria	Recommendations
5950 Features 18-27	Irregularly-Shaped Push pile	Agricultural: Remnant of Mechanized Field Improvement Activity	Historic	D	Archaeological Monitoring is Required During Dismantling (Paraso and Dega 2006)
4787 Feature D	Plantation-era Irrigation Ditch	Water Diversion	Historic	D	Historic American Engineering Report (HAER) Recordation (Haun 2000:41)
6631 Feature A and B	Dry stacked basalt stone wall	Boundary	Historic	C,D	Avoidance and conservation
6632 Features A-Y	Agricultural Complex	Agricultural: Remnant	Pre-Contact to Historic	C,D	Avoidance and conservation
6633	Plantation-era irrigation pipe.	Water Diversion	Historic	D	No Further Work

Section 8 Project Effect and Mitigation Recommendations

The recommendations for SIHP 50-50-03-6631 and SIHP 50-50-03-6632 by Cultural surveys Hawai‘i, Inc. are avoidance and conservation. As a result of the initial Literature Review and Field Inspection (McCurdy and Hammatt 2008) Austin, Tsutsumi & Associates, Inc. elected to re-design the alignment to completely avoid SIHP-6631 and SIHP-6632 (Figure 51 and Figure 52) thus no effect on these historic properties. Inventory level survey documentation has also been completed for SIHP 50-50-03-6631 and Cultural Surveys Hawai‘i, Inc. is recommending no further work.

In addition, it is the recommendation of the State Historic Preservation Division that all of the push piles to be impacted within the Phase 1B-1 corridor be mechanically tested in a similar manner similar to that of the Phase 1A portion (Nancy McMahon, personal communication; 10 July 2009). This would entail employing an excavator with a thumb attachment to dismantle approximately 25% of each of the plantation era push piles while documenting each one with photographs and maps drawn to scale. The results of the mechanical testing will be submitted subsequent to this report under separate cover.

A Historic American Engineering Record (HAER) recording of SIHP 50-50-03-4787 Feature D (Lāhainā Pump Ditch No. 1) will be completed by Mason Architects (119 Merchant St # 50 Honolulu, HI 96813-(808) 536-0556) and submitted as a separate report (Mason Architects 2009).

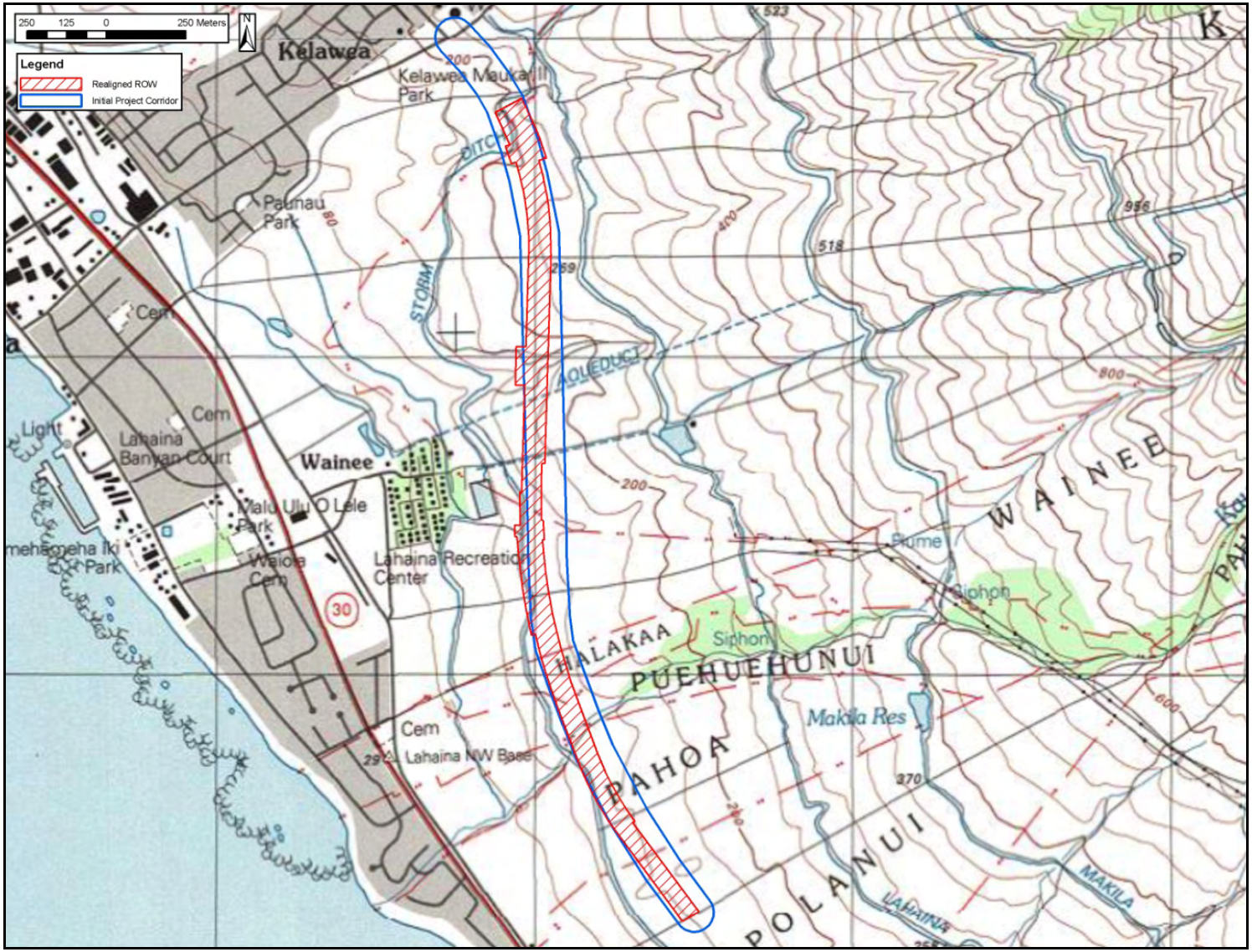

Figure 51. A portion of the USGS 7.5’ topographic map, Lāhainā Quadrangle (1992) showing the realignment.

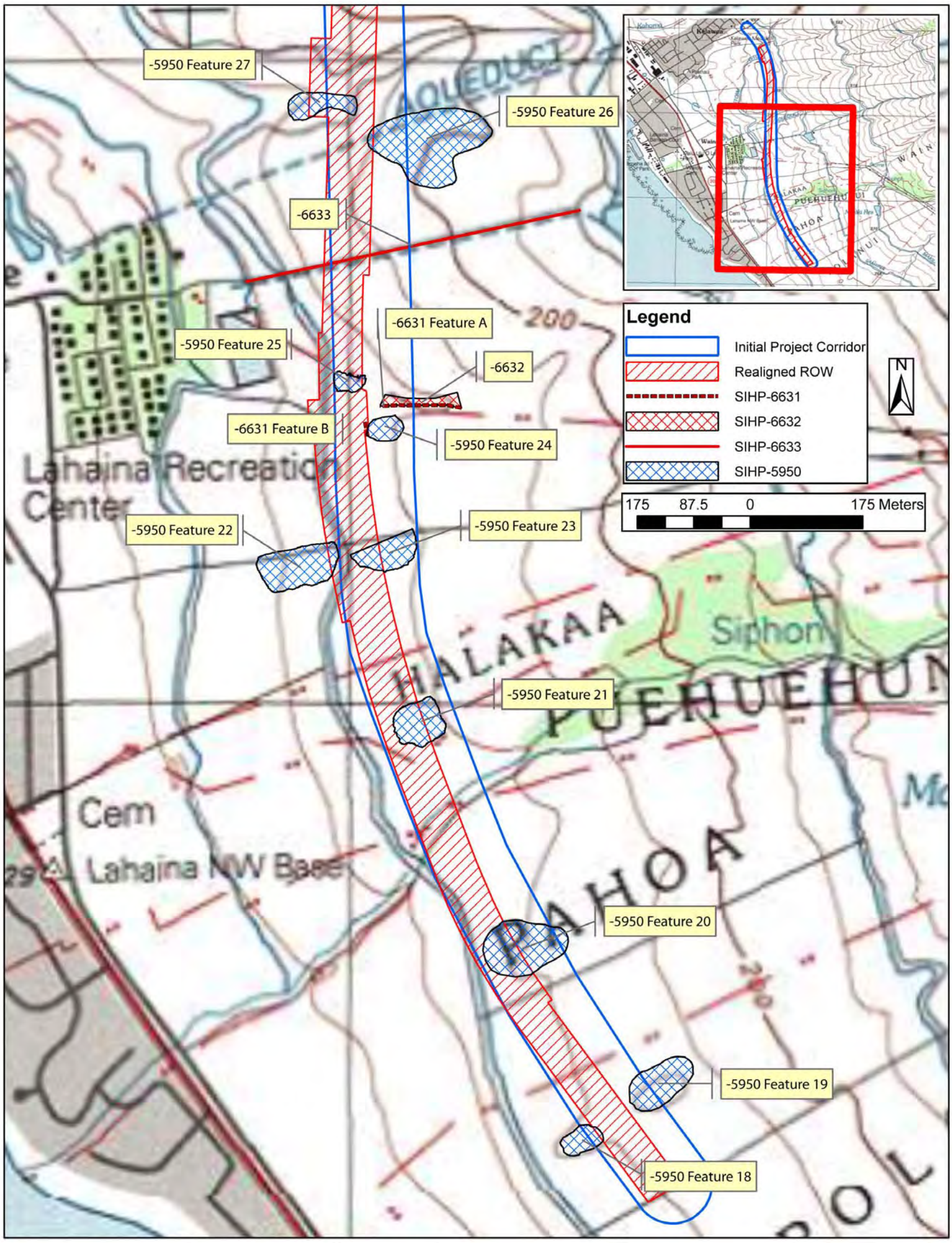

Figure 52. A portion of the USGS 7.5’ topographic map, Lāhainā Quadrangle (1992) showing the historic properties in relation to the realignment.

8.1 Disposition of Materials

All of the data gathered and generated during the course of documenting SIHP #s-6631, 6632, and 6633 are currently being curated and housed at the Maui Office of Cultural Surveys Hawai‘i, Inc. (1993 Main Street, Wailuku, HI 96793), with copies on file at the main office of Cultural Surveys Hawai‘i, Inc. (41-1537 Kalanianaole Hwy # 200, Waimanalo, HI 96795-1185).

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Appendix A Land Commission Awards within or adjacent to the Project Corridor (Waihona ‘Aina Corporation 2000)

No. 2546, Lipi

Number: 02546

Claim Number:	**02546**			
Claimant:	**Lipi, wahine**			
Other claimant:				
Other name:				
Island:	**Maui**			
District:	**Lahaina**			
Ahupuaa:	**Puehuehunui, Halakaa**			
Ili:	**Alio, Paakuohu**			
Apana:	**4**		Awarded:	**1**
Loi:	**2**		FR:	
Plus:	+		NR:	**548v3**
Mala Taro:			FT:	**162v7**
Kula:		1	NT:	**45v5**

House lot:	1	RP:	8231
Kihapai/Pakanu:	1	Number of Royal Patents:	1
Salt lands:		Koele/Poalima:	Yes
Wauke:		Loko:	No
Olona:		Lokoia:	No
Noni:		Fishing Rights:	No
Hala:		Sea/Shore/Dunes:	Yes
Sweet Potatoes:		Auwai/Ditch:	No
Irish Potatoes:		Other Edifice:	No
Bananas:		Spring/Well:	No
Breadfruit:		Pigpen:	No
Coconut:	3	Road/Path:	Yes
Coffee:		Burial/Graveyard:	No
Oranges:		Wall/Fence:	Yes
Bitter Melon/Gourd:		Stream/Muliwai/River:	No
Sugar Cane:		Pali:	No
Tobacco:		Disease:	No
Koa/Kou Trees:		Claimant Died:	No
Other Plants:		Other Trees:	
Other Mammals:	No	Miscellaneous:	farm at Alio, 2 kalo lands, government road

No. 2546, Lipi, Lahaina, Maui, November 19, 1847
N.R. 548-549v3

Greetings to the Land Commissioners: I hereby state my claim for a house lot at Halaakaa in Lahaina. My kupunas began to live at this place during the lifetime of Kamehameha I and afterwards we lived with them at this place. When they died, I remained here until this day; however it is objected to by Kauliokamoa. This lot is between the lot of Kauliokamoa and Nawaa's.

Also, I have a lot mauka of Puehuehu nui which I had from Manukani, however, it was I who made the fence. I have held this in peace, with no objections. At Alio in Lahaina is my farm land. I have one lo'i there which is planted. I hold this peacefully under the konohiki. I also have some coconut trees, there are three of them close to my place.
LIPI

F.T. 162v7
No. 2546, Lipi Wahine

Kapuhi, sworn, the claimant has a house lot in Halakaa, Lahaina and another lot in Puehuehunui. And 2 pieces in Alio, one a kalo and kula land and the other a kalo land.

The house lot she received from her ancestors in the days of Kamehameha I, and has possessed them ever since. But Col. Moa, when he came to possess Halakaa was angry because the claimant would not acknowledge that she lived under him, and then in 1843 disputed her title for the same. He has put in a claim for it.

The piece in Puehuehunui she received from Manukani in 1840 and her title to this has never been disputed. The two pieces in Alio she received from Kaulalua the luna of Alio in 1841 and there has been no dispute about her title.

The house lot in Halekaa is bounded:
Mauka by the Government road
Olowalu by Puupahoehoe's lot
Makai by the sea shore
Kaanapali by Kauliokamoa's lot.

The lot in Puehuehunui is bounded:
Mauka by Kanei's lot
Olowalu by Makila
Makai by Iwa's land
Kaanapali by Kapu's lot.

The kula and kalo piece in Alio is bounded:
Mauka by poalima of the konohiki
Olowalu by the creek of Kanaula
Makai by Kauhihope's land
Kaanapali by the konohiki's poalima.

The remaining piece of one loi is bounded:
Mauka by "Kooka"
Olowalu by Lani's poalima
Kaanapali by Kauhihope's land
[Makai side not given].

F.T. 197v7
Cl. 2546, Lipi from page 162
Cl. 6875, Kaulapea, Jader[?] [Kaulahea], from 74 page

There is a dispute or rather contradiction as to the bounds between the lots in the above claims. Instruct the surveyor as to the bounds.

N.T. 45v5
No. 2546, Lipi

Kapuhi sworn He has seen Lipi's 4 sections - a house lot at Halakaa, a farming lot at Puehuehunui and 2 sections at Alio. The house lot was from Lipi's parents at the time of Kamehameha II.

Kauliokamoa had objected, but the house and the fence are for Lipi and he is living there. The farming lot at Puehuehunui was given by Kanukani in 1849, no one had objected. The Alio sections were from Kaulahea in 1841, Kaulahea is an overseer and no one had objected.

Here are the boundaries:

Section 1 - House lot.
Mauka by Government road
Olowalu by Puupahoehoe's lot
Makai by Beach
Kaanapali by Kauliokamoa's lot.

Section 2 - Lot in Paakuohu.
Mauka by Kanei
Olowalu by Makila's lot
Makai by Kapu's lot
Kaanapali by Iwa's lot.

Section 3 - Taro pasture land at Alio.

Mauka by Friday land
Olowalu by Kanaula stream
Makai by Kauhihope
Kaanapali by Friday land.

Section 4 - 1 patch at Alio.
Mauka by Kooka ahupuaa
Olowalu by Poalima Lani's Friday land
Makai by Kaulahea's land
Kaanapali by Kauhihope.

[Award 2546; Land Patent 8231; Puehuehunui Lahaina; 1 ap.; 2 Acs 36 rods; Index lists Lipi wahine]

No. 3423 B, Iwa

Number: 03423B

Claim Number:	**03423B**			
Claimant:	**Iwa**			
Other claimant:				
Other name:				
Island:	**Maui**			
District:	**Lahaina**			
Ahupuaa:	**Puehuehunui**			
Ili:				
Apana:	**1**		Awarded:	**1**
Loi:	**1**		FR:	
Plus:	+		NR:	
Mala Taro:			FT:	**17v15**
Kula:		1	NT:	
House lot:	**1**		RP:	**1777**
Kihapai/Pakanu:			Number of Royal Patents:	**1**
Salt lands:			Koele/Poalima:	**Yes**
Wauke:			Loko:	**No**
Olona:			Lokoia:	**No**
Noni:			Fishing Rights:	**No**
Hala:			Sea/Shore/Dunes:	**No**
Sweet Potatoes:			Auwai/Ditch:	**No**
Irish Potatoes:			Other Edifice:	**No**
Bananas:			Spring/Well:	**No**
Breadfruit:			Pigpen:	**No**
Coconut:			Road/Path:	**No**
Coffee:			Burial/Graveyard:	**No**
Oranges:			Wall/Fence:	**No**
Bitter Melon/Gourd:			Stream/Muliwai/River:	**No**
Sugar Cane:			Pali:	**No**
Tobacco:			Disease:	**No**

Koa/Kou Trees:		Claimant Died:	**No**
Other Plants:		Other Trees:	
Other Mammals:	**No**	Miscellaneous:	**kalo land**

No. 3423B, Iwa
F.T. 17-18v15

Claimant being sworn, says he forwarded his claim to the Board at the time the Lahaina claims generally were sent in.

Kawaa, sworn, says he wrote out the claim of Iwa in the life time of Mr. Richards. Knows the land of Claimant in Puahuehunui, Lahaina. It consists of three pieces.

The first piece is a House Lot, bounded:
Mauka by Lipi's land
Olowalu by Kailimo Kalaimoku
Makai by Hanakaipu & Ihuanu
Kaanapali by Poepoe and Kapu.

The second piece is cultivated land, bounded:
Mauka by Likua's land
Olowalu by Oo's land
Makai by the Konohiki & a path, Kaanapali by a poalima.

The third piece is Kalo land, bounded:
Mauka by Likua & Konohiki
Olowalu by a brook
Makai by Kapu and Likua
Kaanapali by Halakaa.

Claimant received it through his wife, Ohela about 26 years ago. The second piece is disputed by Likua and Kailimo. the first and third pieces are not disputed.

A. Moku, sworn, says he sent in the Claim of Iwa by Z. Kaauwai. Witness lived on the land in question in 1837. Does not think Kailimo has any right to the part disputed by her. In 1849 the Konohiki took a piece of Iwa's land away from him and gave it to Kailimo, and hence her present claim.

(Ihuanu, the Konohiki, has no objection to make to Iwa's claim).

Likua, sworn, says he knows the land in dispute. Kailimo got it from Kalimaeka in ancient times. Iwa has no right to it, he never cultivated it. It has always been in the possession of Kailimo. (Decided in favor of Iwa).

[Award 3432B; R.P. 1777; Puehuehunui Lahaina; 3 ap.; 9.99 Acs]

No. 4878 F, Pi


Number: 04878F

Claim Number:	**04878F**
Claimant:	**Pi**
Other claimant:	
Other name:	
Island:	**Maui**
District:	**Lahaina**
Ahupuaa:	**Makila**
Ili:	

Apana:	2	Awarded:	1
Loi:	40	FR:	
Plus:		NR:	215v6
Mala Taro:		FT:	28v7
Kula:		NT:	
House lot:	2	RP:	8226,2705,7458
Kihapai/Pakanu:		Number of Royal Patents:	3
Salt lands:		Koele/Poalima:	No
Wauke:		Loko:	No
Olona:		Lokoia:	No
Noni:		Fishing Rights:	No
Hala:		Sea/Shore/Dunes:	No
Sweet Potatoes:		Auwai/Ditch:	No
Irish Potatoes:		Other Edifice:	No
Bananas:		Spring/Well:	No
Breadfruit:		Pigpen:	No
Coconut:		Road/Path:	Yes
Coffee:		Burial/Graveyard:	No
Oranges:		Wall/Fence:	No
Bitter Melon/Gourd:		Stream/Muliwai/River:	Yes
Sugar Cane:		Pali:	No
Tobacco:		Disease:	No
Koa/Kou Trees:		Claimant Died:	No
Other Plants:		Other Trees:	
Other Mammals:	No	Miscellaneous:	

Cl. 4878F, Pi, Part 5
F.T. 28v7

Holi, sworn, I know the lands of Pi. They are in "Makila," Lahaina, and they consist of three moos or ridges of kula land on which his house stands, which are in one piece. Also one House lot separated from this, and one piece of kalo land containing 40 lois.

Claimant received these lands from Kaulunae in 1824 and he has held them without dispute ever since. The King is the great Lord of "Makila" and to him belongs the poalima.

The piece of kula is bounded:
By the House lot of Maimaoe Mauka
Olowalu by the land of Kekua
Makai by the road to Olowalu
Kaanapali by the land of Paele.

The house lot further mauka is bounded:
Mauka by the stream
Olowalu and Makai by Kapuka's land
Kaanapali by the land of Maimai.

The kalo land is bounded:
Mauka by the Auwai dividing it from the lois of Makakapu
Olowalu by the creek

makai by the land of Kekua
Kaanapali sides is a water course dividing it from uncultivated kula.

See page 32 volume 15

F.T. 32v15
No. 4878F, Pi, from p. 28v7

Claimant appeared in person and stated that he had given up the piece of kula land disputed by Pupule, surveyed for him by Mr. Alexander.

[Award 4878F; Land Patent 8226, Makila Lahaina; 1 ap.; 3 roods 8 rods; R.P. 2705; Maikila Lahaina; 2 ap.; 1 Ac.; & R.P. 7458; Makila Lahaina; 1 ap.; 1 Ac. 29 rods; See 4878 for Native Register document]

No. 4878 G, Malaekahana

Number: 04878G

Claim Number:	**04878G**			
Claimant:	**Malaekahana**			
Other claimant:				
Other name:				
Island:	**Maui**			
District:	**Lahaina**			
Ahupuaa:	**Polanui**			
Ili:				
Apana:	**4**		Awarded:	**1**
Loi:	**1**		FR:	
Plus:			NR:	**215v6**
Mala Taro:			FT:	**29v7**
Kula:		2	NT:	
House lot:	**1**		RP:	**1959,2742**
Kihapai/Pakanu:			Number of Royal Patents:	**2**
Salt lands:			Koele/Poalima:	**Yes**
Wauke:			Loko:	**No**
Olona:			Lokoia:	**No**
Noni:			Fishing Rights:	**No**
Hala:			Sea/Shore/Dunes:	**No**
Sweet Potatoes:			Auwai/Ditch:	**No**
Irish Potatoes:			Other Edifice:	**No**
Bananas:			Spring/Well:	**No**
Breadfruit:			Pigpen:	**No**
Coconut:			Road/Path:	**No**
Coffee:			Burial/Graveyard:	**No**
Oranges:			Wall/Fence:	**No**
Bitter Melon/Gourd:			Stream/Muliwai/River:	**No**
Sugar Cane:			Pali:	**No**

Tobacco:		Disease:	**No**
Koa/Kou Trees:		Claimant Died:	**No**
Other Plants:		Other Trees:	
Other Mammals:	**No**	Miscellaneous:	

Cl. 4878G, Malaekahana, part 6
F.T. 29v7

Mahaulea, sworn, I know the land of claimant. They are in Polanui, Lahaina, and consist of three distinct pieces. One kalo land and two patches of kula. There is a house lot beside this.

Claimant has these lands from a woman, Kamane's wife. This was in 1835, I think, and he has never been disputed in his title to the present time. I am the head man of Polanui under Kanaina.

One piece of kula containing two moos is makai and is bounded:
Mauka by Kanaina poalima lois
Olowalu by the land of Makuwahine
makai by the yard of Kaoo
On the other side by the same.

The mauka piece of kula is fenced, and the fence is the correct boundary
Mauka of it is the kula of mine
Olowalu is Puunoa
Makai is Polaiki's land
on the other side is the land of Koalakai.

The house lot has two houses on it and is bounded:
Mauka by the land of Makuwahine's land
Olowalu by John White's land
Makai the road to Olewalu
On the other side by the land of Kapuwanui.

The kalo land contains 10 lois and it is bounded:
Mauka by Alio
Olowalu by the same
Makai by the poalima lois of Kanaina
Kaanapali by Kaiwi.

[Award 4878G; R.P. 1959; Polanui Lahaina; 3 ap.; 8 Acs 49 rods; R.P. 2742; Polanui Lahaina; 1 ap.; 13 rods; See 4878 for Native Register document; (Awardee index lists R.P. 1959 as 2 Acs 49 rods?)]

No. 6211, Maimai (a blind man)

Claim Number:	**06211**
Claimant:	**Maimai**
Other claimant:	
Other name:	
Island:	**Maui**
District:	**Lahaina**
Ahupuaa:	**Makila**
Ili:	

Apana:	Awarded:	**1**
Loi:	FR:	
Plus:	NR:	**355v6**
Mala Taro:	FT:	**104v7**
Kula:	NT:	
House lot:	RP:	**1202,1847**
Kihapai/Pakanu:	Number of Royal Patents:	**2**
Salt lands:	Koele/Poalima:	**No**
Wauke:	Loko:	**No**
Olona:	Lokoia:	**No**
Noni:	Fishing Rights:	**No**
Hala:	Sea/Shore/Dunes:	**No**
Sweet Potatoes:	Auwai/Ditch:	**No**
Irish Potatoes:	Other Edifice:	**No**
Bananas:	Spring/Well:	**No**
Breadfruit:	Pigpen:	**No**
Coconut:	Road/Path:	**No**
Coffee:	Burial/Graveyard:	**No**
Oranges:	Wall/Fence:	**No**
Bitter Melon/Gourd:	Stream/Muliwai/River:	**No**
Sugar Cane:	Pali:	**No**
Tobacco:	Disease:	**No**

Koa/Kou Trees:		Claimant Died:	**No**
Other Plants:		Other Trees:	
Other Mammals:	**No**	Miscellaneous:	**Blind**

No. 6211, Maimai, a blind man
F.T. 104v7

H. Maka[?], sworn, the claimant's land is in "Makila," Lahaina. It is an one-piece patch and loi of kalo [?] of the kula is joined to one of its kalo lands. I know there are only 3 distinct pieces.

The claimant received them from Kaulunae in the year 1841 and has held them in peace ever since.

The first piece makai is bounded:
Mauka by the poalima
Olowalu by Kaapuiki's land
Makai by Paele's land
Kaanapali by Kalehuula's land.

The 2d piece is bounded:
Mauka by Pii's land
Olowalu by the the pali of Makila
Makai by poalima land
Kaanapali by the pali of Makila.

The 3d piece is bounded:
Mauka by Pupuka's land
Olowalu by Kamehai's land
Makai by Pii's land
Kaanapali by the pali of Makila.

See page 6, volume 15

N.T. 6-7v15
No. 6211, Maimai, from 104v7

Kauhi, sworn, says she knows the House Lot claimed by Maimai in Puehuehunui, and disputed by the King's Luna. Kaihee got this lot from my husband Oo and myself when Kaenaena was Luna Auhau, about 1840. It is enclosed by a stone wall which was built by Kaihee, who left this place some years ago and went to live in Honuaula, and the lot is now occupied by Maimai.

Halama, sworn, says the Lot is dispute is enclosed but not occupied. Maimai has possession of it. He got it from Oo before the death of Kinau.

Z. P. Kaamaea, sworn, says he knows the Lot in dispute. It is enclosed with a stone wall built by Kaaihee, a former occupant, who now lives at Honuaula. He left the lot in dispute in 1847. After he left it, then Mahiai occupied it until 1848, when he went to live at Honuaula with Kaaihee. Kaaihee lived under Kalaimoku Hanapilo, at whose expands the stone wall was built. When Mahiai left the Lot, Kaaihee restored it to Kalaimoku. It was unoccupied up to 1850, when Maimai commenced to cultivate in it.

I understand that the King is Kalaimoku's Heir. I have heard that kaaihee did not put in a claim for this lot, because it belonged to Kalaimoku.

Luikua, sworn says he knows the lot in dispute. Kaaihee occupied it till he went to live at Honuaula. I recollect asking Kaaihee at one time who gave him the Lot in question. He told me he got it from Piapia. When the wall was built round it it was at Kalaimoku's expense to whom Kaaihee gave up the Lot when he left it. The Lot is at present unoccupied. There is no house in it. Maimai plants on it.

Pi, sworn, says he knows the Lot in dispute. Kaaihee got it from Oo. The fence was built by Kaaihee. When he left it then Mahiai held it, and after he went away then Maimai began to cultivate there.

(Claimant says that at the time the Kuleanas were being sent in to the Commission, the lot in dispute was not occupied by anyone)

(Decided to belong to the heir of Kalanimoku)

[Award 6211; R.P. 1202; Makila Lahaina; 1 ap.; 1.54 Acs; R.P. 1847; Makila Lahaina; 1 ap.; 1 Ac.; See 6203 for Native Register document]

No. 6449, L. Kapu

Number: 06449

Claim Number:	**06449**		
Claimant:	**Kapu**		
Other claimant:			
Other name:			
Island:	**Maui**		
District:	**Lahaina**		
Ahupuaa:	**Paunau, Puehuehu**		
Ili:			
Apana:	**2**	Awarded:	**1**
Loi:		FR:	

Plus:		NR:	381v6
Mala Taro:		FT:	182v7
Kula:		NT:	64v5
House lot:		RP:	3458
Kihapai/Pakanu:		Number of Royal Patents:	1
Salt lands:		Koele/Poalima:	No
Wauke:		Loko:	No
Olona:		Lokoia:	No
Noni:		Fishing Rights:	No
Hala:		Sea/Shore/Dunes:	No
Sweet Potatoes:		Auwai/Ditch:	No
Irish Potatoes:		Other Edifice:	No
Bananas:		Spring/Well:	No
Breadfruit:		Pigpen:	No
Coconut:		Road/Path:	No
Coffee:		Burial/Graveyard:	No
Oranges:		Wall/Fence:	No
Bitter Melon/Gourd:		Stream/Muliwai/River:	No
Sugar Cane:		Pali:	No
Tobacco:		Disease:	No
Koa/Kou Trees:		Claimant Died:	No
Other Plants:		Other Trees:	
Other Mammals:	No	Miscellaneous:	

No. 6449, Kapu
N.R. 381-382v6

To the Land Commissioners: I hereby petition for my claim for two lots at Puunau I and Puunau II; Halekaa and Puehuehu nui are the land borders which enter one of my lots. The second lot is at Polanui. The diagrams are below

[Diagram I]

Enclosed land of Kapu
This is the first
lot of his land
in Lahaina

[Diagram II]

This is the diagram of the second parcel of land of Kapu.

This is my petition to your Honors with the description of my lots and their dimensions from angle to angle and big and small angles are shown.

The thought of the one who did this is that it is not possible /for him/I to show the size of the area and the acres and roods and rods in these lots. The compass is the thing which will show all the obscure places - it is the thing by which to get the total and the exact center of the circumference, in order to get the area by the rule. If the land had four equal sides then the exact roods would be known.
KAPU
Lahaina, February 4, 1848

F.T. 182v7
Cl. 6449, Kapu

Kauanui, sworn, I know the claimant's land which is one piece, partly in Puehuehunui", Halakaa, Paunau 1 and Paunau 2. It is fenced.

The claimant received this land in 1838 or before and his title has never been disputed.

It is bounded:
Mauka by Col. Moa'a land
Olowalu by Likua's land
Makai by Halakaa and Puehuehunui
Kaanapali by Polanui.

N.T. 64v5
No. 6449, Kapu

Kauanui, sworn, he has seen 1 section at Puehuehunui, it had been from the konohiki at the time the Pili's were yet alive in 1838, no one had objected.

Mauka by Kauliokamoa's land
Olowalu by Likua
Makai by Halakaa and Puehuehunui land
Kaanapali by Polanui.

[Award 6449; R.P. 3458; Puunau Lahaina; 1 ap. 17 acs 2 roods; Puehuehu Lahaina; 1 ap.; 17 Acs 2 rods]

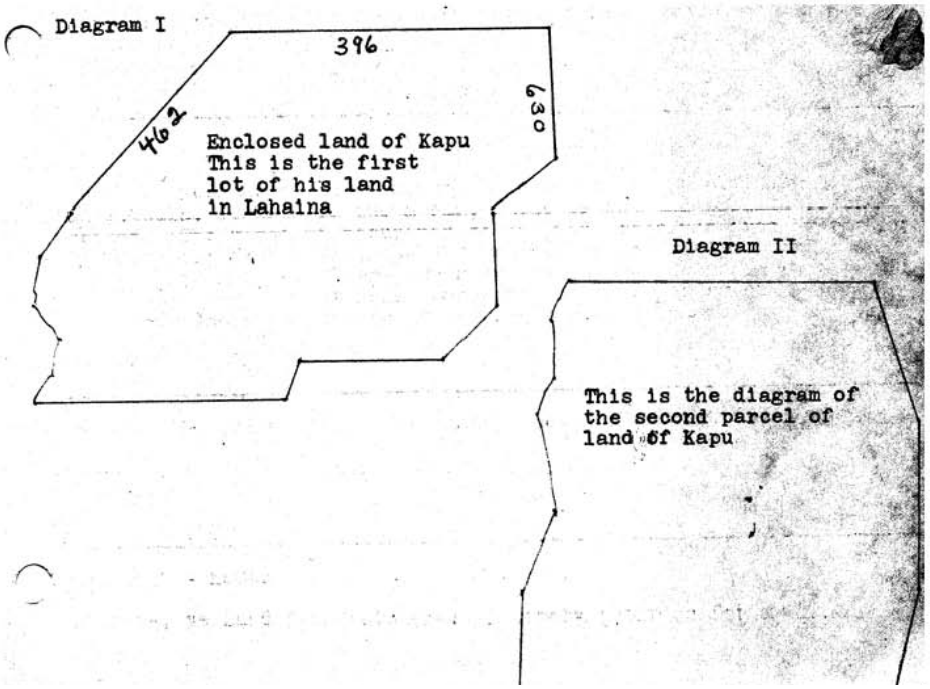
Diagram I
396
630
462
Enclosed land of Kapu
This is the first
lot of his land
in Lahaina
Diagram II
This is the diagram of
the second parcel of
land of Kapu

No. 6754, Naehu

Number: 06754

Claim Number:	**06754**		
Claimant:	**Naehu**		
Other claimant:			
Other name:			
Island:	**Maui**		
District:	**Lahaina**		
Ahupuaa:	**Pahoa**		
Ili:			
Apana:	**1**	Awarded:	**1**
Loi:		FR:	
Plus:		NR:	**416v6**
Mala Taro:		FT:	**72v15**
Kula:	1	NT:	**249v13**
House lot:	**1**	RP:	**8260**
Kihapai/Pakanu:		Number of Royal Patents:	**1**
Salt lands:		Koele/Poalima:	**No**
Wauke:		Loko:	**No**
Olona:		Lokoia:	**No**
Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes:	**No**
Sweet Potatoes:		Auwai/Ditch:	**No**
Irish Potatoes:		Other Edifice:	**No**
Bananas:		Spring/Well:	**No**
Breadfruit:		Pigpen:	**No**
Coconut:		Road/Path:	**No**
Coffee:		Burial/Graveyard:	**No**
Oranges:		Wall/Fence:	**Yes**
Bitter Melon/Gourd:		Stream/Muliwai/River:	**No**
Sugar Cane:		Pali:	**No**
Tobacco:		Disease:	**No**
Koa/Kou Trees:		Claimant Died:	**No**

Other Plants:		Other Trees:	
Other Mammals:	**No**	Miscellaneous:	

No. 6754, Ehu, Lahaina, February 2, 1848
N.R. 416v6

Greetings to you all: I hereby state my claim for a lot at Pahoa, for your information.

Here is its nature: I pay Namauu 450 /?/ per annum. That is my message to you.
EHU

F.T. 72v15
No. 6754, Naehu, Ehu in Index, Disputed by Kekuanaoa

Kaleleiki, sworn, Knows the place in dispute. It is situated in "Pahoa" and enclosed by a stone fence. The fence was made by claimant in 1845. He received the place from Manauu in the same year. It was given as lands were generally given to kanakas at that time. Claimant built a house on the place and cultivated it. He has lived there ever since. No one else lives inside the fence. There is no kuleana on it. He paid a rent of 50 cents a year for it. He never went to the Konohiki's labor. He has held uninterrupted possession of the place up to this time. Claimant was Agent for Namauu in overseeing his lands on different parts of Maui and collecting money &c. and received the place now in dispute in consideration of his services.

Kaehunui, sworn, knows the place of land in question. It was to claimant by Namauu to cultivate. Namauu pastured his horse on the land. He contributed to building the fence around the lot. Namauu told claimant that he might live there under him. He did not give the land lilo loa. Witness lived with Namauu at the time. Witness is Konohiki of "Pahoa."

Kane, sworn, knows the y a stone wall. Witness was employed by claimant to hirer people to build the fence. Naehu paid for the building of it in pai ai. Namauu gave the place to claimant. Witness thinks the gift was absolute in consideration of Naehu's services to Namauu in superintending his business at Kula. Claimant built on the place and has occupied it up to this time.

Upai, sworn, knows the piece of land in dispute. It is surrounded by a fence. Claimant erected a house on it and I saw him at one time building part of the fence. Witness does not know the nature of claimant's title to the place. Knows that claimant worked for Namauu. Claimant paid the land tax on this lot for two successive years, to witness when he was Tax Collector. (continued at page 81)

F.T. 81v15
No. 6754, Naehu, (from page 72), Disputed by Kekuanaoa

Z.P. Kaumaea, sworn, knows the place in dispute. Naehu, enclosed it with a fence in the year 1846 in the early part of that year and built a house on the lot. He lived on the place. Witness, as agent for S. Laahili, disputed the boundary on the Kaanapali side.

Kaleleiki, sworn, knows the boundary disputed by S. Laahili. Knows that the auwai is the proper boundary on that side. Knows that when naehu built the fence the boundary was disputed by Laahili, and acknowledged to be so by claimant, who offered to hold the piece in dispute under Laahili. But is has been included in the survey made by Mr. Alexander, probably by mistake.

N.T. 249v13
No. 6754, Kaehu, See 6624

Moku, sworn, I know this land in Pahoa in Lahaina, Maui. It is walled in.

[It is bounded]

Mauka by konohiki's land
Olowalu by konohiki's land
Makai by Kamohai's land
Kaanapali by Laahili's land.

He received this land from N. Namauu in 1837, and he has lived peacefully since that time to the present. No one has objected.

I am the konohiki of that land now. No one has objected to me.

[Award 6754; Land Patent 8260; Pahoa Lahaina; 1 ap.; 7 Acs 30 rods]

No. 6854, Ohule

Claim Number:	**06854**		
Claimant:	**Ohule**		
Other claimant:			
Other name:			
Island:	**Maui**		
District:	**Lahaina**		
Ahupuaa:	**Puunauiki**		
Ili:			
Apana:		Awarded:	**1**
Loi:		FR:	
Plus:		NR:	**427v6**
Mala Taro:		FT:	**63v7**
Kula:		NT:	
House lot:		RP:	**1890**
Kihapai/Pakanu:		Number of Royal Patents:	**1**
Salt lands:		Koele/Poalima:	**No**
Wauke:		Loko:	**No**
Olona:		Lokoia:	**No**
Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes:	**No**

Sweet Potatoes:		Auwai/Ditch:	No
Irish Potatoes:		Other Edifice:	No
Bananas:		Spring/Well:	No
Breadfruit:		Pigpen:	No
Coconut:		Road/Path:	No
Coffee:		Burial/Graveyard:	No
Oranges:		Wall/Fence:	No
Bitter Melon/Gourd:		Stream/Muliwai/River:	No
Sugar Cane:		Pali:	No
Tobacco:		Disease:	No
Koa/Kou Trees:		Claimant Died:	No
Other Plants:		Other Trees:	
Other Mammals:	No	Miscellaneous:	

Cl. 6854, Ohule
F.T. 63v7

Kaihelua[?], sworn, I know the lands of the claimant. They are in "Punauiki," Lahaina. They consist of one kula land and one kalo land of 30 lois. the claimant received these lands from Kapu, the luna of the land at the death of the Princess Nahienaena in 1831 and he has held them without dispute ever since.

The kula piece consists of 4 moos, but I think that Oleloa, a counter claimant, is entitled to one.

These 3 moos is [are] bounded:
Mauka by my land
Olowalu by the poalima of Kapu
Makai by the Alanui Aupuni
Kaanapali by "Polaiki."

The kalo land is bounded:
Mauka by the land of Kaolanui
Olowalu by the creek of Kauaula
Makai by the land of Kuli
Kaanapali by my land.

[Award 6854; R.P. 1890; Puunauiki-Paunau Lahaina; 5 ap.; 3.44 Acs.; See No. 6851 Kahula ma for Native Register document]

No. 6862, Kaumiumi

Number: 06862

Claim Number:	**06862**
Claimant:	**Kaumiumi**
Other claimant:	
Other name:	
Island:	**Maui**
District:	**Lahaina**
Ahupuaa:	**Puehuehu**
Ili:	
Apana:	Awarded: **1**

Loi:		FR:	
Plus:		NR:	427v6
Mala Taro:		FT:	66v7
Kula:		NT:	
House lot:		RP:	8230
Kihapai/Pakanu:		Number of Royal Patents:	1
Salt lands:		Koele/Poalima:	No
Wauke:		Loko:	No
Olona:		Lokoia:	No
Noni:		Fishing Rights:	No
Hala:		Sea/Shore/Dunes:	No
Sweet Potatoes:		Auwai/Ditch:	No
Irish Potatoes:		Other Edifice:	No
Bananas:		Spring/Well:	No
Breadfruit:		Pigpen:	No
Coconut:		Road/Path:	No
Coffee:		Burial/Graveyard:	No
Oranges:		Wall/Fence:	No
Bitter Melon/Gourd:		Stream/Muliwai/River:	No
Sugar Cane:		Pali:	No
Tobacco:		Disease:	No
Koa/Kou Trees:		Claimant Died:	No
Other Plants:		Other Trees:	
Other Mammals:	No	Miscellaneous:	

No. 6862, Kaumiumi
F.T. 66-67v7

Moku, sworn, I know the lands of the claimant. They are in "Puehuehunui,"Lahaina and consist of two pieces of kula, one house lot, and one kalo land, in all 4 pieces. The claimant received these lands from the luna, Liukua, in 1844 and his title has never been disputed.

The house lot is bounded:
Mauka by my land
Olowalu by the land of Liukua
Makai by the poalima land
Kaanapali by Puehuehuiki.

The kula piece is bounded:
Mauka by the land of Kamakahi
Olowalu by my land
Makai by the land of Kapu
Kaanapali by Puehuehuiki.

The other piece is bounded:
Mauka by the land of Kanakaoo
Olowalu by the creek of Puehuhuenui
Makai by the yard of Lipi
Kaanapali by "Halekaa."

The kalo land is bounded:
Mauka by the land of Nuhi
Olowalu by the kahawai
Kaanapali by the land of Nuhi
[No makai given].

[Award 6862; R.P. 8230; Puehuehunui Lahaina; 4 ap.; 6.25 Acs 2 rods; See No. 6851 Kahula ma for Native Register document]

No. 6886, Kamohai

Number: 06886

Claim Number:	**06886**		
Claimant:	**Kamohai**		
Other claimant:			
Other name:			
Island:	**Maui**		
District:	**Lahaina**		
Ahupuaa:	**Pahoa**		
Ili:			
Apana:		Awarded:	**1**
Loi:		FR:	
Plus:		NR:	**427v6**
Mala Taro:		FT:	**82v7**
Kula:		NT:	
House lot:		RP:	**1188**
Kihapai/Pakanu:		Number of Royal Patents:	**1**
Salt lands:		Koele/Poalima:	**No**
Wauke:		Loko:	**No**
Olona:		Lokoia:	**No**
Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes:	**No**
Sweet Potatoes:		Auwai/Ditch:	**No**
Irish Potatoes:		Other Edifice:	**No**
Bananas:		Spring/Well:	**No**
Breadfruit:		Pigpen:	**No**
Coconut:		Road/Path:	**No**
Coffee:		Burial/Graveyard:	**No**
Oranges:		Wall/Fence:	**No**
Bitter Melon/Gourd:		Stream/Muliwai/River:	**No**
Sugar Cane:		Pali:	**No**
Tobacco:		Disease:	**No**
Koa/Kou Trees:		Claimant Died:	**No**
Other Plants:		Other Trees:	
Other Mammals:	**No**	Miscellaneous:	

No. 6886, Kamohai, June 4, 1849
F.T. 82v7

Poopuu woman, sworn, I know the lands of the claimant. They are in "Kaulalo," Lahaina. They consist of 2 pieces of land, one of three moos, the other 4 lois. The claimant received these lands from Puunui, the luna of Kaulalo in the time of Maunalola[?] and he has possessed them in peace ever since.

The piece of kalo land is bounded:
Mauka by Pinauea's land
Olowalu by "Kahula"
Makai by the Alanui Aupuni
Kaanapali by Pohui's[?] land.

The kula land is bounded:
Mauka by my land
Olowalu by Makakuia's land
Makai by Nakiai's land
Kaanapali by the high pali.

[Award 6886; R.P. 1188; kauaula Lahaina; 1 ap.; 30 rods; See No. 6851 Kahula ma for Native Register document]

No. 7713, V. Kamamalu

Number: 07713*M

Claim Number:	**07713*M**
Claimant:	**Kamamalu, Victoria**
Other claimant:	
Other name:	
Island:	**Maui**
District:	**Lahaina, Wailuku, Hamakualo**
Ahupuaa:	**Waihee, Paunau, Aki, Kelawea, Moalii, Kalua, Haiku, Makapuu, Kawela, Onouli, Kaumanu, Kahalehili, Kaeleku, Honokolani, Kawaipapa, Niumalu, Palemo, Pakakia, Kahuakamalii, Ihuula, Oloewa, Papalauhau, Mokae, Puekahi, Puuiki, Kapohoe, Pukuilua, Kaou, Hal**
Ili:	

Apana:	**55**	Awarded:	**1**
Loi:		FR:	
Plus:		NR:	**440v5,569v5**
Mala Taro:		FT:	**408v3**
Kula:		NT:	**650v1**
House lot:		RP:	**4475**
Kihapai/Pakanu:		Number of Royal Patents:	**1**
Salt lands:		Koele/Poalima:	**No**
Wauke:		Loko:	**No**
Olona:		Lokoia:	**No**
Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes	**No**
Sweet Potatoes:		Auwai/Ditch:	**No**
Irish Potatoes:		Other Edifice:	**No**
Bananas:		Spring/Well:	**No**
Breadfruit:		Pigpen:	**No**
Coconut:		Road/Path:	**No**
Coffee:		Burial/Graveyard:	**No**
Oranges:		Wall/Fence:	**No**

Bitter Melon/Gourd:		Stream/Muliwai/River:	No
Sugar Cane:		Pali:	No
Tobacco:		Disease:	No
Koa/Kou Trees:		Claimant Died:	No
Other Plants:		Other Trees:	
Other Mammals:	No	Miscellaneous:	

No. 7713*M, Victoria Kamamalu, Land Division, See Page 569
N.R. 440-444v5

Opukaula, `Ili, Waimano, Ewa, Oahu
Kilauluna, `Ili, Waimano, Ewa, Oahu
Hananau, `Ili, Waimano, Ewa, Oahu
Kanenelu, `Ili, Waimano, Ewa, Oahu
Pohe, `Ili, Waimano, Ewa, Oahu
Kaulu, `Ili, Waimano, Ewa, Oahu
Kapuna, `Ili, Waimano, Ewa, Oahu
Poupouwela, `Ili, Manaiki, Ewa, Oahu
Kapaloa, `Ili, Waiawa, Ewa, Oahu
Panio, `Ili, Waiawa, Ewa, Oahu
Kuhialoko, `Ili, Waiawa, Ewa, Oahu
Kahoaiai, `Ili, Waiawa, Ewa, Oahu
Papaa, `Ili, Waiawa, Ewa, Oahu
Kaohai, `Ili, Waiawa, Ewa, Oahu
Kalona, `Ili, Waiawa, Ewa, Oahu
Kuhiawaho, `Ili, Waiawa, Ewa, Oahu
Kapuaihalulu, `Ili, Waiawa, Ewa, Oahu

2.
Haleaka, `Ili, Waiawa, Ewa, Oahu
Piloaumoa, `Ili, Waiawa, Ewa, Oahu
Kionaole, `Ili, Waiawa, Ewa, Oahu
Hanakehau, `Ili, Waiawa, Ewa, Oahu
Kapopou, `Ili, Waiawa, Ewa, Oahu
Kalimukele, `Ili, Waiawa, Ewa, Oahu
Kumuulu, `Ili, Waiau, Ewa, Oahu
Hapuna, `Ili, Kalihi, Kona, Oahu
Waiaula, `Ili, Kalihi, Kona, Oahu
Kalaepohaku, `Ili, Kapalama, Oahu
Kauluwela, `Ili, Honolululu land, Oahu
Kanewai, `Ili, Waikiki, Oahu
Kapaakea, `Ili, Waikiki, Oahu
Komoawaa, `Ili, Waikiki, Oahu
Waialae, `Ili, Waikiki, Oahu

3.
Halawa, Ahupua`a, Koolau, Molokai

Kaa, Ahupua`a, Lanai

Kelawea, Ahupua`a, Lahaina, Maui
Moalii, Ahupua`a, Lahaina, Maui
Aki, Ahupua`a, Lahaina, Maui
Paunau, Ahupua`a, Lahaina, Maui
Waihee, Ahupua`a, West Puali, Maui
Kalua, `Ili, Wailuku, Maui
Haiku, Ahupua`a, Hamakualoa, Maui

Makapuu, Ahupua`a, Hana, Maui
Kawela, Ahupua`a, Hana, Maui
Onouli, Ahupua`a, Hana, Maui
Kaumanu, Ahupua`a, Hana, Maui
2 Kahalehili, Ahupua`a, Hana, Maui
3 Kaeleku, Ahupua`a, Hana, Maui
Honokalani, Ahupua`a, Hana, Maui
Kawaipapa, Ahupua`a, Hana, Maui
5 Niumalu, Ahupua`a, Hana, Maui
2 Palemo, Ahupua`a, Hana, Maui
3 Pakakia, Ahupua`a, Hana, Maui
2 Kahuakamalii, Ahupua`a, Hana, Maui
Ihuula, Ahupua`a, Hana, Maui
Oloewa, Ahupua`a, Hana, Maui
4 Papalauhau, Ahupua`a, Hana, Maui
4 Mokae, Ahupua`a, Hana, Maui
Puekahi, Ahupua`a, Hana, Maui
Puuiki, Ahupua`a, Hana, Maui
3 Kapohoe, Ahupua`a, Hana, Maui
Pukuilua, Ahupua`a, Hana, Maui
2 Kaou, Ahupua`a, Hana, Maui
Halehana, Ahupua`a, Hana, Maui
Kaukuhalahala, Ahupua`a, Hana, Maui
2 Piapia, Ahupua`a, Hana, Maui
Koakapuna, Ahupua`a, Hana, Maui
Kawaalua, Ahupua`a, Hana, Maui
Pueokahi, Ahupua`a, Hana, Maui
Pueokauiki, Ahupua`a, Hana, Maui
Pohakanele, Ahupua`a, Hana, Maui
Ahuakaio, Ahupua`a, Hana, Maui
Kihapuhala, Ahupua`a, Hana, Maui
Papahawahawa, Ahupua`a, Hana, Maui
Muolea, Ahupua`a, Hana, Maui
Puuhaoa, Ahupua`a, Hana, Maui
Kahalawe, Ahupua`a, Hana, Maui
Ohia, Ahupua`a, Hana, Maui
Kolokole, Ahupua`a, Hana, Maui
Kapuuomahuka, Ahupua`a, Hana, Maui
Mahulua, Ahupua`a, Hana, Maui
Poopoo, Ahupua`a, Hana, Maui
Lapalapaiki, Ahupua`a, Hana, Maui
Waieli, Ahupua`a, Hana, Maui
Paihala, Ahupua`a, Hana, Maui
Kalihi, Ahupua`a, Hana, Maui
Kakiweka, Ahupua`a, Hana, Maui
Kailihiakoko, Ahupua`a, Hana, Maui
Puukohola, Ahupua`a, Hana, Maui
Kahalawe, Ahupua`a, Hana, Maui
Puaaluu, Ahupua`a, Hana, Maui

Kahua, Ahupua`a, Kohala, Hawaii
Honokane, Ahupua`a, Kohala, Hawaii
Holualoa 1,2, Ahupua`a, Kona, Hawaii
Kahaluu, Ahupua`a, Kona, Hawaii
Keopunui, Ahupua`a, Kona, Hawaii
Keauhou, Ahupua`a, Kona, Hawaii
Honuaino, Ahupua`a, Kona, Hawaii
2 Honokua, Ahupua`a, Kona, Hawaii
Haukalua 1, 2, Ahupua`a, Kona, Hawaii

Pakini, Ahupua`a, Kau, Hawaii
Keauhou, `Ili, KapapalaKau, Hawaii
Kahuai, Ahupua`a, Puna, Hawaii
Kauhaleau, Ahupua`a, Puna, Hawaii
Kauaea, Ahupua`a, Puna, Hawaii
Piopio, Ili in Waiakea, Puna, Hawaii
Kalalau, Ahupua`a, Puna, Hawaii
Honohononui, `Ili in Waiakea, Puna, Hawaii
Pahoehoe, Ahupua`a, Puna, Hawaii
Onomea, Ahupua`a, Puna, Hawaii
Alae, Ahupua`a, Puna, Hawaii
Kekelani, `Ili in Waimanu, Hamakua, Hawaii
Kuilei, Ahupua`a, Puna, Hawaii

N.R. 569v5
0No. 7713, Victoria Kamamalu, from page 440

Victoria Kamamalu's lands in the Mahele by the Mo`i, in the month of January 1848, continued:

Huleia, a district of Kauai, however, the Government cattle shall graze there.
Makaweli, Ahupua`a, Kona, Kauai
Places unsuitable for the soldiers and the fort
Maunalua, `Ili, Waimanalo, Koolaupoko, Oahu
Pahoa, `Ili, Waianae, Waianae, Oahu
Kaluanui, Ahupua`a, Koolauloa, Oahu
Kawailoa, Ahupua`a, Waialua, Oahu
Paalaa, Ahupua`a, Waialua, Oahu
Kaelepulu, `Ili, Kailua, Koolaupoko, Oahu
Kikiwelawela, `Ili, Kaneohe, Koolaupoko, Oahu

F.T. 408-411v3
No. 7713, V. Kamamalu
No. 10474, N. Namauu
No. 7716, R. Keelikolani
No. 7714B, M. Kekuaiwa
No. 7712, M. Kekuanaoa [7712B]
A True Copy
(Sig). A. G. Thurston
Clerk Interior Department.
Copy of the Division of Lands agreed upon in Privy Council August 27, 1850

Kekuanaoa and his children to receive Fee simple titles for those lands here set off to them- they resigning to the Gov. all title to the other lands granted them in the Buke Mahele.

No. 7713, Ko Victoria Kamamalu mau aina ma ke ano Alodio

Honokane, Ahupuaa, Kohala, Hawaii
Kahua, Ahupuaa, Kohala, Hawaii
Keopu, Ahupuaa, Kona, Hawaii
2 Holualoa, Ahupuaa, Kona, Hawaii
Kahaluu, Ahupuaa, Kona, Hawaii
Keauhou, Ahupuaa, Kona, Hawaii
Honuaino, Ahupuaa, Kona, Hawaii
Honokua, Ahupuaa, Kona, Hawaii
Pakini, Ahupuaa, Kau, Hawaii
Keauhou, Ili is Kapapala, Kau, Hawaii
Kahuwai, Ahupuaa, Puna, Hawaii

Kauwalehau, Ahupuaa, Puna, Hawaii
Kauaea, Ahupuaa, Puna, Hawaii
Honohononui, ili o Waiakea, Hilo, Puna, Hawaii
Piopio, ili o Waiakea, Hilo, Puna, Hawaii
Kalalau, Ahupuaa, Puna, Hawaii
Pahoehoe, Ahupuaa, Hilo, Hawaii
Alae, Ahupuaa, Puna, Hawaii
Onomea, Ahupuaa, Puna, Hawaii
Kuilei, Ahupuaa, Hamakua, Hawaii
Kekelani, ili no Waimanu, Hamakua, Hawaii

Kalua, Ahupuaa, Wailuku, Maui
Waihee, Ahupuaa, Puali, Kom. [Komohana]

Aki, Ahupuaa, Lahaina, Maui
Paunau, Ahupuaa, Lahaina, Maui
Kelawea, Ahupuaa, Lahaina, Maui

Halawa, Ahupuaa, Koolau, Molokai

Kaa, Ahupua, Kona, Lanai

Maunalua, ili no Waimanalo, Koolaupoko, Oahu
Kaelepulu, ili no Kailua, Koolaupoko, Oahu
Kikiwelawela, Ahupuaa, Heeia, Koolaupoko, Oahu
Kaluanui, Ahupuaa, Koolauola, Oahu
Kawailoa, Ahupuaa, Wailalua, Oahu
Paalaa, Ahupuaa, Waialua, Oahu
Waiawa, Ahupuaa, Ewa, Oahu
Pahoa, ili no Waianae, Waianae, Oahu
He mau ili ma Waimano, Ewa, Oahu
Poupouwela, ili in Mananaiki, Ewa, Oahu
Kumuulu, no Waiau, Ewa, Oahu
Kapuna no Kalihi, Kona, Oahu
Waiaula no Kalihi, Kona, Oahu
Kalaepohaku no Honolulu, Kona, Oahu
Kauluwela no Honolulu, Kona, Oahu
Kapaakia no Waikiki, Kona, Oahu
Komowaa no Waikiki, Kona, Oahu
Kanewai no Waikiki, Kona, Oahu
Waialae no Waikiki, Kona, Oahu

Makaweli, Ahupuaa, Kauai
Huleia, Puna, Kauai
Kikiaola, Waimea, Kauai

Ko ke Aupuni hapakolu loko o ko V. Kamamalu mau aina. Makapuu, Kawela, Oniuli, Kaumanu, 2 Kahalehili, Kaeleku, Honokalani, Kawaipapa, 5 Niumalu, 2 Palemo, 2 Pakakea, Nahuakamaii, Ihuuloi, Hoewaa, 2 Papauhau, Hamoa, 3 Mokae, Puekahi, Puuiki, 3 Pohue, Pukuilua, Haou, Halehana, Kaukuhalahala, Peapea, Koakupuna, Kawalua, Pueokauiki, Pohakanele, Ahuakaio, Kihapuhala, Papahawahawa, Muolea (The above ahupuaa in Hana, Maui) Moalii Ahupuaa Lahaina Maui.

F.T. 538-539v3
No. 7713, M. Kekuanaoa (for Victoria), 1 April 1854, Counter the government

A. Paki, sworn, for the Government, Knows that the fish pond called "Kawa", in Honolulu, was broken up in the year 1847 & the materials of the wall taken to help to construct the wall or breakwater

erected by the Government on the west side of the harbor. The Government got permission from M. Kekuanaoa to take the materials of the wall of "Kawa" to make the Breakwater. He did not give the Government any portion of the soil of "Kawa," or of "Kaakaukukui." The land on which now stands the Government slaughter House, occupied by John Meek, is a portion of the ili of "Kalui."[?] I do not know what title the Government has to that place, but I have heard that Kekualoa had given it to the Government - this I state as hearsay only.

G.P. Judd, sworn, for Government, says, I was the Hawaiian Minister of Finance in the year 1847, and remember when the wall was built from the present lime kiln House running over to the land of sea & Sumner, Known as Kohololoa." It was built to prevent the filling up of the Harbor of Honolulu. It was thought advisable to remove a part of the wall of a fish pond in "Kawa," which I supposed belonged to the Government. Finding, however, that it was claimed by M. Kekuanaoa, for Victoria, Mr. Young and I applied to him for the privilege of removing it, which he granted to us, and accordingly it was removed under the direction of Piikoi and the stones put into the new wall first named, and my impression is that we built a new partition wall for the Governor's fishpond. I will not be certain however. Piikoi will know. Piikoi ran a plow through the fish pond to give direction to the stream and divert it from the harbor. I never knew of any definite cession of the fish pond or other land to the Government, but I think Kekuanaoa consented that the Government should divide the fish pond, in Privy Council. I didn't know that he claimed the land where the wall runs from the Lime Kiln, but I don't recollect that he said anything particular about it.

See P. 548. [about Pearl Harbor]

F.T. 548v3
No. 7713, M. Kekuanaoa (V. Kamamalu), Aprila 19, 1854, counter the Government, from page 538

Keone Ana, sworn says, I have nothing to testify to in reference at the claim of M. Kekuanaoa in Kaakuukukui, pertaining to the wall built to protect the harbor from filling in, which wall runs from the Lime Kiln to Sea & Sumner's land.

I am sure he gave it to Government in 1847, but I will not swear anything about it until I have laid the matter before the Privy Council, as to "Kaliu," he said he had nothing to say.

To page 555

F.T. 555-557v3
No. 7713, M. Kekuanaoa (for V. Kamamalu) from page 538, counter the Government

Keoni Ani, sworn, presents a plan which he says was made by Order of the King in Council, in the year 1848, perhaps, and placed in my charge, as minister of the Interior. The plan shows two rows of lots laid out from the Beach seaward. The Government built the wall or breakwater in the year 1847, I think. The Government claimed no more land as I understood the matter than what is shown on the plan. When the wall was built by the Government no opposition was made to its erection by any private party. The wall was erected by the Government to prevent the harbor from being filled up with the mud washed down by the Nuuanu River. When this wall was built the wall of the loko called "Kawa" was taken down and the size of the loko reduced. After the wall was built, this plan was made by the Government and laid before the Privy Council, who resolved to sell the lots as laid out for the benefit of the Treasury. Two of the lots were accordingly disposed of with the approval of the Privy Council, to Louis Gravier. After that, a proposition was made in Privy Council to sell some of the lots to a steam boat company, but at the suggestion of M. Kekuanaoa, the proposition was dropped. Kekuanaoa advising the Council that they were disposing of the Government property too fast. After the report of a committee appointed by the Privy Council on the subject of the filling up of the harbor, the Council resolved to remove the wall of the loko called "Kawa" and M. Kekuanaoa assented.

I do not know to whom the land really belonged. I have always seen this, that when the government wanted a piece of land for their purposes, the konohikis have always given their consent. A. Paki, who had charge of Kaliu, and M. Kekuanaoa, who had charge of Kaakaukukui were both in Privy

Council at the time referred to. I consider that the place where this wall is built belonged to the Government previous to that time, because by law, the papakoa and the harbor belongs [sic] to the Government. All the chiefs were in Council at the time these things were transacted. The place where the wall is built is papa koa, perhaps, mud perhaps.

Iona Kapena, sworn, says the names of the land lying between the wall of the Government and the loko called "Kawa" are Kaakaukukui and Kaliu. I pointed out the boundary line between Kaakaukukui and Kaliu a few days ago to Messers Lee and Robertson. The boundary has been well known to me ever since I was a boy. The breakwater or wall is built on the land of Kaakaukukui.

M. Kekuanaoa states that he never understood before that the Government meant to take this place now in dispute. I have heard the testimony of Young, who says the Government took it. I gave my consent to the Government to remove the wall of Kawa and for the materials, but I did not intend that the Government should take away any part of Kaakaukukui.

N.T. 598-599v3
No. 7713, V. Kamamalu - protest

M. Kekuanaoa and Mahuka were the persons who settled the land of V. Kamamalu with objections to C. Kanaina's rights to that property over which there was a dispute. Below are the statements of witnesses clarifying their /two/ rights.

Kumuhonua, sworn, I have seen the place over which there is a dispute between C. Kanaina and V. Kamamalu, Kaanaenui is the name. I have seen that it is the center for Waialae. The boundaries as I have seen from Kaiahaki to Kauhaki, from there to Pohakuaumiumi, then to Kaananiau and run directly to Puukuaka; from there to Kalohupale; Kapahulu is on this side and from there run directly to Kupikipikio point.

Mt. Leahi is for Kapahulu.

The boundaries of the land Kekio: on the mauka direction of Makahuna road is the taro land, detached and following to the sea of Kapua and the coconut grove.

Poo wahine: I am a native of Waiale and since I was very young and at the time of Kahekili, I have known that place over which there is a dispute. Keanaenui is the name and it is the center of Waialae. I have known the boundaries as they are at Kuialauahi to Aumeume Rock, to Kaananiau, to Mount Kuaka and from there to Kalahu to the lae of Kupikipikio. Those are the boundaries which separate Waialae from Kapahulu. Mt Leahi is for Kapahulu.

The land Kekio runs from mauka of Makahuna Street, then separated to the extreme makai to the sea and the coconut grove.

Kuapuu, sworn, I am a land child of Waialae and I have seen the boundaries of Waialae as they were pointed out to me by my parents, from Kuahaki to Kauhaki, therefrom to Aueume Rock and so on just as Poo has related here.

The boundaries of Kekio run from mauka of Makahuna road, then it separates until the extreme makai of Kapua sea and a road called Kukii. The report given of this survey is imperfect because he had taken Waialae's pasture.

Kaula, sworn, I have not been a native very long, but I have heard the same thing from my older brother whose name is Hanakinau, as the reports given by those people above. I had heard these things after the death of Kaahumanu I.

Hehea, sworn, I am a land child of Waialae and have seen the boundaries of Waialae exactly as those witnesses have related above.

The boundaries of the land, Kekio by name, of Keekapu, are exactly as the statements given

N.T. 373-375v10
No. 7713, Victoria Kamamalu, Waianae, 17 August 1854

Testimony on the boundary between the ahupuaa of Waianae and the ili of "Pahoa."

Nahinu, sworn, says the ili of Pahoa is but small. The loko, makai, belongs to this ili. The boundary of the piece is dispute runs along to the eastward of an enclosure belonging to Kaapuiki, and up through the coconut grove and along a stone wall to some hau trees, and then up mauka and across to the east corner of the land, and from thence running makai to the loko.

This ili consists of three pieces, first, the fish pond; second, the piece which I have tried to describe; third, the mauka piece undisputed.

I learned these boundaries from my ancestors who lived here from ancient times.

Cross examined. I accompanied Kekuanaoa and M. Hopkins when they suspected [inspected?] the boundary line in question. I saw the marks made at that time on the coconut trees by order of Kekuanaoa, in presence of M. Hopkins. The line marked out by them on the northwest side, runs farther mauka than that described by me in my testimony.

Ohule, sworn, says he knows the middle Mana of Pohao about which the present dispute exists. It is only of late that I have heard that the boundary was disputed. This middle piece is bounded: Mauka by a stone wall. The western boundary runs up through the coconut grove and then runs to the southward, and then at the corner of what used to be a wauke patch, turns seaward and runs down to the hau trees and the stone wall. I was born on this land. The land on which stand the church and parsonage belongs to the ahupuaa of Waianae.

Kaapuiki, sworn, says when I came here to live, the boundaries of the middle piece of Pahoa were nearly the same as have been described by the preceding witnesses. Afterwards, when the law was made to restore the ancient boundaries of all the lands, Kulepe, the then tax officer, gave to "Pahoa" the land now claimed by Victoria, on the southeast side of the coconut grove, and disputed by the King. I was luna of Waianae when that arrangement was made by Kulepe. I was under Kekuanaoa. The people who live on the disputed land formerly went to the labor days on Waianae," but of late they labor on "Pahoa."

Kulepe, sworn, says, "Pahoa" consists of two pieces; the fish pond forming the part of the mauka piece. I have lived here about 15 years. I was appointed tax officer of Waianae in 1841. In 1850, the boundaries of the makai piece of "Pahoa" were pointed out to me by three kamaainas, who are all now dead. In the same year, Hopkins and Kekuanaoa came down here but I did not accompany them when they went round this land. I do not know anything myself of the true boundary, except what I heard from these kamaainas in 1850. About 1841, I restored a lihi of "Pahoa," which lies between the fish pond and the stone wall, and was claimed for "Pahoa," on account of some coconut trees. This was the only lihi of "Pohoa" restored by me. The people who formerly lived on the land now in dispute used to do konohiki labor for the ahupuaa of "Waianae."

Molea, sworn, confirms in full, the testimony of Nahinu and Ohule.

[Award 7713; (Maui) R.P. 4475; Kalua Waihee Wailuku, 1 ap. (Ap. 23); Iliaina; Puali Waihee Wailuku; R.P. 4475; Paunau Lahaina; 1 ap.; ahupua`a (Ap. 26); Aki Lahaina; 1 ap.; ahupua`a (Ap. 25); Kelawea Lahaina; 1 ap.; ahupua`a (Ap. 27); (Island of Hawaii) R.P. 4475; Keopu, Honuaino, Holualoa, Keauhou Kona and Keauhou Kau, Kuilei Hamakua, Honokane & Kahua Kohala, Honohononui, Piopio, Kalalau; Kekelani, R.P. 4475 & 6856, Kahaluu; R.P. 6857, Honokua; R.P. 6865, Haukalua; R.P. 4475, 6883 & 8220, Kauaea R.P. 6884, Kahuwai Puna; R.P. 4475 & 6887 Pakini nui Kau; R.P. 4475 & 8117 Onomea; R.P. 4475 & 8199 Kaueleau; R.P. 4475 & 6860 Pahohoe Hilo; R.P. 4475 & 6864 Alae Hilo; (Molokai) R.P. 4475 Halawa, Molokai 1 ap. Ahupuaa; (Oahu) R.P. 227 Kamoaaa, Waikiki; no R.P. for Kanewai Manoa; R.P. 4475, Waialaenu, Maunalua, Waiawa, Poupouwela, Mananaiki, Hapuna & Waialua Kalihi; Waimano, Waiau; R.P. 4475 & 7834,

Kalaepohaku Kapalama; R.P. 4475 & 7805 Kaluanui; R.P. 4775 & 7793, Kauluwela; R.P. 4475 & 7789, Kapaakea; R.P. 4475, Kikiwelawela Heeia, Kawailoa Waialua, Paalaa Waialua, Kaelepulu Koolaupoko; (Lanai) R.P. 4475, Kaa; (Kauai) Kikiaola Waimea, R.P. 4476 Makaweli; R.P. 4477, Haiku, Nawiliwili, Niumalu; R.P. 4480, Kalapaki, R.P. 4481, Hanamaulu; R.P. 4482 Kipu & Mahaulepu; See 7713 for Oahu, Kauai, Lanai, Hawaii and Molokai]

No. 7716, Ruta Keelikolani

Number: 07716*M

Claim Number:	**07716*M**		
Claimant:	**Keelikolani, Ruta**		
Other claimant:			
Other name:			
Island:	**Maui**		
District:	**Kahikinui,Lahaina, Honuaula**		
Ahupuaa:	**Auwahi, Kuhua, Kuia, Kanahena**		
Ili:			
Apana:	**5**	Awarded:	**1**
Loi:		FR:	
Plus:		NR:	**445v5**
Mala Taro:		FT:	
Kula:		NT:	
House lot:		RP:	**7791,8146**
Kihapai/Pakanu:		Number of Royal Patents:	**2**
Salt lands:		Koele/Poalima:	**No**
Wauke:		Loko:	**No**
Olona:		Lokoia:	**No**
Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes:	**No**
Sweet Potatoes:		Auwai/Ditch:	**No**
Irish Potatoes:		Other Edifice:	**No**
Bananas:		Spring/Well:	**No**
Breadfruit:		Pigpen:	**No**

https://www.waihona.com/purchase.asp 5/28/2008

Coconut:		Road/Path:	**No**
Coffee:		Burial/Graveyard:	**No**
Oranges:		Wall/Fence:	**No**
Bitter Melon/Gourd:		Stream/Muliwai/River:	**No**
Sugar Cane:		Pali:	**No**
Tobacco:		Disease:	**No**
Koa/Kou Trees:		Claimant Died:	**No**
Other Plants:		Other Trees:	
Other Mammals:	**No**	Miscellaneous:	**ahupuaa of Kuia,Auwahi,Kanahena**

No. 7716*M, R. Keelikolani
N.R. 445v5

R. Keelikolani's lands from the division by the Mo`i, January 1848:

Laaloa, Ahupua`a, Kona, Hawaii
Kealia, Ahupua`a, Kona, Hawaii
Hianaloli, Ahupua`a, Kona, Hawaii
Hamanamana, Ahupua`a, Kona, Hawaii
Opea, Ahupua`a, Kona, Hawaii
Mahukona, Ahupua`a, except the harbor, Kona (Akahi No 5368), Hawaii

Kuhua, Ahupua`a, Lahaina, Maui
Kuia, Ahupua`a, Lahaina, Maui
Auwahi, Ahupua`a, Kahikinui, Maui
Kanahena, Ahupua`a, Honuaula, Maui
1 Waipa, Ahupua`a, Halelea, Maui

Manana, Ahupua`a, Ewa, Oahu.

F.T. 411v3
[No. 7716] Ko R. Keelikolani

Waipa, Ahupuaa, Koolau, Kauai

Manana, ili i Manana, Ewa, Oahu

Kuhua, Ahupuaa, Lahaina, Maui
Kuia, Ahupuaa, Lahaina, Maui
Auwahi, Ahupuaa, Kahikinui, Maui

Laaloa, Ahupuaa, Kona, Hawaii
Hienaloli, Ahupuaa, Kona, Hawaii
Kealia, Ahupuaa, Kona, Hawaii

Ko ke Aupuni hapakolu noloko ae o ko R. Keelikolani.

Kanahena Ahupuaa, Honuaula, Maui, Hamanamana, Ahupuaa, Kona, Hawaii
Opea, Ahupuaa, Hilo, Hawaii.

[Award No. 7716; (Maui) R.P. 7791; Auwahi Kahikinui; 1 ap.; 5280 Acs (ahupua`a); R.P. 8146; Kuhua & Kuia Lahaina; 2 ap.; 2061.79 Acs; no R.P. for Kanahena Honuaula; 1 ap.; ahupua`a (Ap.7)]

No. 8520, Iosua Kaeo

Number: 08520*M

Claim Number:	**08520*M**		
Claimant:	**Kaeo, Iosua**		
Other claimant:			
Other name:			
Island:	**Maui**		
District:	**Lahaina**		
Ahupuaa:	**Halakaa, Puou**		
Ili:			
Apana:	**2**	Awarded:	**1**
Loi:		FR:	
Plus:		NR:	**342v4**
Mala Taro:		FT:	
Kula:		NT:	**183v10**
House lot:		RP:	**6727,8407**
Kihapai/Pakanu:		Number of Royal Patents:	**2**
Salt lands:		Koele/Poalima:	**No**
Wauke:		Loko:	**No**
Olona:		Lokoia:	**No**
Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes:	**No**
Sweet Potatoes:		Auwai/Ditch:	**No**
Irish Potatoes:		Other Edifice:	**No**
Bananas:		Spring/Well:	**No**
Breadfruit:		Pigpen:	**No**
Coconut:		Road/Path:	**No**
Coffee:		Burial/Graveyard:	**No**
Oranges:		Wall/Fence:	**No**
Bitter Melon/Gourd:		Stream/Muliwai/River:	**No**
Sugar Cane:		Pali:	**No**
Tobacco:		Disease:	**No**
Koa/Kou Trees:		Claimant Died:	**No**
Other Plants:		Other Trees:	
Other Mammals:	**No**	Miscellaneous:	

No. 8520*M, Iosua Kaeo, Honolulu, February 1848
N.R. 342v4

Kealia Ahupua`a, Lanai

Puou, Lahaina, Maui
Halakaa, Lahaina, Maui

Laimi, Hilo, Hawaii
Kahawale, `ili, Honolulu, Oahu.

To the Land Commissioners: This is my share from the Mo`i, with the leles and the Lihis and the kulas, from the upland to the sea. Kindly award these to me as shown. There is also a place at Kaumakapili at the stream, next to the hale pele /bell house?/ of Mika, mauka of the road.
IOSUA KAEO

N.T. 183v10
No. 8520, Iosua Kaeo

Copy
Iosua Kaeo's land as listed in Mahele Book.
Kahawali ili for Honolulu, Kona, Oahu

Halakaa ahupuaa, Lahaina, Maui
Puou ahupuaa, Lahaina, Maui

Kealia ahupuaa, Lanai

Laimi ahupuaa, Hilo, Hawaii.

[Award 8520; (Maui) R.P. 6727 & 8407 Halakaa & Puou Lahaina; 2 ap.; 122 Acs 2 roods 30.50 rods; (Oahu) R.P.; 7973, R.P. 8197; R.P. 8293; R.P. 8430; R.P. 8478; Kahawali Honolulu; R.P.; 7144; (Lanai) Kealia; R.P. 7862; (Hawaii) Laimi Hilo; 1 ap.; 116.3 Acs; R.P.; 1668; Waiaka 2 Kohala]

No. 8559 B, W. C. Lunalio

Number: 08559B*M

Claim Number:	**08559B*M**		
Claimant:	**Lunalilo, William C.**		
Other claimant:	Kanaina, Charles for King		
Other name:			
Island:	**Maui**		
District:	**Lahaina, Kaanapali, Wailuk**		
Ahupuaa:	**Polanui, Kalimaohe, Kuholilea, Aki, Paeohi, Waianae, Honolua, Pepee, Waiehu 2, Kaapahu**		
Ili:	**Luaehu, Ahikuli**		
Apana:	**13**	Awarded:	**1**
Loi:		FR:	
Plus:		NR:	
Mala Taro:		FT:	**82v16**
Kula:		NT:	
House lot:	**1**	RP:	**5637, 5639, 5699-2, 7664,**
Kihapai/Pakanu:		Number of Royal Patents:	**13**
Salt lands:		Koele/Poalima:	**No**
Wauke:		Loko:	**No**
Olona:		Lokoia:	**No**
Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes:	**No**

https://www.waihona.com/purchase.asp 5/28/2008

Sweet Potatoes:		Auwai/Ditch:	No
Irish Potatoes:		Other Edifice:	No
Bananas:		Spring/Well:	No
Breadfruit:		Pigpen:	No
Coconut:		Road/Path:	Yes
Coffee:		Burial/Graveyard:	No
Oranges:		Wall/Fence:	No
Bitter Melon/Gourd:		Stream/Muliwai/River:	No
Sugar Cane:		Pali:	No
Tobacco:		Disease:	No
Koa/Kou Trees:		Claimant Died:	No
Other Plants:		Other Trees:	
Other Mammals:	No	Miscellaneous:	government road

No. 8559B*M, (W.C. Lunalilo) C. Kanaina
F.T. 551-552v3

W.H. Uana, sworn, says he knows the house lot of Lunalilo, in Kaluaaha, Molokai. It is bounded:

Mauka by the public road
On the Halawa side by a fish pond of the government called "Neaupala"
Makai by the sea beach
On Kaluaakoi side by a government fish pond called "Kaluaaha."

This lot formerly was ordered to be enclosed by Hoapili wahine and Kekauluohe when Eseta Kipa was Governess of Molokai. The people of Kekauluohi's lands erected a stone house on this lot in the year 1835. It is now in possession of Lunalilo as heir of Kekauluohi.

E. Kipa, sworn says, she knows the lot. I was Governess of Molokai under Hoapili wahine & Kekauluohi in former times, and by their orders enclosed this lot and built a stone house on it with the labor of the people of their own lands. When the government sold the land of "Kaluaaha" to the Missionaries, I heard Kalolou come and ask permission from Kanaina to live in the stone house, which permission she got.

(A. Paki sets up a claim for this lot as heir of Kalaolou.)

L. Haalelea, sworn says, he knows the house lot claimed by Lunalilo in Kailua, Hawaii. It is bounded:

On Kiholo side by the church lots
Makai by the public road
On Keauhou side by a road leading mauka
Mauka by some house lots.

It is enclosed by a wall. This lot I have heard belonged formerly to Keaho, the father of Mahuka. I have heard that when Keaho died he left this lot to Kekauluohi, and I have recently seen a letter from Mahuka to W.C. Lunalilo requesting him to allow Mahuka to retain charge of this lot under Lunalilo. In 1843 I was at Kailua & Kekauluohi was there. I then saw the later Governor Adams give her some money which he said was rent received for this same lot. Part of this lot is claimed by the heir of W.P. Leleiohoku. There is a fence remaining though and dividing the lot into two parts.

F.T. 82-84v16 and N.T. 82-84v16
No. 8559B, William C. Lunalilo

Polea, sworn says, he knows the lots claimed by William C. Lunalilo, at Lahaina, Maui.

The first called Luaehu, is bounded as follows:
Mauka by Kaiheekai and Hiram's land
Olowalu by King's land
Makai by Sea beach
Kaanapali by Polea and M.J. Nouliau [Nowlien].

The second in Pakala is bounded as follows:
Mauka by Public street
Olowalu by Kaiheekai's land
Makai by H.S. Swinton's and others' land
Kaanapali by Public road.

The third lot called Hawaikaekea is also bounded as follows:
Mauka by Kalaleikio's land
Olowalu by Public road
Makai by Alaloa Kahiko street
Kaanapali by Daniela Ii's land.

This lot is disputed by Maunahina the wife of George Shaw, whose claim in right of her father. She has already got an award for a part of this lot.

The fourth lot in Paunau is bounded as follows:
Mauka by Keaweiheuhu's and Kahula's land
Olowalu by Keaweluaole's land
Makai by Old road
Kaanapali by Street leading to Lahainaluna.

The fifth lot called Loinui is bounded as follows:
Mauka by Keaweluaole; Kauhi and Kalolou's land
Olowalu by Mr. Baldwins
Makai by Old road
Kaanapali by Kamakinui's land.

The sixth lot in Aki is bounded as follows:
Mauka by Kaweka's land
Olowalu by Wahie's land
Makai by Main road
Kaanapali by M.I. Nowlein's land.

The seventh lot in Puunoa is bounded as follows:
Mauka by Main road
Olowalu by Iosua Kaeo
Makai by Iosua Kaeo
Kaanapali by King's land.

The eighth lot in Kelawea is bounded as follows:
Mauka by Lahainaluna
Olowalu by Road from the beach
Makai by Keleikini and Kahookano's lands
Kaanapali by A stream.

All these lots have descended to William C. Lunalilo from his mother, Kekauluohi, and are now in the hands of his lunas. The lot in "Pakala" is disputed by Paki and others.

N.T. 185-187v10
No. 8559B, William Charles Kanaina, [for Lunalilo], Honolulu, 24 April 1850

COPY

Greetings to you Highness, John Young, the Minister of Interior.
My desire is to have the government claim separated from my lands; therefore I hereby give some of my land for the government to have forever and the same shall apply to mine. Here are the names of my lands:

Kawela ahupuaa, Hamakua, Hawaii.
Waikaekoe ahupuaa, Hamakua, Hawaii.
Makapala ahupuaa, Kohala, Hawaii.
Kehena ahupuaa, Kohala, Hawaii.
Puhau ili of Iole, Kohala, Hawaii.
Puakoa ili of Waimea, Kohala, Hawaii.
Honuainonui ahupuaa, Kona, Hawaii.
Puapuanui ahupuaa, Kona, Hawaii.
Lehuulanui ahupuaa, Kona, Hawaii.
Kawainui ahupuaa, Kona, Hawaii.
Lanihaunui ahupuaa, Kona, Hawaii.
Pakiniili ahupuaa, Kau, Hawaii.
Hanuapo ahupuaa, Kau, Hawaii.
Kahanalea ahupuaa, Puna, Hawaii.
Keahialaka ahupuaa, Puna, Hawaii.
Keaau ahupuaa, Puna, Hawaii.
Makahanaloa ahupuaa, Hilo, Hawaii.
Pepekeo ahupuaa, Hilo, Hawaii.

Kaapuhu ahupuaa, Kipahulu, Maui.
2 Waiehu, Puali, West Maui.
Ahipuli [Ahikuli] ili for Waiehu, West Maui.
Pepee ili for Wailuku, West Maui.
Honolua ahupuaa, Kaanapali, Maui.
Kalimaohe ahupuaa, Lahaina, Maui.
Polanui ahupuaa, Lahaina, Maui.
Kuholilea ahupuaa, Lahaina, Maui.

Waialua ahupuaa, Kona, Molokai.
Kawela ahupuaa, Kona, Molokai.

Pau ili for Waikiki in Manoa, Kona, Oahu.
Kamoku ili for Waikiki in Manoa, Kona, Oahu.
Kaluaokau ili for Waikiki in Manoa, Kona, Oahu.
Kapahulu ili for Waikiki in Manoa, Kona, Oahu.
Kaalaea ahupuaa, Koolaupoko, Oahu.
Kapaka ahupuaa, Koolauloa, Oahu.
Laiewai ahupuaa, Koolauloa, Oahu.
Laiemaloo ahupuaa, koolauloa. Oahu.
Pahipahialua, Koolauloa, Oahu.

Kahili, Koolauloa [sic], Koolau, Kauai.
Kalihiwai, Koolauloa [sic], Koolau, Kauai.
Pilauwai, Koolauloa [sic], Koolau, Kauai.
Manuahi ili, Kona, Kauai.
Waipouli ahupuaa, Puna, Kauai.

These lands listed above shall be for me fee simple forever, it would not be right for the government to claim my land.

The following lands, I shall give to the government fee simple forever.
Kapulena ahupuaa, Hamakua, Hawaii.
Kukuihaele ahupuaa, Hamakua, Hawaii.
Auau ahupuaa, Kohala, Hawaii.

Keopuhuikahi ahupuaa, Kona, Hawaii.
Papaakoko ili of Honokohau, Kona, Hawaii.
Ninole ahupuaa, Kau Hawaii.
Laepaoo ahupuaa, Puna, Hawaii.
Koae 1 ahupuaa, Puna, Hawaii.
Koae 2 ahupuaa, Puna, Hawaii.
Laeapuki ahupuaa, Puna, Hawaii.
Kaiuiiki ahupuaa, Hilo, Hawaii.
Kahuku ahupuaa, Hilo, Hawaii.

Waiakoa ahupuaa, Kula, Maui.
Kou ili of Waiehu Puali, Komohana Maui.
Kapoino ili of Waiehu Puali, Komohana, Maui.
Halelena ili of Waiehu Puali, Komohana, Maui.
Keokamu ili of Waiehu Puali, Komohana, Maui.
Wainee ahupuaa, Lahaina, Maui.

Mahana ahupuaa, Lanai.

Kamalomalo ahupuaa, Puna, Kauai.
Kumukumu ahupuaa, Koolau, Kauai.

I've given the lands listed above to the government forever, all of them are for the government.
Please consider my request with compassion for me.
With appreciation, I am,
William Charles Lunalilo, Charles Kanaina (child guardian)
Department of Interior, 6 April 1852.

This is a try copy of Lunalilo's division with the government,
A.G. Thruston, Secretary

N.T. 450v10
No. 8559B, William C. Lunalilo, Protested by Kaai

Mahuna, sworn, it is true my own place was written in the bill of sale to C. Kanaina, the place is just mauka of the land in Kailua of Kona, Hawaii, over which there is a dispute by Kaai. That is the lot I have transmitted to him, Kanaina, but I have not seen the property Kaai has at this present time; however, I had seen my parents living on this land at the time [of] Kaahumanu I. I had gone on a tour. Houses had been built, but I have not lived there since that time to the present, nor have I seen this lot over which there is a dispute with Kaai.

C. Kanaina, relates - the witnesses for this land on which Kaai and I are working are dead; although, I had thought they (two) would be my witnesses, but today they have denied by claim to this place. It is true this place had been for their father, Keoho, where he lived until he had died and they (two) are his own children, but I am demanding according to the old bequest of Keaho to M. Kekauluohi as well as by many other statements.

Naea, sworn, I have seen Kaai's place in Keopu of Kona, Hawaii, which is a house lot.

Mauka by Mahuka's lot
South Kona by a road
Makai by Government road
Kohala by vacant lot.

Land from Keoho (his father) upon his (Keoho) death in 1833. Keoho had obtained it long ago as idle land.

Kaai has always lived there peacefully to the present time.

Now C. Kanaina has offered a protest, I do not know the reason for it.

Kioloa, sworn, all of the statements above are true. I have known in the same way. I have not known the place was for C. Kanaina. It had been for Keoho, Kaai's father and now Kaai is the true claimant of this place.

[Award 8559B; (Maui) Land Patent 8395; Polanui Lahaina; 1 ap.; 440 Acs (apana 25); Land Patent 8129; Honolua Kaanapali; 1 ap.; 3860 Acs (ahupua`a, apana 23); R.P. 7664; Pepee Wailuku (apana 22); 4 ap.; 255.70 Acres; Land Patent 8396; 1 ap.; 255.7 Acs; Kalimaohe Lahaina; 2 ap.; 4.93 Acs; (apana 24); Land Patent 8397; Kuholilea Lahaina; 2 ap.; 184. 5 Acs; (apana 26); R.P. 5637; Paunau Lahaina; 1 ap.; 2 roods 24 perkas (apana 4); R.P. 5639; Aki Lahaina; 1 ap.; 16 perkas (apana 6); no R.P.; Paeohi Lahaina; 1 ap.; 1 Ac. 52 rods; R.P. 5699; Loiniu (Luaehu Waianae) Lahaina; 2 ap.; 2.75 Acs 37 rods; Land Patent S-8597; Kaapahu Kipahulu; 1 ap.; (ahupuaa, apana 19);1480 Acres; no R.P. Ahikuli Waiehu (apana 21); Land Patents 8537; Waiehu Wailuku; Por. apana 20; .205 Ac; Land Patent 8546; Waiehu Wailuku, Portion Apana 20, .41 Ac.; Land Patent S-8654; 2 Waiehu Wailuku, Por. apana 20; 27,797 square feet;(Hawaii) R.P. 478; Pakiniiki Kau; 1 ap.; 2357 Acs; Makanaloa Hilo; 2 ap.; 7600 Acs; R.P. 7049; Honuapo Kau; 1 ap.; ahupuaa 2200 Acs; Honuaino nui; 1 ap.; 262 Acs; R.P. 7454; Kawainui iki Kona; 1 ap.; 380 Acs; R.P. 7455; Lehuula nui; 1 ap.; 290 Acs; Lehuula nui; 1 ap.; 2840 Acs; Puapuaanui Kona; 1 ap.; 370 Acs; R.P. 7680; Kahena 2 N. Kohala; 1 ap.; (ap.4); ahupuaa; Puako S. Kohala; 1 ap.; Iliaina (Ap.6); Kahaualea Puna; 1 ap.; 26,000; Keahialaka Puna; 1 ap.; 5562 Acs; Pepeekeo Hilo; Keaau Puna; 1 ap.; 64.275 Acs; Kawela Hamakua; R.P. 7434 Honuainonui N. Kona; R.P. 7456; Lanihau Nui Kona; Land Patent 8452; Waikoekoe Hamakua; no R.P.; Makapala Kohala; R.P. 7192 Makanaloa Hilo; 2 ap.; 7600 Acs; (Molokai) R.P. 7655; Waialua; R.P. 7656 Kawela; (Oahu); R.P.; 7635; Kamoku Waikiki; Land Patents 8193, 8311 & 8416; Pau Waikiki; Land Patent 8124 & 8165 (see Kapahulu award); Land Patent 8124; Kapahulu Kona; 1 ap.; 31.50 Acs; Land Patent 8165; Kapahulu Kona; 2 ap.; 2,184.44 Acs; R.P. 7652; Kalauakou Waikiki; R.P. 7531; Kaalaea Koolaupoko; R.P. 7494; Laie-wai Koolauloa; Laie-maloo Koolauloa; R.P. 5688; Pahipahialua Koolauloa; no R.P.; Kapaka Koolauloa; (Kauai) Land Patent 8173; Kalihiwai Halelea; no R.P. Manuahi Hanapepe; Land Patent 8323; Kahili Koolau; R.P. 7060; Pilaa Koolau; R.P. 7373; Waipouli Puna; See 8559 to C. Kanaina who is awarded a property at Ukumehame under 8559B; see also Award 277]

No. 10474, M Namauu

Number: 10474*M

Claim Number:	**10474*M**		
Claimant:	**Namauu, N.**		
Other claimant:			
Other name:			
Island:	**Maui**		
District:	**Lahaina,Kula,Hana,Wailuku,H**		
Ahupuaa:	**Kainehe, Pahoa, Aki, Kaonoulu, Koanauhi, Kaupakalua, Keoneula, Waiohuli, Ulumalu**		
Ili:	**Kalepolepo**		
Apana:	**9**	Awarded:	**1**
Lot:		FR:	
Plus:		NR:	**558v4**
Mala Taro:		FT:	**231v3**
Kula:		NT:	**188v10**
House lot:		RP:	**4490, 8609**
Kihapai/Pakanu:		Number of Royal Patents:	**2**
Salt lands:		Koele/Poalima:	**No**
Wauke:		Loko:	**No**
Olona:		Lokoia:	**No**
Noni:		Fishing Rights:	**No**
Hala:		Sea/Shore/Dunes:	**No**
Sweet Potatoes:		Auwai/Ditch:	**No**
Irish Potatoes:		Other Edifice:	**No**
Bananas:		Spring/Well:	**No**
Breadfruit:		Pigpen:	**No**
Coconut:		Road/Path:	**No**
Coffee:		Burial/Graveyard:	**No**
Oranges:		Wall/Fence:	**No**
Bitter Melon/Gourd:		Stream/Muliwai/River:	**No**
Sugar Cane:		Pali:	**No**

Tobacco:		Disease:	No
Koa/Kou Trees:		Claimant Died:	No
Other Plants:		Other Trees:	
Other Mammals:	No	Miscellaneous:	claims varous ahupua`a, canoe landing near house in Waiohuli

No. 10474*M, Namauu, Honolulu, February 4, 1848
N.R. 558-559v4

Greetings to the Land Commissioners: I, Namauu, hereby state all my claims to you.

1. One lo`i, Kekuniluna, at Keoneula, and `ili in Honolulu, makai of Kunawai.
1. One cultivated lot at Kainehe, land of J. Piikoi, in Lahaina.
3. Two enclosed lands at Pahoea, Lahaina.
4. One cattle enclosure at Kahawai in Kapoulu, in Aki, Lahaina.
5. One houselot, Waiohuli, adjoining Kalepolepo at Kula, East Maui.
6. One sweet potato lot at Koanauhi, East Maui.
7. Two Taro mo`o in Wailuku in the `ili of Pohakupukupu.
8. These are my claims within the `ili of Pohakupukupu, Honokohau.
9. I also have a small canoe landing, between A. Keliiahonui's and Kaumealani's, next to my house lot.
10. Hoaeae Ahupua`a in Ewa, Oahu.
11. Pahoa Ahupua`a of Lahaina, Maui, Puunoa Ahupua`a of Kahakuloa, Maui, Kaupakulua Ahupua`a of Hamakua, Hawaii, Kulaikahono Ahupua`a in Hilo, Halelua Ahupua`a in Kau, Awakee Ahupua`a, Kona, Moeauoa Ahupua`a, Kona, Ulumalu Ahupua`a, Hamakualoa, Maui. Within these lands which I am listing, the people have rights, under me.
NAMAUU

Note in margin says: (Forgot) Halelua Ahupua`a in Kohala, Hawaii.

F.T. 231v3
No. 10474, Kekuanaoa, Counter to 311 above, 3 December [No. 311 above on page 231v3]

Mataio Kekuanaoa says that there is a portion of Ulumalu which was given Caswell's wife, a small piece and he has no objection to her having this, but for the balance Caswell has no claim.

Z. Kaauwai, sworn, I know this land Ulumalu. It is an Ahupuaa in Hamakualoa, Island of Maui. All I know about Caswell's claim is what Caswell has told me. When the King was living at Lahaina I met Caswell in the road near Laahili's house. I asked him where have you been? he answered, to the King's place with Namauu. I asked what business have you been transacting with the King. He said I have been appointed a luna of Ulumalu under Namauu to see to the people of this land, we look their work and act as a kind of Konohiki. No further said Namauu and the King had consented to his planting sugar cane there, and that he was going to do it and build a sugar mill. I said why did you not get the whole. He said because I could not. The Chiefs were stingy and would not let me have but a small piece where I am going to plant. He said Namauu had refused to let him have more than this small portion. Altho he had made him a luna over the whole. Afterwards he built a Mill there and ground the cane. I don't know the bounds of it but I have always heard that it was about 4 1/2 acres.

Stephen Grant recalled. I know the portion of Ulumalu which Caswell planted to sugar cane and worked. It was makai of his house, and contained about four or five acres planted. I went around and across it. The part makai of the house was the cane land or land fit for cane and contained about fifty acres. I should think. The whole land I supposed was his according to my testimony the other day.

Z. Kaauwai recalled and Cross Examined by Mr. Parsons.

I never heard Caswell say the he gave Namauu anything for this land. I never heard of Caswell's giving

Namauu forty dollars for the land. I know of Freeman Caswell's taking timber from the land. He paid Namauu for the sum I have heard. I was tax gatherer of the land in 1841 and before, and this land was always considered as Namauu's lands. I believe Namauu paid the tax for the same. The tax was paid in hogs. namauu gave orders to the people on that land (not through Freeman) to deliver the hogs and they were delivered accordingly. (Fifty acres ordered by the Board to be surveyed for the Claimant as the extent of his right.)

N.T. 188v10
No. 10474, N. Namauu

COPY
N. Namauu's land in the Mahele Book.
Moeanoa ahupuaa, Kona Hawaii.
Awakee ahupuaa, Kona, Hawaii.
Halelua ahupuaa, Kohala Hawaii.
Kuleikahono ahupuaa Hilo, Hawaii.
Halelua ahupuaa, Kau, Hawaii.
Weha ahupuaa, Hamakua, Hawaii.
Kaupokolua, ahupuaa Hamakualoa, Maui.
Ulumalu ahupuaa, Hamakualoa, Maui.
Pahoa ahupuaa, Lahaina, Maui.
Puumoa ahupuaa Lahaina, Maui.
Hoaeae ahupuaa, Ewa, Oahu.
Puohai ahupuaa, Hilo, Hawaii.
True Copy.
A.G. Thruston, Secretary K.K., Department of Interior, 25 December 1852.

[Award 10474; R.P. 4490, (Maui) Puunau Lahaina; 1 ap.; R.P. 4490, Pahoa Lahaina; 1 ap.; R.P. 4490; Kaupakulua Hamakualoa; 1 ap.; (ahupuaa; Ap. 6; Namauu for Kekuanaoa); R.P. 4471; Ulumalu Hamakualoa; 1 ap.; (ahupuaa; 1376 Acs; Land Patent S-8609; Ulumalu Hamakualoa (Makawao); Lot 13A; 17,800 square feet;(Hawaii) R.P. 4490 Kulaikahono Hilo; R.P. 4471, Halelua Kohala; R.P. 4490, Halelua Kau; Awakee Kona; Moeauoa N. Kona; (Oahu) R.P. 4490, Hoaeae Ewa; See Award 311 for Foreign Testimony 231v3 document]

Appendix B Land Grants within the Project Corridor (Waihona ‘Aina Corporation 2000)

No. 725, L. Namauu

Land Grants Documents

Grant Number(LG)	**725**	Source Book:	**3**
Grantee:	**Namauu**	Acreage::	**22.08** Acs
Ahupua`a	**Kooka**	Year	
District:	**Lahaina**	Cancelled	**False**
Island	**Maui**	TMK	**2-4-6-12, -15**
Miscellaneous			

No. 725, Namauu, Kooka Ahupuaa & Kauaula Ahupuaa, Lahaina District, Island of Maui, Volume 3, pps. 265-266 [LG Reel 2, 00340-00342.tif]

Helu 725
PALAPALA SILA NUI,

Ma keia palapala Sila Nui ke hoike aku nei o Kamehameha III., ke Alii nei a ke Akua i kona lokomaikai i hoonohi ai maluna o ko Hawaii Pae Aina, i na kanaka a pau, i keia la, nona iho, a no kona mau hope Alii, ua haawi lilo loa aku oia ma ke ano alodio ia Namauu i kona kanaka i manao pono ia ia, i kela apana aina a pau o waiho la ma Kooka Lahaina ma ka Mokupuni o Maui a penei hoi ka waiho ana o na Mokuna:

Apana 1.
E hoomaka ma ke Kihi Komohana Hema mauka ae o ke Alanui Kahiko, e pili ana i ka aina o Kupalii, a e holo
Akau 72 1/2° Hikina 2.98 Kaulahao
Akau 64 3/4° Hikina 2.03 Kaulahao
Akau 53 1/2° Hikina 2.34 Kaulahao
Akau 43 1/2° Komohana 96 pauku e pili ana ia mau aoao i ko Kupalii, Alaila
Akau 44 1/2° Hikina 2.08 Kaulahao ma ko Keaka. Alaila
Hema 70 1/4° Hikina 1.13 Kaulahao ma ko Manu, Alaila
Hema 78 3/4° Hikina 2 Kaulahao ma ko Apaa, Alaila
Hema 52 3/4° Komohana 3.40 Kaulahao a
Hema 62° Hikina 36 pauku ma ko Hoonaulu, Alaila
Hema 44° Komohana 1 Kaulahao ma ko Alio, Alaila
Akau 62 3/4° Komohana 39 pauku
Hema 62 3/4° Komohana 2.85 Kaulahao
Hema 04° Komohana 1.77 Kaulahao
Hema 71 1/2° Komohana 2.42 Kaulahao ma ko Kahaka, i ke Alanui, Alaila
Akau 34 1/2° Komohana 74 pauku ma ke Alanui a i Kahi i hoomaka'i.
1 Eka 1 Ruda 11 Roda

Apana 2.

E hoomaka ma ke Kihi Komohana Akau o keia e pili ana me Puaa, a me ko Manu, a e holo
Hema 37 1/2° Hikina 2.14 Kaulahao ma ko Manu, Alaila
Hema 36 1/2° Hikina 2.47 Kaulahao ma ko Apaa,
Hema 15° Hikina 44 pauku ma ko Hoonaulu,
Akau 84° Hikina 2.98 Kaulahao ma ko Kuhalake,
Akau 48° Hikina 2.52 Kaulahao ma ko Polanui.
Akau 48 3/4° Komohana 3.61 Kaulahao ;
Akau 59° Hikina 5.61 Kaulahao ma ko Apaa
Akau 69 3/4° Hikina 3.55 Kaulahao ma ko Olelo
Akau 85 3/4° Komohana 4.20 Kaulahao ma ko Manu
Hema 65 1/4° Komohana 4.23 Kaulahao
Akau 59 3/4° Komohana 1.74 Kaulahao ma ko Kahaka, Alaila
Hema 44 3/4° Komohana 4.31 Kaulahao ma Puaa i Kahi i hoomaka'i.
4 Eka 1 Ruda.

Apana 3.
E hoomaka ma Pohakuloa, ma ka palena o Kooka a me Polanui, a e holo
Hema 73 1/2° Komohana 5.59 Kaulahao ma Polanui
Akau 19 1/4° Komohana 2 Kaulahao ma ko Olelo
Akau 7 1/2° Komohana 1.64 Kaulahao ma ko Manu
Hema 82 3/4° Hikina 6 Kaulahao ma Puaa
Akau 72 1/4° Hikina 14 Kaulahao
Akau 84 1/2° Hikina 23.30 Kaulahao,
Akau 87 1/2° Hikina 6.45 Kaulahao ma Wainee
Hema 21 1/4° Hikina 2.57 Kaulahao ma ko Kupalii
Hema 84° Komohana 43 Kaulahao ma Polanui a hiki i Kahi i hoomaka'i.
11 Eka 3 Ruda 19 Roda

Apana 4.
E hoomaka ma ke Kihi Komohana Hema Kahi e pili ana keia me ka aina o Kupalii, ma ka palena o Polanui, a e holo
Akau 14 1/3° Komohana 2.16 Kaulahao ma ko Kupalii, Alaila
Hema 78° Hikina 3.61 Kaulahao ma Wainee
Hema 7 3/4° Hikina 86 pauku ma Halakaa
Hema 80 1/2° Komohana 3.17 Kaulahao ma Polanui i Kahi i hoomaka'i.
2 Ruda

[Blank page Insert]
Treasury Office
28th of February 1852
Received of Namauu
The sum of Twenty-eight dollars
for land as per Patent No. 725
and four dollars
the fee of patenting
S. Hardy
For Minister of Finance
[end of insert]

[Page 266]
[?] no kela mau Apana 4 iloko o ke Ahupuaa o Kooka.

Apana 5. He lele no Kookaa iloko o ka Ahupuaa o Kanaula [Kauaula]
E hoomaka ma Kekahi pohaku nui, ma ka palena o Wainee, e pili ana i ka aina o Olelo, a e holo
Hema 79 3/4° Hikina 1.99 Kaulahao, a
Hema 8 1/2° Hikina 45 pauku a
Hema 28° Komohana 3.53 Kaulahao ma ko Olelo,
Hema 80 1/2° Hikina 1.64 Kaulahao ma ko Keaka,
Akau 14° Hikina 1.86 Kaulahao ma ko Kuaana, Alaila

Akau 13° Komohana 1.38 Kaulahao a
Akau 87 1/4° Hikina 2.29 Kaulahao ma ko Manu,
Akau 9° Komohana 2.53 Kaulahao ma ko Kahaka,
Akau 21 1/2° Komohana 1.88 Kaulahao ma ko Kupalii, Alaila
Hema 35° Komohana 3.04 Kaulahao a
Hema 49 1/2° Komohana 2.65 Kaulahao ma Wainee i Kahi i hoomaka'i.
1 Eka 2 Ruda 11 Roda.

Apana 6. He lele no Kooka ma Kanaula [Kauaula], elua apana
Apana 1
E hoomaka ma ke Kihi Komohana ma ka auwai o Piilani, e pili ana i ko Kaia a me Puehuehu, a e holo
Hema 24 1/2° Hikina 6.73 Kaulahao ma ko Puehuehu,
Akau 72° Hikina 1.46 Kaulahao ma ko Panau
Akau 22 1/2° Komohana 6.62 Kaulahao ma ko Puali,
Hema 74° Komohana 1.66 Kaulahao ma ko Kaia a hiki i Kahi i hoomaka'i.
1 Eka 6 Roda

Apana 2.
E hoomaka ma ke Kihi Komohana ma ka Auwai o Piilani e pili ana i Kaia, a me ko Puali, a e holo
Hema 24 3/4° Hikina 6.12 Kaulahao ma ko Puali,
Akau 43° Hikina 3.50 [3.30?] Kaulahao ma Punau,
Akau 33° Komohana 4.94 Kaulahao ma ko Kaia,
Hema 63 1/2° Komohana 2.28 Kaulahao ma Kuia [Kaia] i Kahi i hoomaka'i.
1 Eka 2 Ruda 5 Roda.

A maloko o ia Apana 22 Eka 12 Roda ~~eka~~ a oi iki aku, a emi iki mai paha.

Eia ko kumu o ka lilo ana; ua haawi mai oia iloko o ka waihona waiwai o ke Aupuni i Iwakaluakumamawalu Dala /$284.-/ Aka, ua koe i ke Aupuni na mine minerala a me na mine metala a pau.

No Namauu, ua aina la i haawiia, nona mau loa aku no, ma ko ano alodio, a no kona mau hooilina, a me kona waihona; ua pili nae ka auhau a ka Poe Ahaolelo e kau like ai ma na aina alodio a pau i kela manawa i keia manawa.

Ai mea e ikea'i, ua kau wau i ko'u inoa, a me ka Sila Nui o ko Hawaii Pae Aina, ma Honolulu, i keia la 15 o Ianuari, 1852.

(Inoa) Kamehameha
(Inoa) Keoni Ana

[Land Patent No. 725, Namauu, Kooka Ahupuaa & Kauaula Ahupuaa, Lahaina District, Island of Maui, 7 apana, 22.08 Acres, 1852]

No. 7855, The Lāhainā Agricultural Co., Limited

Land Grants Documents

Grant Number(LG)	**7855**	Source Book:	**43**
Grantee:	**The Lahaina Agricultural Co., Limited**	Acreage::	**5.7** Acs
Ahupua`a	**Haleu, Lahaina**	Year	
District:	**Lahaina**	Cancelled	**False**
Island	**Maui**	TMK	
Miscellaneous	**Reel 19, 0924.tif-0925**		

No. 7855, Lahaina Agricultural Company, Limited, Waiokamao Ahupuaa, District of Lahaina, Island of Maui, Volume 43, pps. 377-379 [Reel 19, 00924-00933.tif]

Land Patent No. 7855
(Grant)

On Land Exchange
By this Patent the Governor of the Territory of Hawaii, in conformity with the laws of the United States of America and of the Territory of Hawaii, makes know to all men that he has this day granted and confirmed unto The Lahaina Agricultural Company, Limited, an [sic.] Hawaiian Corporation, for the consideration of the conveyance to the ~~Dollars~~ Terri- ~~paid into the Treasury~~ tory of Hawaii, the same being the land mentioned and more particularly desribed in a Deed from said, the Lahaina Agricultural Company, Limited, to the Territory, dated the 25th day of June A.D. 1921, and required by the Territory directly for public use, to wit, for cemetery purposes, all of the land situate at Lahaina in the District of Lahaina, Island of Maui bounded and described as follows:

Parcel 1. Government Remnant in Ahupuaa of Haleu, Lahaina, Maui
Beginning at the Northwest corner of this piece, and the Northeast corner of L.C.A. 8519-B Ap.5 to Fanny Young at a point whose coordinates referred to Government Survey Train Station "Laina" being 7686.0 feet South and 1879.0 feet West, and running by true azimuths
1. 262° 20' 55.2 feet along L.C.A. 7269 Apana 3 to Auwaa
2. 353° 00' 56.0 feet along same;
3. 83° 20' 50.0 feet along L.C.A. 8519-B Apana 6 to Fanny Young
4. 352° 30' 30.0 feet along same
5. 270° 00' 57.0 feet along same
6. 357° 00' 37.0 feet along same
7. 93° 40' 65.0 feet along L.C.A. 10218 Apana 1 to Makaulia
8. 175° 10' 117.0 feet along L.C.A. 8519-B Apana 5 to Fanny Young, to the point of beginning. Area 13/100 Acre

[page 378]

Parcel 5. Government Remnant in Puehuehu-nui, Lahaina, Maui

Beginning at Northeast corner of this piece at a point whose coordinates referred to Government Survey Train Station "Laina" are 10515.9 feet South and 4389.2 feet East, and running by true azimuths
1. 68° 25' 154.0 feet along L.C.A. 9583-B Apana 3 to Liukua
2. 341° 15' 184.0 feet along same
3. 238° 40' 203.0 feet along same to North side of Kauaula Stream;
4. Thence Southwesterly along North side of Kauaula Stream, the direct azimuth and distance being: 56° 23' 589.2 feet
5. 168° 30' 465.0 feet along L.C.A. 6895 Apana 4 to Kauakahi;
6. 266° 20' 436.0 feet along Ahupuaa of Halakaa (L.C.A. 8520 Apana 1 to J. Kaeo)
7. 298° 30' 67.0 feet along same to the point of beginning. Area 3-53/100 Acres.

Parcel 6. Government Remnant on North side of Kanaha Stream, Alamihi, Lahaina Maui
Beginning at the East corner of this piece, on the North side of Kanaha Stream and on the West side of the Government Main road, the Station "Laina" being 4000.0 feet South and 5763.0 feet West, and running by true azimuths.
1. Along the North side of Kanaha Stream, on the following direct azimuths and distances;
1. 129° 00' 77.0 feet
2. 103° 00' 75.0 feet
3. 132° 30' 145.0 feet
4. 112° 00' 70.0 feet to seashore at high water mark; thence along seashore at high water mark, on the following direct azimuths and distances
5. 150° 00' 53.0 feet
6. 188° 00' 46.0 feet
7. 230° 00' 20.0 feet to the South boundary of L.C.A. 6760-B Apana 1 to Hanalei
8. 313° 30' 427.0 feet along L.C.A. 6760-B Apana 1, to Hanalei along the land of Moalii to the point of beginning. Area 40/100 Acre.

Parcel 2. Government Remnant in Ahupuaa of Haleu, Lahaina, Maui
Beginning at the Northwest corner of this piece and the South corner of L.C.A. 6441 Apana 1 to Keokeo, at a point whose coordinates referred to Government Survey Train Station "Laina" being 7799.0 feet South and 2166.0 feet West, and running by true azimuths
1. 233° Government Remnant 52' 141.0 feet along L.C.A. 6441 Apana 1 to Keokeo;
2. 258° 45' 49.0 feet along L.C.A. 493 Apana 1 to Kalalakoa;
3. 354° 35' 46.0 feet along L.C.A. 7269 Apana 2 to Auwaa;
4. 80° 15' 43.0 feet along same;
5. 70° 50' 40.0 feet along L.C.A. 8519-B Apana 4 to Fanny Young;
6. 344° 30' 90.0 feet along same;
7. 52° 15' 54.0 feet along L.C.A. 10218 Apana 2 to Makaulia;
8. 154° 45' 39.0 feet along L.C.A. 8519-B Apana 3 to Fanny Young;
9. 68° 35' 30.0 feet along same
10. 157° 40' 34.0 feet along L.C.A. 7159 Apana 2 to Kanekuapuu
11. 245° 30' 9.0 feet along L.C.A. 8519-B Apana 2 to Fanny Young;
12. 153° 10' 29.0 feet along same to point of beginning. Area 29/100 Acre.

Parcel 3. Government Remnant in the Ahupuaa of Kapunakea 1
Beginning at an iron pipe at the Northeast corner of this piece, on the West side of Government Road and on the South Boundary of the land of Wahikuli, the coordinates of said point of beginning referred to Government Survey Train Station "Laina" being 2131.7 feet South and 5753.1 feet West, and running by true azimuths
1. 355° 50' 185.0 feet along the West side of Government Road;
2. 148° 31' 192.7 feet along Grant 1891 Apana 1 to D. Baldwin;
3. 256° 69' 89.5 feet along Grant7793 to Lahaina Agricultural Company, Limited, along the land of Wahikuli to the point of beginning. Area 19/100 Acre

Parcel 4. Government Remnant in Puehuehu-nui
Beginning at the Northwest corner of this piece, said point being true azimuth and distance 20° 52' 35.0 feet from a concrete post marked "11" at edge of trail on the South side of a small gulch the coordinates referred to Government Survey Train Station "Laina" being 11066.6 feet South and

1825.7 feet East, and running by true azimuths
1. 246° 50' 295.0 feet along Ahupuaa of Halakaa (L.C.A. 850 Apana 1 to J. Kaeo);
2. 278° 00' 59.0 feet along same;
3. 265° 00' 198.0 feet along same;
4. 71° 00' 22.0 feet along L.C.A. 6862 Apana 4 to Kaumiumi;
5. 65° 00' 320.0 feet along same;
6. 63° 52' 432.3 feet along same;
7. 227° 16' 195.0 feet along L.C.A. 6449 to Kapu;
8. 200° 52' 80.7 feet along same to point of beginning. Area 1-16/100 Acres.

Attached hereto and made part of Grant No. 7855.
Governor of Hawaii, C. J. McCarthy
Commissioner of Public Lands, C.T. Bailey

Proved as to Form, J. Lightfoot, Acting Attorney General

[Diagram]

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[page 379]

Parcel 1 Area .13 Acres

Parcel 2 Area .29 Acres
Parcel 3 Area .19 Acres
Parcel 4 Area 1.16 Acres
Parcel 5 Area

Commissioner of Public Lands, C.T. Bailey

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[Diagram]

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[page 379]

Parcel 1 Area .13 Acres
Parcel 2 Area .29 Acres
Parcel 3 Area .19 Acres
Parcel 4 Area 1.16 Acres
Parcel 5 Area

Appendix C Artifacts Recovered

Acc #	Site #	Trench	Depth	Stratum	n=	Length (cm)	Width (cm)	Thickness (cm)	Weight (g)	Material	Comments
1	-6632	TU-4	28-40 cmbd	II						soil	For pollen analysis
2	-6632	TU-6	20-30 cmbd	II						soil	For pollen analysis
3	-6632	TU-1	35-45 cmbd	II						soil	For pollen analysis
5	-6632	TU-2	47 cmbd	I	2	12.1	7.3	2.1	36.7	Wood	Milled lumber; falling apart and possibly burned
6	-6632	TU-2	47 cmbd	I	1	6.3	0.8	0.8	5	metal	Wire nail - found with wood
8	-6632	TU-2	82 cmbd	I	2	7.8	0.8	0.8	15.4	metal	Wire nails
9	-6632	TU-2	82 cmbd	I	10	6.6	0.7	0.7	51	metal	Wire nails
10	-6632	TU-2	82 cmbd	I	3	4.9	0.8	8.8	8.5	metal	Wire nail
11	-6632	TU-2	82 cmbd	I	5	6.8	0.8	0.8	26.6	metal	Wire nail
13	-6632	TU-2	82 cmbd		1	6.6	0.7	0.7	4.6	metal	Wire nail
14	-6632	TU-2	82 cmbd		3	5.3	0.7	0.7	8.4	metal	Wire nail
q16	-6632	TU-3	82 cmbd	I	1	6.5	0.8	0.8	4.8	metal	Wire nail
17	-6632	TU-3	82 cmbd	I	1	4.1	1.6	0.8	12.3	metal	Small threaded bolt
18	-6632	TU-3	82 cmbd	I	2	5.5	0.7	0.7	6	metal	Wire nail
19	-6632	TU-3	82 cmbd	I	2	6.9	0.8	0.8	10.8	metal	Wire nail
20	-6632	TU-3	Level 2	I	1	6.4	0.7	0.7	4.8	metal	Wire nail
21	-6632	TU-3	Level 2	I	2	5.2	0.7	0.7	5.9	metal	Wire nail
23	-6632	TU-4	25-30 cmbd	II	1	1.8	0.7	0.1	0.1	Glass	Small piece of slightly curved, clear glass

CULTURAL SURVEYS HAWAI`I
ARCHAEOLOGICAL, CULTURAL, AND HISTORICAL DOCUMENTATION SERVICES - SINCE 1982

O`ahu Island
P.O. Box 1114
Kailua, Hawai'i 96734
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Maui Island
1993 Main Street
Wailuku, Hawai'i 96793
Ph: (808) 242-9882
Fax: (808) 244-1994

Branch Offices:
Hilo, Hawai'i
Kona, Hawai'i
Lāwai, Kaua'i

CSH Job Code: LAHAINABYPASS 1

Thursday, January 14, 2010

State Historic Preservation Division
601 Kamokila Blvd.
Kakuhihewa Building, Suite 555
Kapolei, Hawai`i, 96707

Subject: Addendum Report for Inventory Survey Documentation of Inadvertent Finds Identified During the Honoapi'ilani Highway Realignment (Lāhainā Bypass), Phase 1B-1

Dear SHPD Staff:

Please find the subject Addendum Report for Archaeological Inventory Survey Documentation of Inadvertent Finds Identified during the Honoapi'ilani Highway Realignment (Lāhainā Bypass), Phase 1B-1 and formal submittal sheet, enclosed herein. We are seeking guidance regarding the findings of the additional work and look forward to hearing from you. An electronic copy of this letter and the enclosed report will also be e-mailed separately to Ms. Patty Conte on Maui. If you have any further questions or comments regarding this document, please feel free to contact me at our Maui Island office (808) 242-9882, or Hal Hammatt at our O'ahu location (808) 262-9972.

Respectfully,

Todd D. McCurdy, M.A.
Project Director-Maui Office
Hallett H. Hammatt Ph.D. – President
Cultural Surveys Hawai'i, Inc.

Enclosures (3)

cc: Ms. Patty J Conte. – SHPD, Interim Maui Island Archaeologist
Terrance Arashiro – ATA, Chief Engineer

Submittal Sheet for Historic Preservation Review Filling Fees

State Historic Preservation Division
Department Land and Natural Resources

Agency/Firm (Requesting Review): Cultural Surveys Hawaii,Inc(Jobcode:LAHAINABYPASS1)

Contact: Todd D. McCurdy

Phone: 808 242.9882 Fax: 244.1994 E-Mail: tmccurdy@culturalsurveys.com

Address: 1993 Main Street, Wailuku, HI 96793

Title of Report/Plan: Addendum Report for Archaeological Inventory Survey of Inadvertent Finds Identified during the Honoapiilani Highway . Realignment (Lahaina Bypass), Phase 1B-1.

Island:	Maui	District:	Lāhainā	Ahupua`a:	Paunau to Polanui

TMK [(1) 1-1-001:001]: (2) 4-6-014, 018, (2) 4-7-001, 003:Multiple Parcels

Acreage inventoried (hectares):	Approx. 39	Number of new sites inventoried:	N/A
Please characterize survey level: Reconnaissance or Intensive	Intensive		

Submitted Plan/Report Fee & Type: (All reports or plans submitted to the SHPD for review shall be accompanied by the appropriate fee in accordance with HAR §13-275-4 and §284-4).

X		Check if Report is a Re-Submittal (no fee charged)
	$50	Archaeological Assessment
	$150	Archaeological Inventory Survey Plan
	$450	Archaeological, Architectural or Ethnographic Survey Report
	$150	Preservation Plan
	$25	Monitoring Plan
	$150	Archaeological Data Recovery Plan
	$250	Burial Treatment Plan
	$100	Archaeological Monitoring Report, if resources reported
	$450	Archaeological Data Recovery Report
	$450	Ethnographic Documentation Report
	$25	Burial Disinterment Report
	$50	Osteological Analysis Report

Fee Total: $0 (Make check payable to "Hawaii Historic Preservation Special Fund")

For Office Use Only:

Date Received:	Payment Method: Cash _____ $ _____ Check: _____ Check No.: _____
Log. No.: _____	Receipt Issued: _____

Addendum Report for Archaeological Inventory Survey Documentation of Inadvertent Finds Identified during the Honoapiʻilani Highway Realignment (Lāhainā Bypass), Phase 1B-1, Paunau Ahupuaʻa to Polanui Ahupuaʻa, Lāhainā District, Maui Island TMK: (2) 4-6-014:001-002, 4-6-018:002-003, 4-7-001-002 and 4-7-003:001

Prepared for

Austin, Tsutsumi &Associates, Inc.

DRAFT

Prepared by

Todd D. McCurdy, M.A.

And

Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawaiʻi, Inc.

Wailuku, Hawaiʻi

(Job LAHAINABYPASS 1)

January 2010

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1993 Main Street
Wailuku, Hawaiʻi 96793
Ph: (808) 242-9882
Fax: (808) 244-1994

Management Summary

Reference	Addendum for Archaeological Inventory Survey Documentation of Inadvertent Finds Identified during the Honoapi’ilani Highway Realignment (Lāhainā Bypass), Phase 1B-1, Paunau Ahupua‘a to Polanui Ahupua‘a, Lāhainā District, Maui Island, TMK: (2) 4-6-014:001-002, 4-6-018:002-003, 4-7-001:002 and 4-7-003:001 (McCurdy and Hammatt 2010)
Date	January 2010
Project Number	Cultural Surveys Hawai‘i Inc. (CSH) Job Code: LAHAINABYPASS 1
Agencies	Federal: Federal Highway Administration (FHWA) State: Hawaii Department of Transportation (HDOT) Hawai‘i Department of Land and Natural Resources/State Historic Preservation Division (DLNR/SHPD)
Investigation Permit Number	Cultural Surveys Hawai‘i Inc. (CSH) Job Code: LAHAINABYPASS 1 The fieldwork component of the archaeological inventory survey documentation was carried out under archaeological permit # 09-20 issued by the Hawai‘i State Historic Preservation Division/Department of Land and Natural Resources (SHPD/DLNR), per Hawai‘i Administrative Rules (HAR) Chapter 13-282.
Project Location	The project corridor begins south of the intersection of Lahainaluna Rd. and Ikena Ave., and ends approximately 244 m south of Hokiokio Place , Paunau Ahupua‘a to Polanui Ahupua‘a, Lāhainā District, Maui Island, TMK: (2) 4-6-014:001-002, 4-6-018:002-003, 4-7-001:002 and 4-7-003:001.
Land Jurisdiction	Private Ownership
Area of Potential Effect (APE) and Survey Acreage	In order to account for areas of cut and fill, the APE covered during the literature review and field inspection (McCurdy and Hammatt 2008) extends out from the Phase 1B-1 Right-of-Way (ROW) approximately 200 ft, approximately 3.9 Hectares (9.1 acres).
Project Description	Phase 1B-1, the current project area consists, of a 400 ft (122 m) wide corridor, approximately 3 km. long. The purpose of this investigation was to assess the probability of intact cultural features and/or material buried within or beneath six plantation era rockpiles proir to the construction of the Lahaina Bypass Phase 1B-1 corridor (SIHP 50-50-03-5950 Features 20-23, 25 and 27).
Historic Preservation Regulatory Context	At the request of Austin, Tsutsumi & Associates, Inc. CSH conducted this inventory survey level documentation of inadvertent finds encountered during the Honoapi’ilani Highway Realignment (Lāhainā Bypass), Phase 1B-1. In consultation with SHPD, this investigation was designed to fulfill the requirements for an archaeological inventory survey per HAR Chapter 13-13-280 employing the standards of HAR Chapter 13-276.
Fieldwork Effort	The fieldwork component of the mechanical testing of plantation-era rockpiles within the Honoapi’ilani Highway Realignment (Lāhainā Bypass), Phase 1B-1 ROW, was accomplished between August 10, 2009 and August 26, 2009, by CSH archaeologists, Todd McCurdy, M.A., Michael Willman, B.A, under the general supervision of Hallett H. Hammatt, Ph.D. The fieldwork required 221 person-hours to complete.

Number of Historic Properties Identified	No new Historic Properties were identified as a result of this archaeological investigation.
Recommendation	Although data collected may reinforce the proposal of slash-and-burn deforestation practices and historic referrences to land clearing for sugar cane cultivation, no cultural features or objects were observed during this study to warrant any additional investigation of the push piles. The recommendation of the State Historic Preservation Division that all of the push piles to be impacted within the Phase 1B-1 corridor be mechanically tested (Nancy McMahon, personal communication; 10 July 2009) has been completed. Archaeological monitoring is still required during the dismantling of SIHP 50-50-03-5950 (Paraso and Dega 2006).

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Section 1 Introduction

1.1 Project Background

The Honoapi‘ilani Highway Realignment, Lāhainā Bypass Project is a State of Hawai‘i Department of Transportation (HDOT) project scheduled to be constructed in three segments (Phases IA through IC). Phase 1B-1 is the second phase of build-out for the Lāhainā Bypass Project. The project area consists of a 400 ft (122 m) wide corridor, approximately 3 km. long, beginning south of the intersection of Lāhaināluna Rd. and Ikena Ave. at the southern terminus of the Lāhainā Bypass Phase 1A corridor and ends approximately 244 m south of Hokiokio Place.

At the request of Austin, Tsutsumi & Associates, Inc. (ATA), Cultural Surveys Hawai‘i, Inc. (CSH) completed an archaeological literature review and field inspection of the original Phase 1B-1 right-of-way between August 18 and September 22 2008 (McCurdy and Hammatt 2008). During the field inspection three previously unrecorded historic properties ([SIHP] 50-50-03-6631, 6632 and 6633) were identified and 10 features of an existing historic property were observed (SIHP 50-50-03-5950, Features 18 to 27).

Since the historic preservation review process for the Lāhainā Bypass Section of the Honoapi‘ilani Highway Realignment Project had already been completed (December 22, 1992 [Log No.: 7126; Doc No.: 9212AG52]; March 3, 1994 [Log No.: 10704; Doc No.: 9402KD28]; October 6, 1994 [Log No.: 12728; Doc No.: 9409KD32]; June 2, 1994 [Log No.: 11460; Doc No.: 9406RC04]; and June 2, 1994 [Log No: 11459; Doc No.: 9406RC05]), SIHP-6631, 6632 and 6633 were designated as inadvertent finds as per HAR §13-280-3 (b). As per the recommendation of the Department of Land and Natural Resources/State Historic Preservation Division (DLNR/SHPD) archaeological inventory survey level documentation of the newly discovered historic properties was completed in order to assess the extent and significance of the overall sites (McCurdy and Hammatt 2009). In addition, as per recommendation of SHPD (Nancy McMahon, personal communication; 10 July 2009) all of the rockpiles (SIHP-5950) to be impacted within the Phase 1B-1 corridor were mechanically tested to address the concern of cultural materials within or beneath them. The results of the rockpile testing are presented herein.

1.2 Scope of Work

The following scope of work was followed in order to accommodate the recommendations of the DLNR/SHPD regarding the plantation-era rockpiles within the current project corridor.

1. A 25 % sample of each rockpile impacted by the current Lahaina Bypass Phase 1B-1 corridor was excavated in order to assess the potential of anything of cultural significance within or buried beneath them (see Section 2).
2. Field documentation including photographs and maps drawn to scale with an evaluation of function, interrelationships, and significance.

Section 2 Methods

2.1 Field Methods

The fieldwork component of the mechanical testing of plantation-era rockpiles within the Honoapi'ilani Highway Realignment (Lāhainā Bypass), Phase 1B-1 Right of Way, was accomplished between August 10, 2009 and August 26, 2009, by CSH archaeologists, Todd McCurdy, M.A., Michael Willman, B.A., and under the general supervision of Hallett H. Hammatt, Ph.D. The fieldwork required 221 person-hours to complete. The inventory survey documentation of the inadvertent finds included site recordation and subsurface testing.

2.1.1 Site Recordation

Archaeological documentation included:

1. Mapping to scale using a tape and compass.
2. Detailed written descriptions.
3. Photographic documentation using an Olympus Stylus 780, resolution 7.1 megapixels.
4. Feature location through GPS data collection:

2.1.2 Subsurface Testing

1. Mechanical testing of the rockpiles was conducted in the following manner:
    a. Approximately 25% of each of the rockpiles was disassembled using a Caterpillar 320 DL excavator with a thumb attachment.
    b. Soil stratigraphy was recorded; with soil attributes described using Munsell soil colors and U.S. Soil Conservation Service terminology.
    c. Where applicable, soil samples were collected for pollen/phytolith analysis and charcoal samples were collected for radiocarbon dating.
    d. Each completed excavation was then photographed, mapped in plan-view, and backfilled.
2. Hand excavations were conducted in the following manner:
    a. Two 1m by 1m test units were excavated to the underlying bedrock and/or saprolitic soils.
    b. All excavated sediments were screened through a 1/8-inch wire mesh screen.
    c. Soil stratigraphy was recorded; with soil attributes described using Munsell soil colors and U.S. Soil Conservation Service terminology.
    d. Soil and charcoal samples were collected for subsequent analysis.
    e. Each completed excavation unit was then photographed, mapped in plan-view, and backfilled.

2.2 Laboratory Methods

No cultural materials were observed or collected during this investigation. Charcoal samples were submitted to Beta Analytic (Miami, Florida) for Accelerated Mass Spectrometry (AMS) radiocarbon dating. AMS radiocarbon dating provides the means for more precise dates and utilizes requires a smaller sample than standard radiocarbon dating. This is accomplished by counting all of the C14 atoms instead of a limited proportional count of those that are decaying as is done by standard radio carbon dating resulting in a more accurate chronological sequence.

Section 3 Results of Fieldwork

Of the 27 features of associated with SIHP 50-50-03-5950 six were within the current project Right of Way (ROW). These include features 27, 25, 23, 22, 21, and 20 (Figure 1). A summary of the rockpiles that were mechanically tested is available in (Table 1). For safety purposes all of the rockpiles were excavated *mauka* to *makai*, east to west in this case. In general we began at the lowest elevation and excavated towards the highest point of the structures to minimize the hazard of collapse. In this manner it was possible to follow the natural soils into the rockpile as far as the mechanical limits of the machine would allow.

The fieldwork component of the mechanical testing of plantation-era rockpiles within the Honoapi’ilani Highway Realignment (Lāhainā Bypass), Phase 1B-1 ROW, was accomplished between August 10, 2009 and August 26, 2009, by CSH archaeologists, Todd McCurdy, M.A., Michael Willman, B.A., under the general supervision of Hallett H. Hammatt, Ph.D. The fieldwork required 221 person-hours to complete.

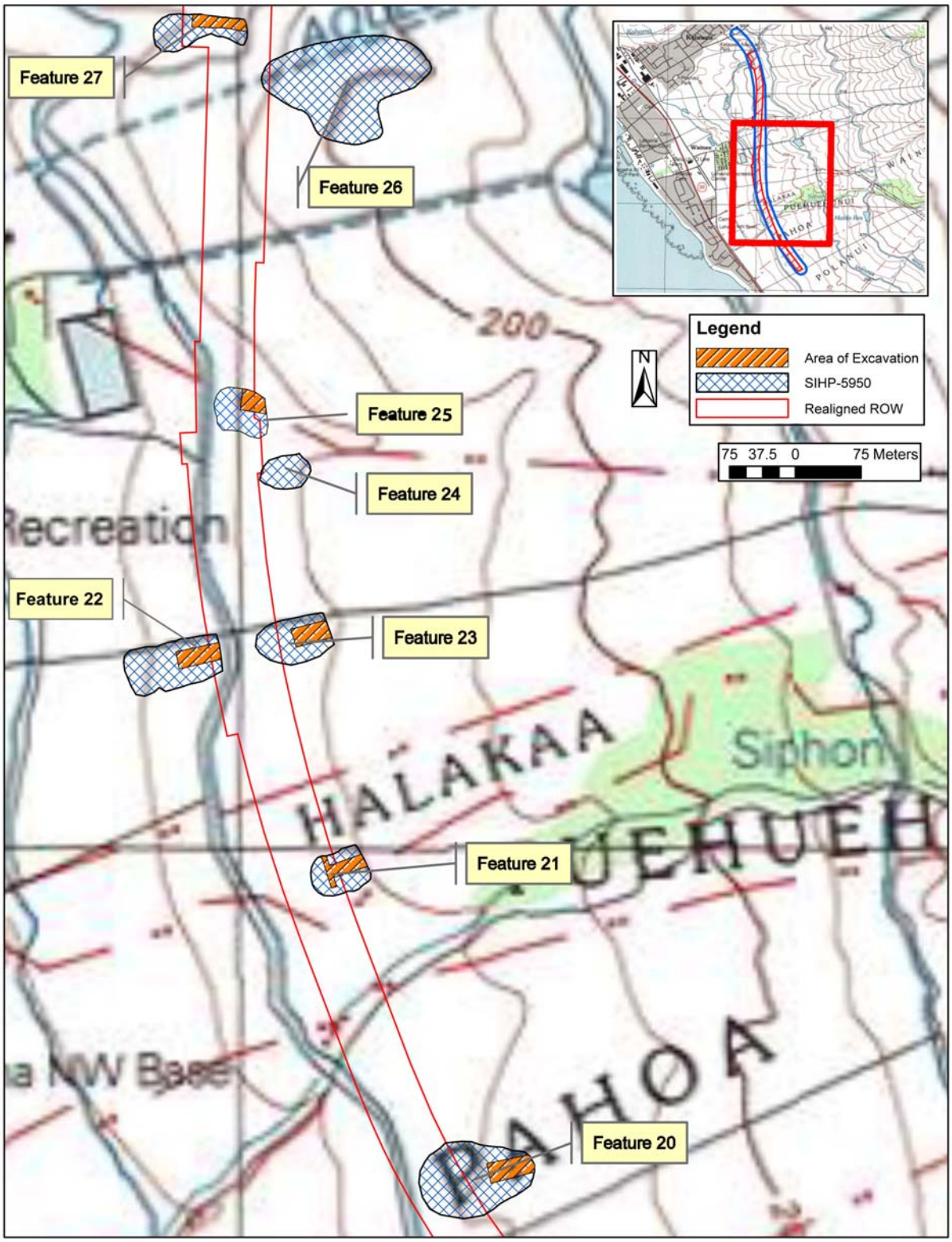

Figure 1. A portion of the USGS 7.5’ topographic map, Lāhainā Quadrangle (1992) showing the features of SIHP-5950 that were mechanically tested.

Table 1. The approximate dimensions of the SIHP 50-50-03-5950 features that were mechanically tested.

SHIP -5950 Feature #	Max. Length (m)	Max. Width (m)	Height (m)	Approx. Area (m²)	Approx. Excavation Area/percentage. (m²)
27	93	35	4	2442	813/33%
25	53	42	5	2226	606/27%
23	86	42	6	3612	861/24%
22	109	47	7	6889	Excavation terminated, HAZMAT concerns
21	60	48	4	2880	815/28%
20	85	55	10	4675	1112/24%

3.1 Historic Property Descriptions

3.1.1 SIHP 50-50-03-5950

Function: Agriculture

Type: Agricultural Rockpile

Total Features: 27

Dimension: Ranging from 44 to 180 m in length and 22 to 107 m in width

Condition: Good

Age: Historic

Significance Criteria: D

Description: SIHP -5950, was previously recorded by Paraso and Dega (2006) as a group of 17 large “plantation era clearing mounds” southeast of the current project area. Ten additional “plantation era clearing mounds” were identified in the Lāhainā Bypass Phase 1B-1 corridor and designated as SIHP -5950, Features 18 to 27 (McCurdy and Hammatt 2008 and McCurdy and Hammatt 2009). The mounds, a result of Post-World War II field improvement activities associated with the Pioneer Mill Co. and commercial sugar cultivation, are generally constructed with the steepest face of the pile facing downslope while the upslope terminus is flush with the ground surface (Lee-Greig and Hammatt 2008:47-53). Several of the “clearing mounds” have been used as dumpsites for domestic garbage and abandoned automobiles.

Similar features have been mechanically tested during the Phase 1A portion of the Lāhainā Bypass (Lee-Greig and Hammatt 2008). The rockpiles generally consisted of loose medium to large boulders within a silt loam matrix underlying a thin A-horizon (0.36m to 0.60m thick) of loose silt loam. Cultural materials observed during the excavation consisted of historic to modern trash including metal cable, PVC pipe and concrete (Lee-Greig and Hammatt 2008:54-61).

3.2 Mechanical Excavation Findings

3.2.1.1 SIHP 50-50-03-5950 Feature 27

SIHP- 5950 Feature 27 is located near the center of a modern banana plantation that is bisected by the current Lahiana Bypass Phase 1B-1 Right of Way (ROW). Measuring 93 m in length and 45 m wide, this structure rises 4m above the surrounding area at its highest point (Figure 2). Several sections of riveted 24-inch irrigation pipe were observed atop of the rockpile. Approximately 33 percent (813 of 2442 m²) of Feature 27 was excavated (Figure 3).

Figure 2. SIHP-5950 Feature 27 view to south.

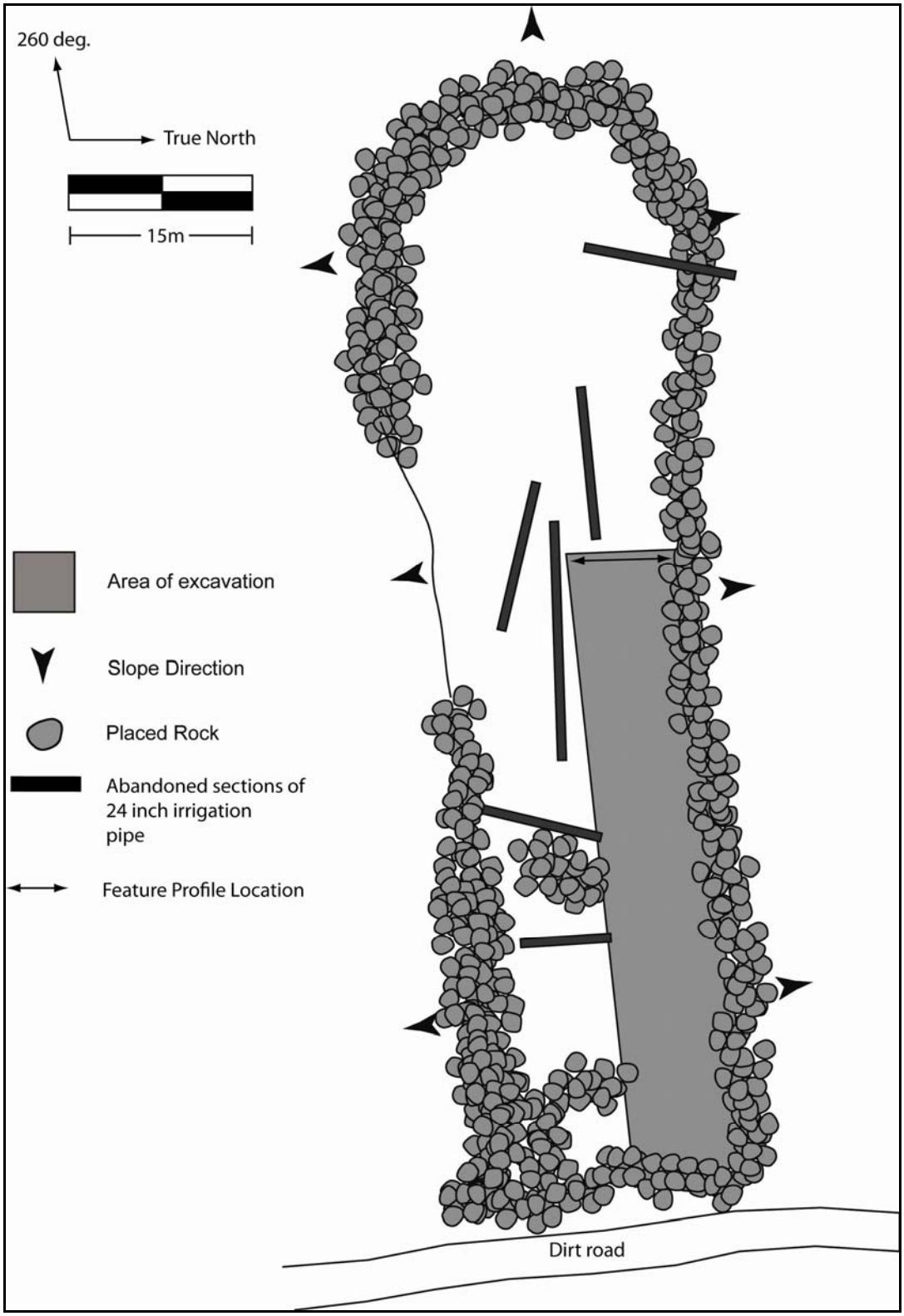

Figure 3. SIHP-5950 Feature 27, plan view.

Excavation began at the northeast corner of the rockpile just off of an unimproved road used by the banana plantation and continued west (Figure 4). There was very little sediment beneath the rockpile. The rocks were piled atop an existing landform/bedrock outcropping, stacked 1-2 m high also falling over the side giving it the appearance of a much larger pile of rocks.

Figure 4. Excavating SIHP-5950 Feature 27 view to west.

The stratigraphy consisted of two easily discerned strata (Figure 5 and Figure 6). Stratum II is a 7.5 YR 4/4 strong brown silt with 90% basalt boulder and cobble inclusions, the rockpile proper. Stratum III, a 7.5 YR 4/6 strong brown silt, is combination of the sediment that has migrated down through the rockpile and the natural soils that have accumulated atop the landform/basalt outcropping. A detailed stratigraphic summary is available in Table 2.

Figure 5. SIHP-5950 Feature 27, west profile.

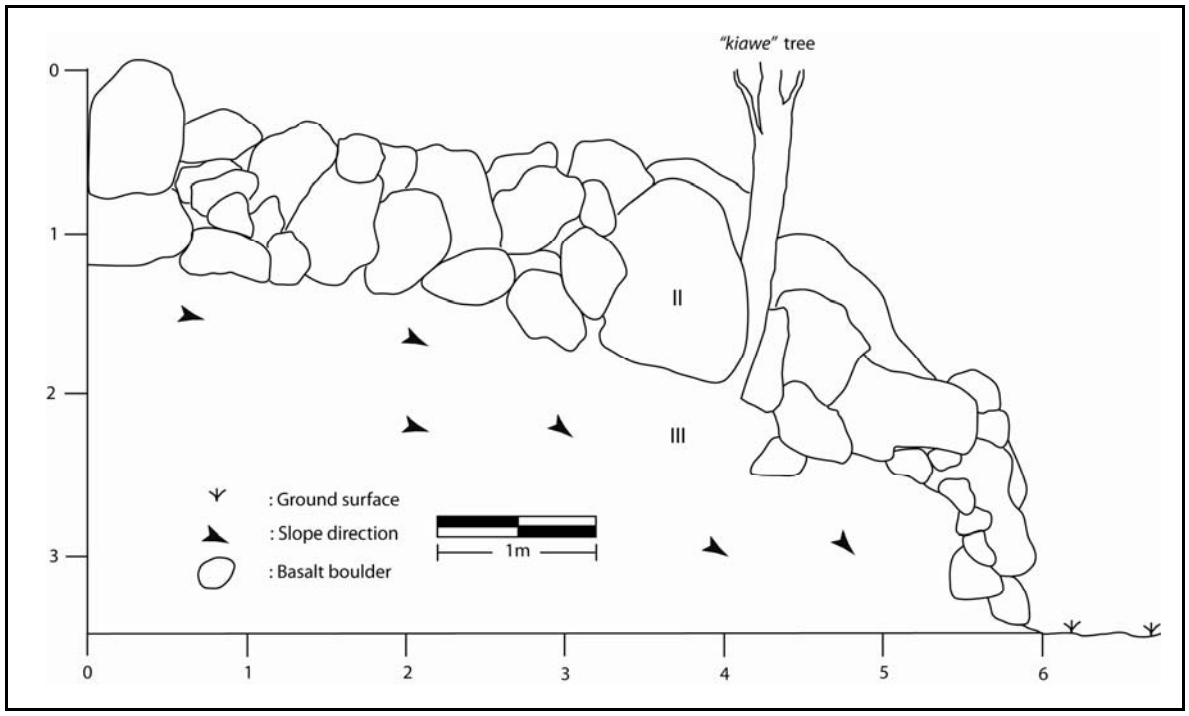

Figure 6. SIHP-5950 Feature 27 west profile.

Table 2. Stratigraphic Summary for Feature 27

Stratum II: 0-350 cmbgs	7.5 YR 4/6, strong brown silt; weak, fine, granular structure; weakly coherant dry consistency; non-plastic; no cementation; clear wavy lower boundary; 90% basalt boulder and cobble inclusions.
Stratum III: 80-350 cmbgs	A Horizon; 7.5 YR 4/6, strong brown; silt; weak, fine, granular structure; loose dry consistency; loose moist consistency; non-sticky wet consistency; non-plastic; no cementation; wavy lower boundary; no cultural material obsevered.

3.2.1.2 SIHP 50-50-03-5950 Feature 25

SIHP-5950 Feature 25 is located in the southeastern corner of a modern banana plantation currently located within the project corridor (Figure 7 and Figure 8). The rockpile is 53 m in length, 42 m wide and 5 m tall at its highest point. Approximately 31 percent (684 of 2226 m²) of Feature 25 was excavated mechanically. Feature 25 is bound to the north by an unimproved plantation road, to the south by Puamana stream and to the west by a concrete irrigation ditch (SIHP-4787 Feature D).

Figure 7. SIHP-5950 Feature 25, view to north.

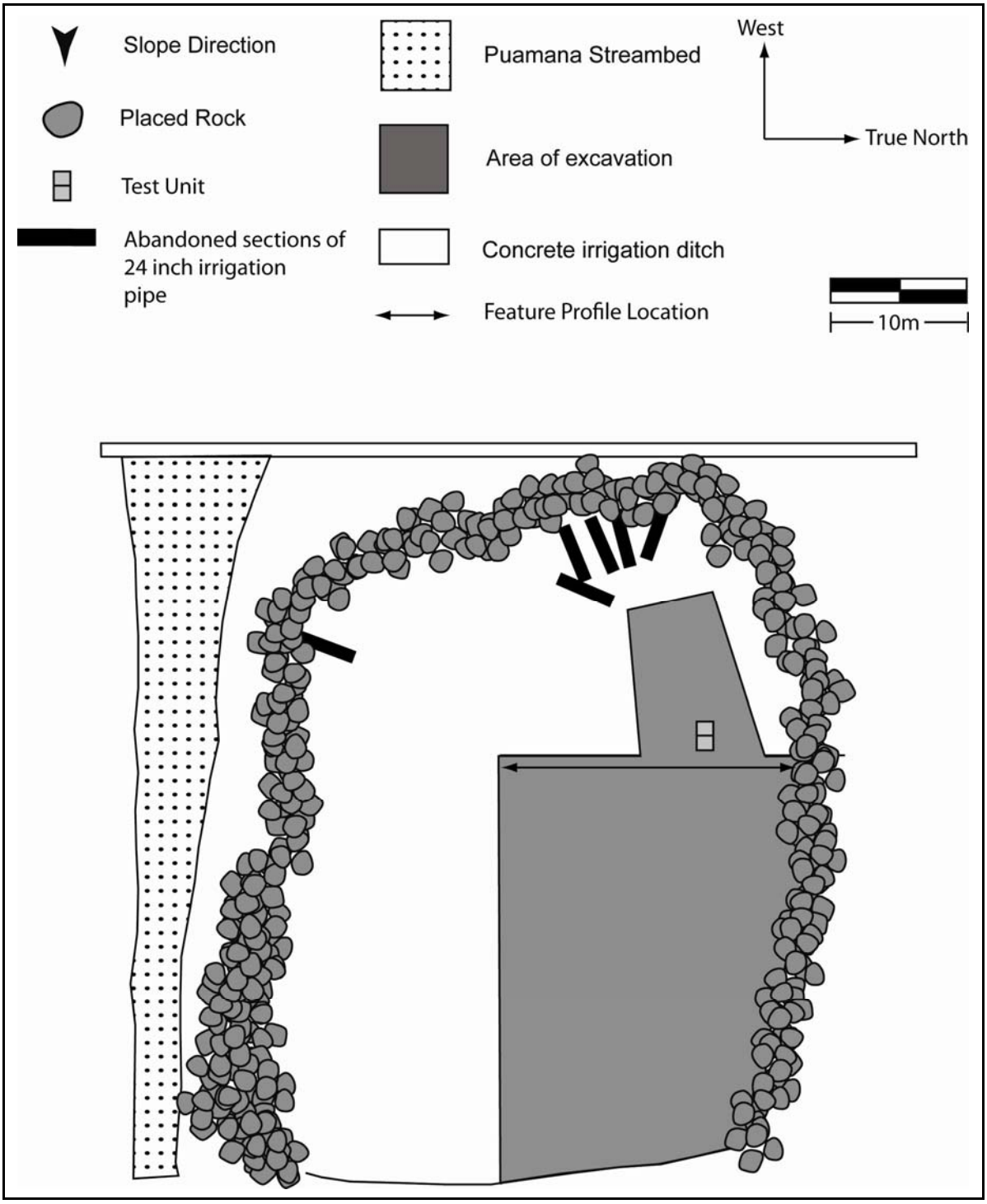

Figure 8. SIHP-5950 Feature 25 plan view.

We began dismantling the rockpile from the northeast corner and continued to the west (Figure 9). Materials observed during the removal of the large rocks and boulders were typical of plantation operation. These include plastic irrigation hoses, metal cable, PVC pipe and several sections of riveted 24-inch irrigation pipe.

Figure 9. Excavating SIHP-5950 Feature 25 view to west.

Five distinct strata were observed in the west profile of Feature 25. Stratum I, 2.5 YR 3/5 dark reddish brown silt, is modern/historic A horizon atop the rockpile and Stratum II, 7.5 Yr 3/5 dark reddish brown sandy loam, is the rockpile fill consisting of approximately 90% basalt cobble and boulder inclusions. Stratum III, the natural A horizon beneath the rockpile was subdived into Stratum IIIa and Stratum IIIb. Stratum IIIa, 5 YR 3/3 dark reddish brown sandy loam, was exposed in the northwest portion of Feature 25 below Stratum II and contained a thin layer of charcoal flecking (Figure 10, Figure 11 and Figure 12). Stratum IIIa was thickest in the northern portion of rock pile and thinned out towards the center of Feature 25. A charcoal and soil sample was collected during the mechanical testing of Feature 25 for subsequent analysis. Stratum IIIb, a 2.5 YR 3/4 dark reddish brown sandy loam, although similar in color and texture to Stratum IIIa did not contain any charcoal flecking. Stratum IV, 10 YR 4/6 dark yellowish brown in color, is saprolitic soils.No cultural features or materials were observed during the mechanicl testing of Feature 25.

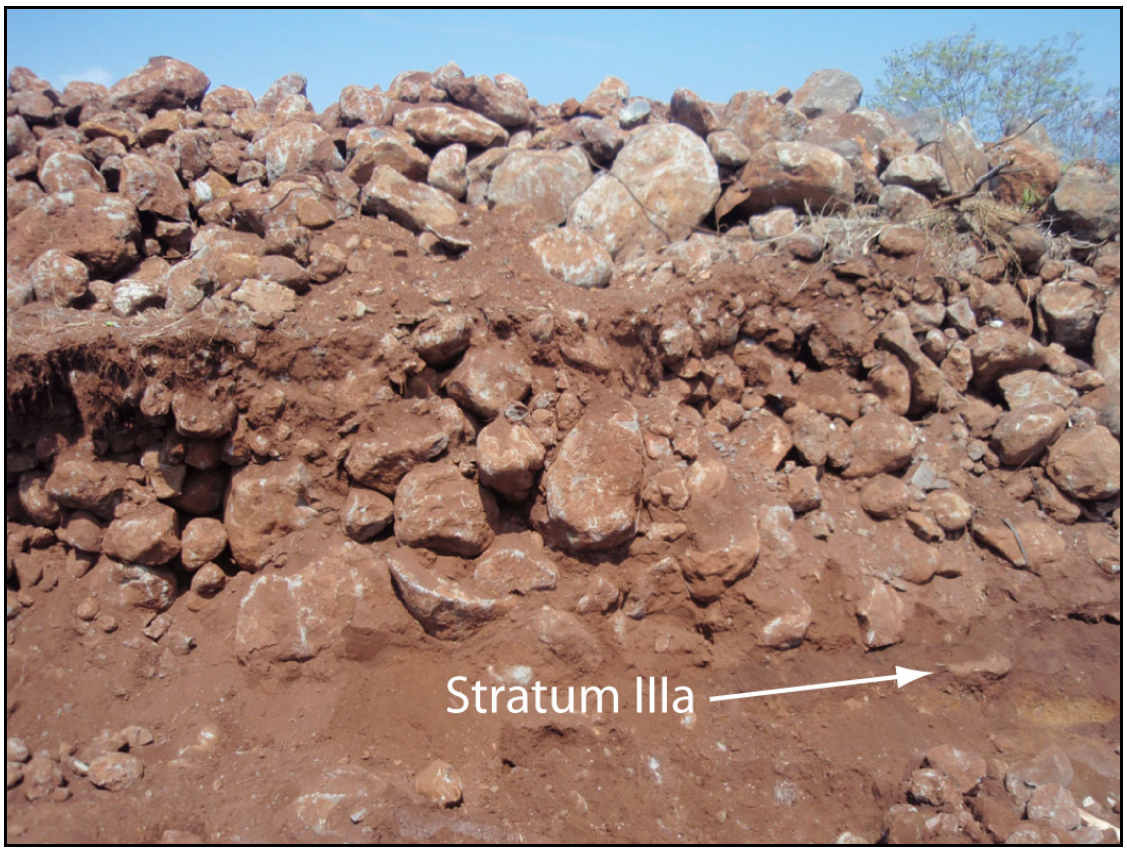

Figure 10. SIHP-5950 Feature 25 west profile.

The charcoal sample collected during the mechanical testing of Feature 25 was submitted to Beta Analytic for analysis and yielded a mean date of AD 1770. This prompted CSH to conduct additional testing by way of two 1 x 1 m hand excavated test units to collect additional charcoal samples to support the preliminary radiocarbon date and check for any cultural features or materials. A detailed stratigraphic summary is available in Table 3 and a summary of the hand excavation is available in the following subsection.

Figure 11. SIHP-5950 Feature 25 showing Stratum IIIa and the thin layer of charcoal flecking.

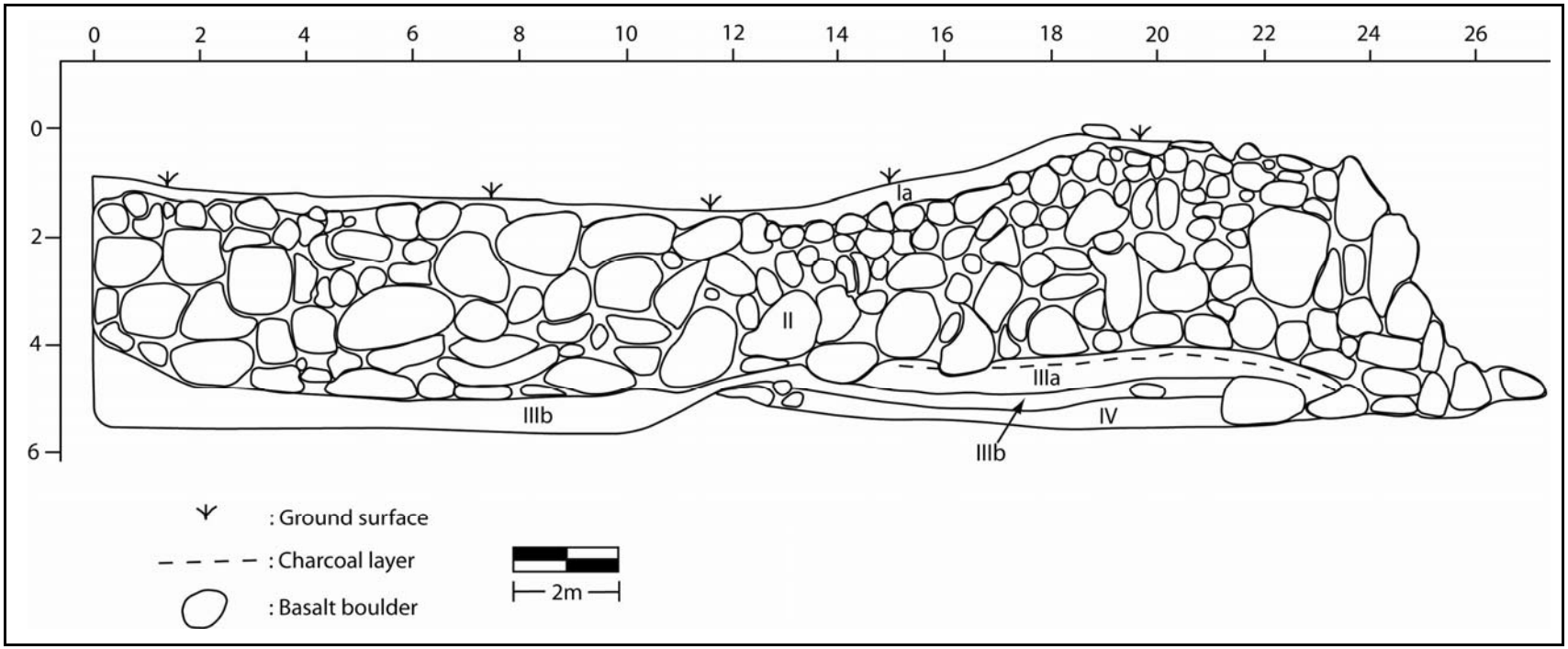

Figure 12. SIHP-5950 Feature 25 west profile.

Table 3. Stratigraphic Summary for Feature 25

Stratum I: 0-130 cmbgs	A Horizon; 2.5 YR 3/5, Dark reddish brown; silt; structureless, fine, single grain structure; loose dry consistency; loose moist consistency; non-sticky wet consistency; non-plastic; no cementation; abrupt wavy lower boundary.
Stratum II 20-500 cmbgs	7.5 YR 3/5, dark reddish brown; sandy loam; weak, fine, granular structure; weakly coherant dry consistency; non-plastic; no cementation; clear wavy lower boundary; 90% basalt boulder and cobble inclusions.
Stratum IIIa: 400-460 cmbgs	A Horizon; 5 YR 3/3, dark reddish brown; sandy loam; weak, fine, granular structure; loose -weakly coherent dry consistency; loose moist consistency; non-sticky wet consistency; non-plastic; no cementation; abrupt smooth lower boundary; with charcoal flecking and no cultural material.
Stratum IIIb: 400-510 cmbgs	A Horizon; 2.5 YR 3/4, dark reddish brown; sandy loam; weak, fine, granular structure; weakly coherant dry consistency; loose moist consistency; non-sticky wet consistency; non-plastic; no cementation; clear smooth lower boundary.
Stratum IV 430-520 cmbgs	10 YR 4/6, dark yellowish brown; Saprolite

3.2.1.2.1 Subsurface Excavation Findings.

Subsequent to observing Stratum IIIa, CSH determined that additional testing was warranted in order to gain further insight as to the origin of the deposit. A Caterpillar series 312 with a thumb attachment was used to further expose Stratum IIIa (Figure 13). This was accomplished by remove the large basalt rocks and boulders from atop of the exposed profile and continuing west.

Two 1 x 1 m test units were set up and excavated in 10 cm arbitrary within natural levels until sterile soils or sapprolite was encountered (Figure 14). A datum was established in the NW corner of the test unit. This section outlines the results of the test unit excavation. In summary, four additonal charcoal samples were collected for AMS analysis in addition to a soil sample that was collected for pollen analysis if necessary dependent on the nature of the deposit (see Sectioin 4). No cultural materials were observed during the hand excavation.

Figure 13. Exposing Stratum IIIa, view to the west, the yellow caution tape marks the location of Stratum IIIa.

3.2.1.2.1.1 Test Units 1 and 2

Since the test units were adjacent and shared similar stratigraphy they are discussed together in this section. The eastern boundary of Test Unit 1 was located at the location where stratum IIIa was first observed in the west profile of Feature 25 (Figure 14 and Figure 15). At the time we were not confident as to the size and extent of the deposit because it was not observed in the eastern portion of Feature 25. Test Unit 2 was positioned immediately west of Test Unit one ultimately creating a 1 x 2 m excavation area. Test Units 1 and 2 was excavated to a terminal depth of 44 cm below unit datum (cmbud) when saprolitic soils were encountered (Figure 16, Figure 17 and Figure 18).

Three previously identified strata were observed during the excavation (Figure 19 and Figure 20). Stratum II, a 7.5 YR 3/5 reddish brown sandy loam, extended from 19-32 cmbud. The matrix from stratum II was unconsolidated and loose compared to the soils beneath indicative of sediments that have migrated down through the boulders fill. Stratum IIIa, a 5 YR 3/3 dark reddish brown sandy loam was the focus of the hand excavation. This deposit was approximately 22 cm thick and contained a lens of charcoal flecking near the top. Three charcoal samples were collected for analysis from Test Unit 1 and a single carbon sample was collected form Test Unit 2 (see Section 4). Stratum IIIb, a 2.5 YR 3/4 dark reddish brown sandy loam appears to be a natural A Horizon that the rocks were piled on. No cultural materials or features were observed during the excavation of either test unit justifying any further hand excavation. A detailed stratigraphic description is available in Table 4.

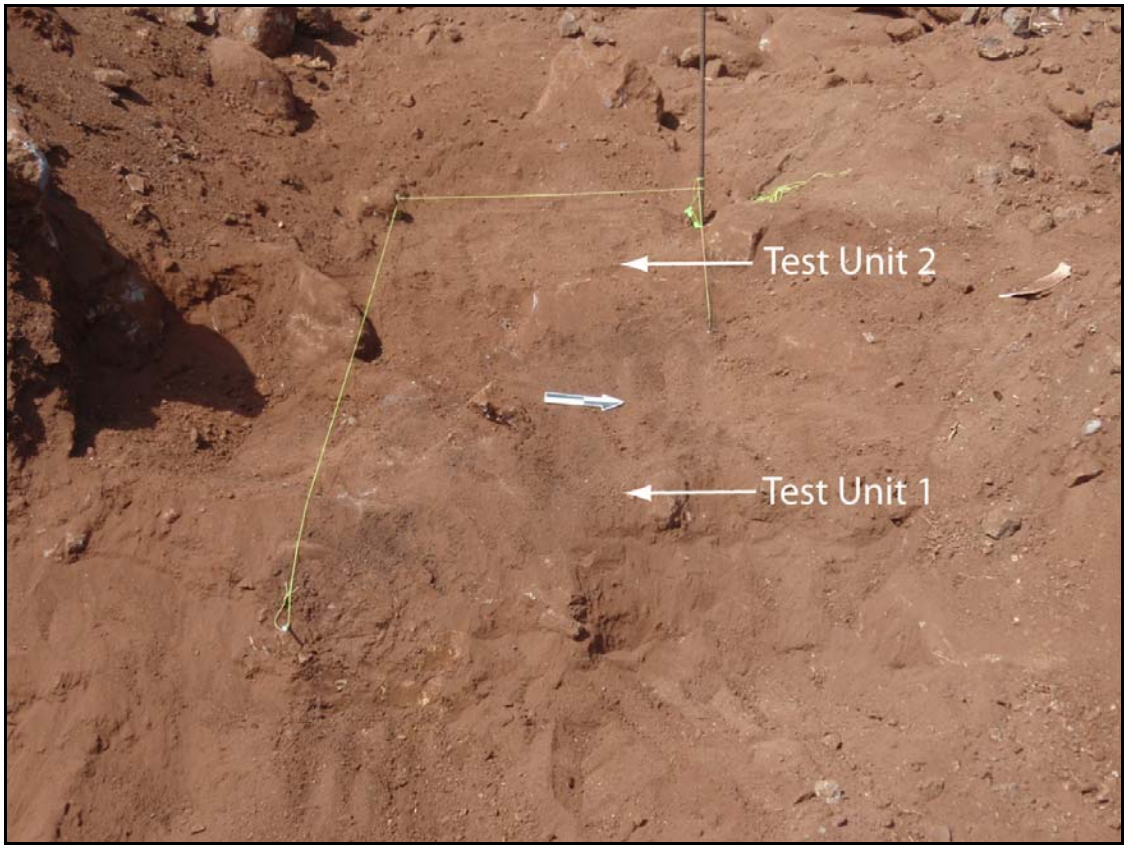

Figure 14. Opening plan view, Test Units 1 and 2, view to the west.

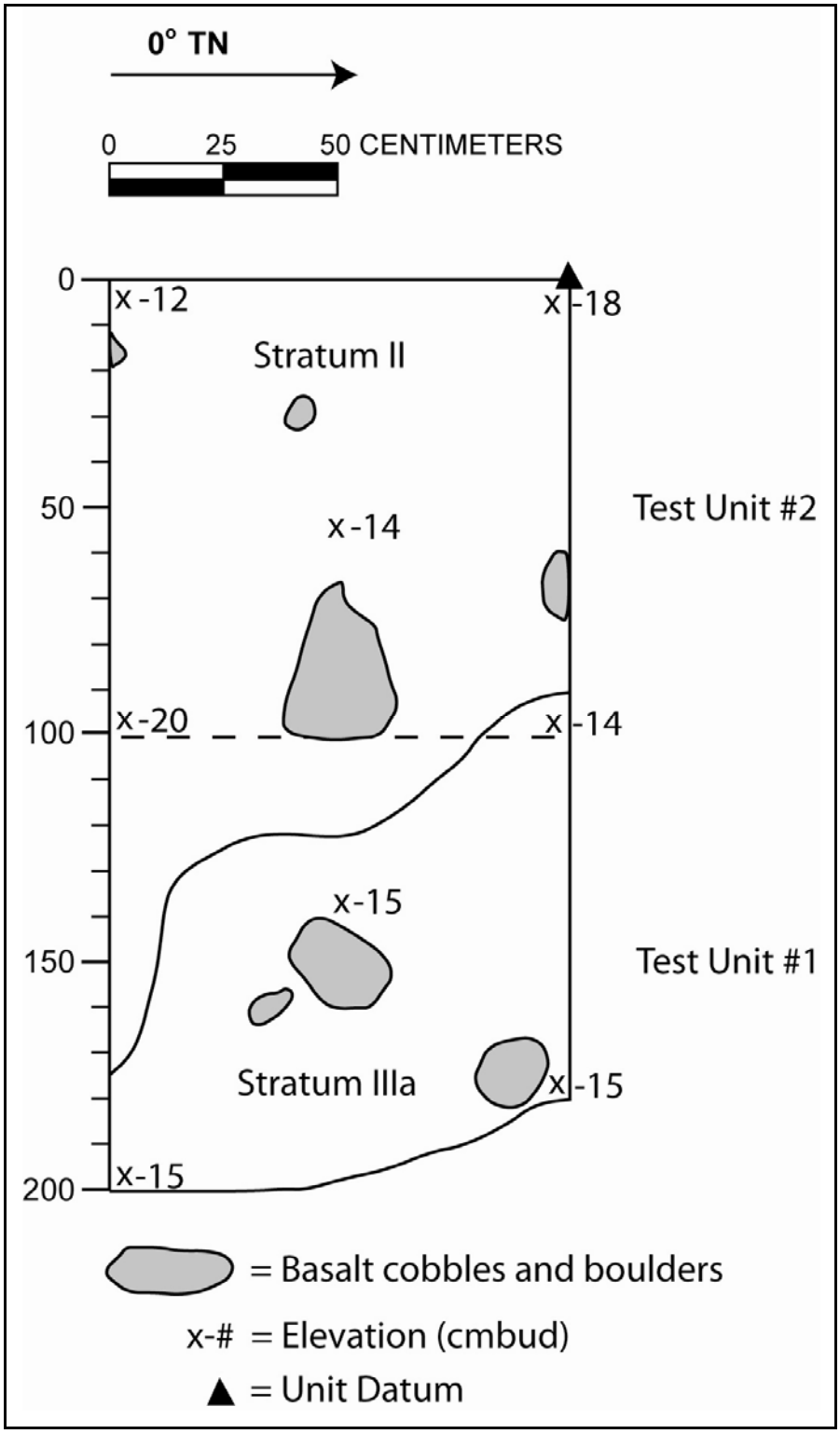

Figure 15. Test Units 1 and 2, opening plan view.

Figure 16. Test Unit 1 base of excavation, view to west.

Figure 17. Test Unit 2 base of excavation, view to west.

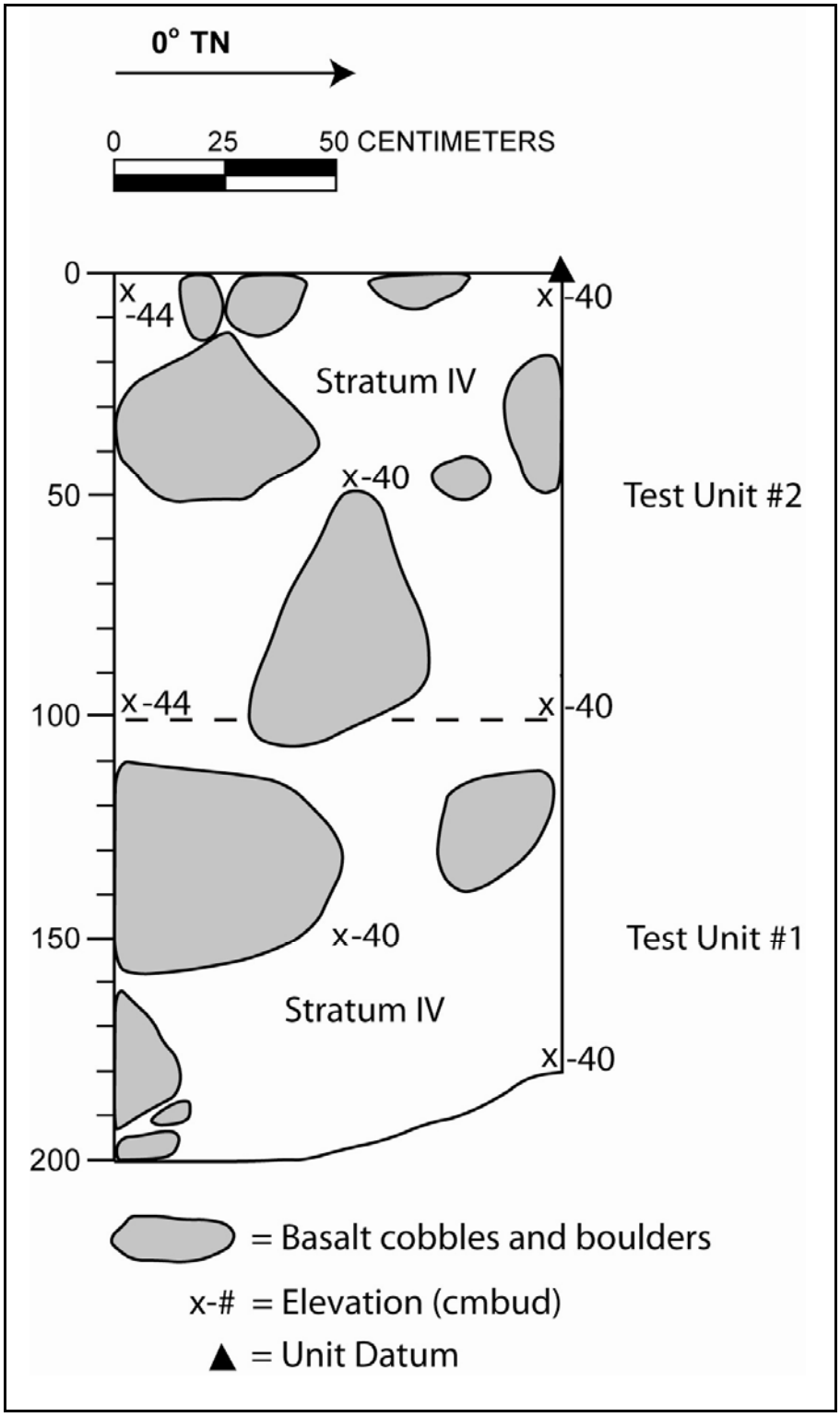

Figure 18. Base of excavation plan view, Test Units 1 and 2.

Figure 19. South profile of Test Units 1 and 2.

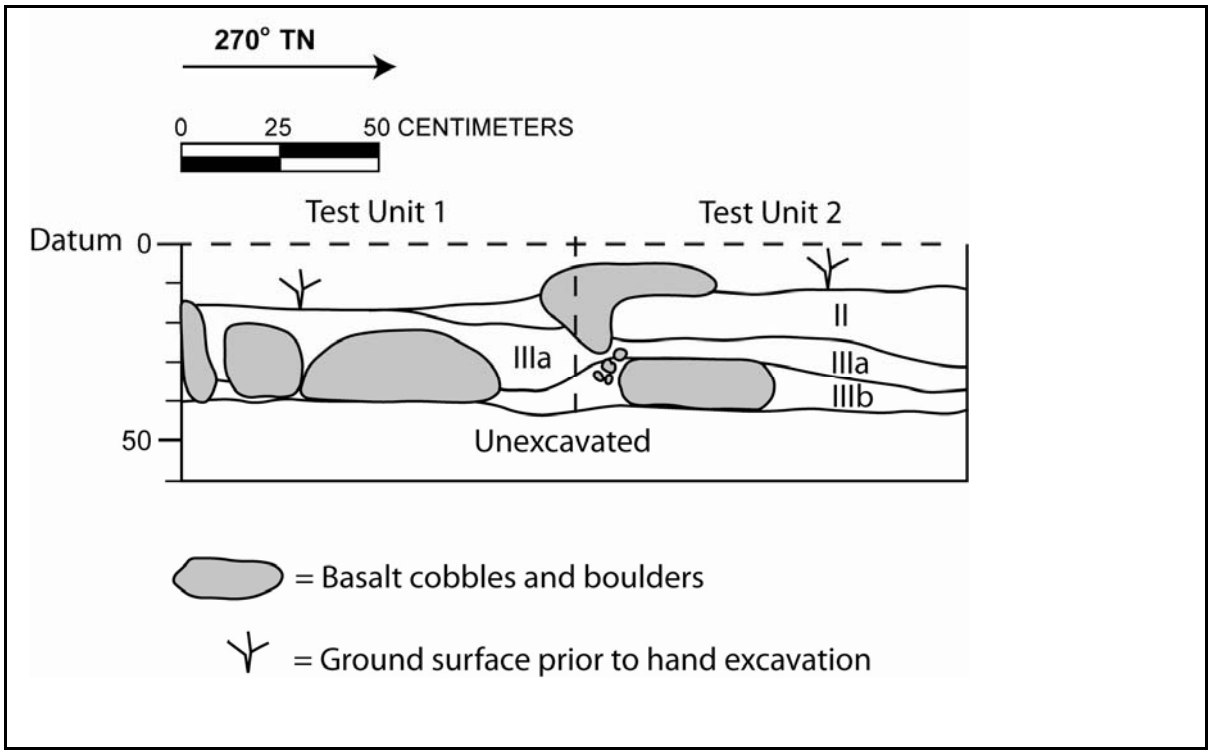

Figure 20. South profile Test Units 1 and 2.

Table 4. Stratigraphic Summary for Test Units 1 and 2

Stratum II 12-31 cmbud	7.5 YR 3/5, dark reddish brown; sandy loam; weak, fine, granular structure; weakly coherant dry consistency; non-plastic; no cementation; clear wavy lower boundary; 90% basalt boulder and cobble inclusions.
Stratum IIIa: 15-36 cmbud	A Horizon; 5 YR 3/3, dark reddish brown; sandy loam; weak, fine, granular structure; loose -weakly coherent dry consistency; loose moist consistency; non-sticky wet consistency; non-plastic; no cementation; abrupt smooth lower boundary; with charcoal flecking and no cultural material.
Stratum IIIb: 30-44 cmbgs	A Horizon; 2.5 YR 3/4, dark reddish brown; sandy loam; weak, fine, granular structure; weakly coherant dry consistency; loose moist consistency; non-sticky wet consistency; non-plastic; no cementation; clear smooth lower boundary.

3.2.1.3 SIHP 50-50-03-5950 Feature 23

SIHP-5950 Feature 23 is located on along the south side of an unimproved road used to access *kuleana mauka* of the current Lahaina Bypass Phase 1B-1 corridor. It measures 86 m in length, 42 m wide and 6 m above the surrounding ground surface at its highest point. As you can see in Figure 21, it has been used as a dumpsite for modern trash. This includes automobiles, appliances, mattresses and general domestic trash. Approximately 24 percent (861 of 3612 m²) was excavated (Figure 22).

Figure 21. SIHP-5950 Feature 23, view to east

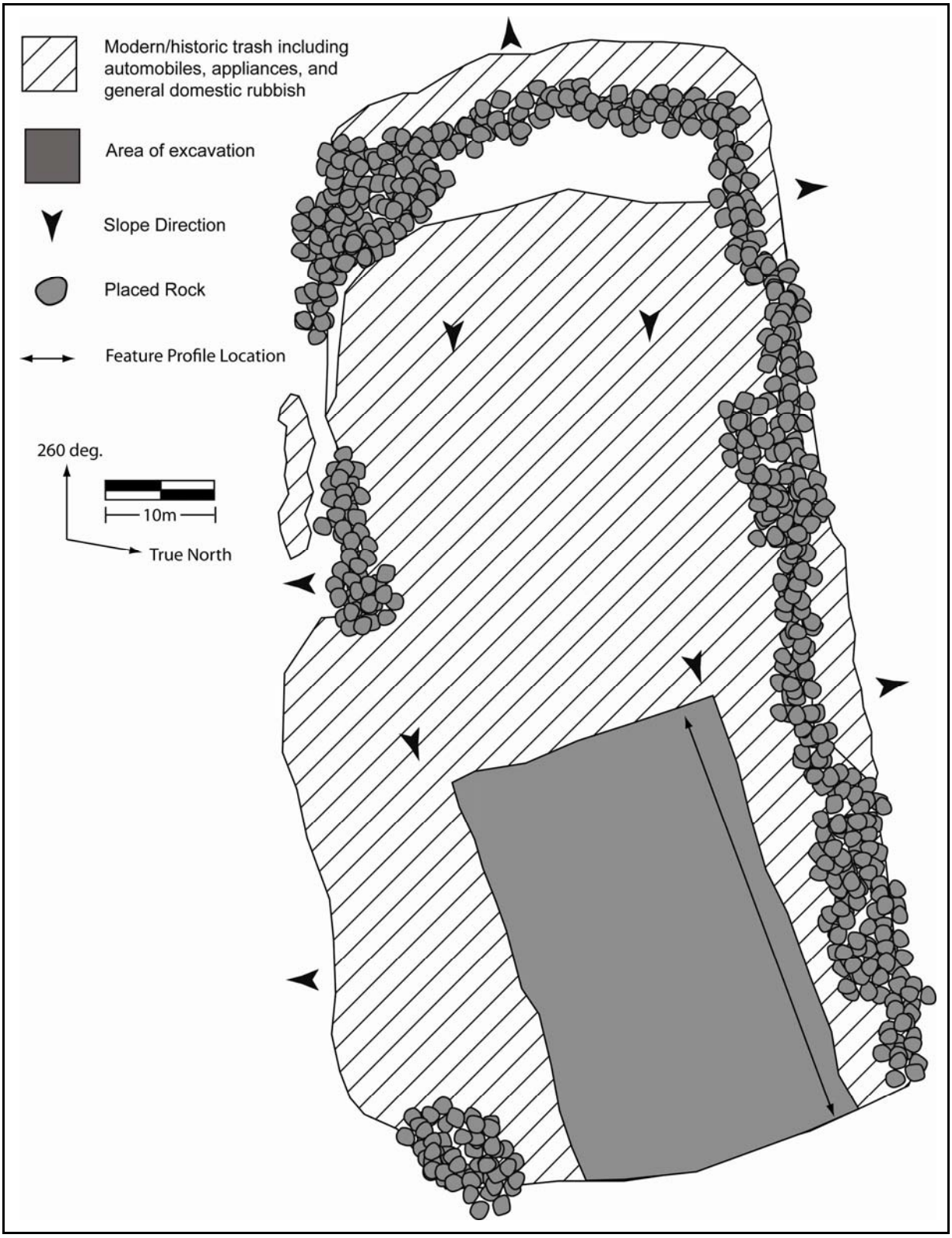

Figure 22. SIHP-5950 Feature 23 plan view

Before we could begin the excavation it was necessary to clear the modern trash from the excavation area (Figure 23). This included household appliances, abandoned automobiles, mattresses and domestic rubbish. Excavation of the rockpile began from the east and continued to the west (*mauka* to *makai*) following the natural soils as far as the mechanical limits of the machine would allow.

Figure 23. Showing the clearing of modern trash from atop SIHP-5950 Feature 23.

Figure 24. Excavating SIHP-5950 Feature 23, view to west.

The stratigraphy of SIHP-5950 Feature 23 consisted of five distinct stratigraphic layers (Figure 25 to Figure 27). Stratum Ia, a 10 YR 4/3 brown sandy loam, is associated with the modern fill currently atop the mound. Stratum Ib, 10 YR 5/3 brown sandy loam, is a thin compacted layer representing the original surface of the rockpile containing materials consistent with plantation operations including wire cable and irrigation lines. Stratum II, 7.5 YR brown sandy loam with 90% basalt boulder and cobble inclusions is the rockpile proper. Stratum III, 7.5 YR 4/4 dark brown sandy loam, is the natural A Horizon covered by the rockpile and Stratum IV is sapprolite. No cultural materials or features were observed during the excavation of Feature 23.

Figure 25. SIHP-5950 Feature 23, north profile.

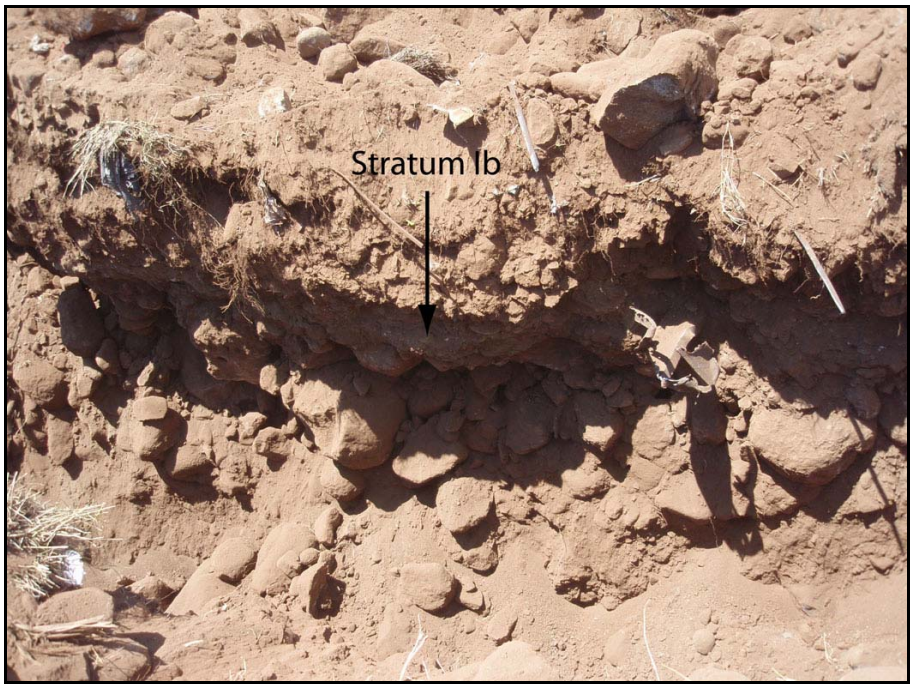

Figure 26. SIHP-5950 Feature 23 north profile showing Stratum 1b

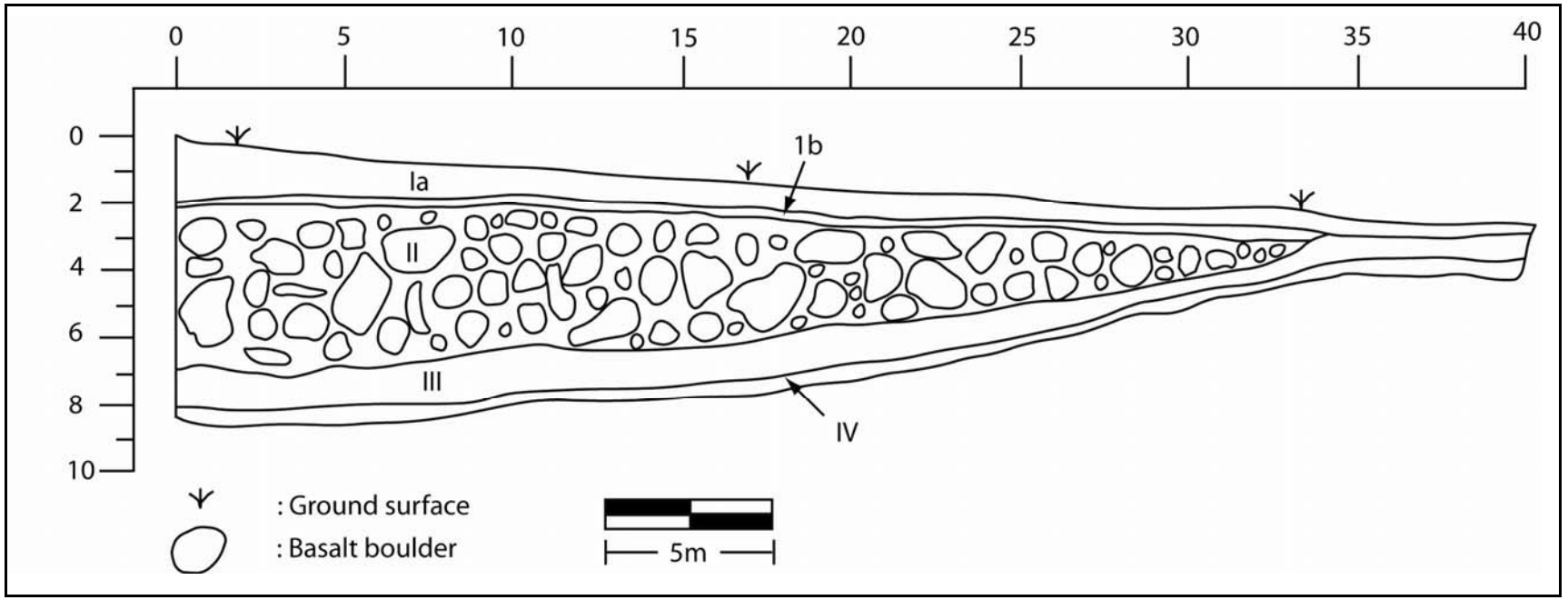

Figure 27. SIHP-5950 Feature 23 north profile

Table 5. Stratigraphic Summary for Feature 23

Stratum Ia: 0-250 cmbgs	Modern A Horizon; 7.5 YR 4/3, Brown; sandy loam; weak, fine, granular structure; loose dry consistency; non-plastic; no cementation; abrupt wavy lower boundary; modern garbage inclusions
Stratum Ib: 180-300 cmbgs	Historic A Horizon; 10 YR 5/3, brown; sandy loam; weak, medium, crumb structure; weakly coherant dry consistency; non-plastic; no cementation; abrupt smooth lower boundary; Historic A Horizon associated with rock pile construction
Stratum II: 200-650 cmbgs	Fill Horizon; 7.5 YR 4/3, brown; sandy loam; weak, fine, granular structure; loose dry consistency; non-plastic; no cementation; abrupt wavy lower boundary; 90% basalt cobble and boulders
Stratum III: 260-800 cmbgs	A Horizon; 7.5 YR 4/4, dark brown; sandy loam; weak, fine, granular structure; weakly coherant dry consistency; non-plastic; no cementation; clear smooth lower boundary; 20% basalt boulder and cobble inclusions.
Stratum IV: 320-830 cmbgs	10 YR 4/6, dark yellowish brown; Saprolite.

3.2.1.4 SIHP 50-50-03-5950 Feature 22

SIHP-5950 Feature 22 is located approximately 50 m west of SIHP-5950 Feature 23 along the south side of an unimproved road used to access *kuleana mauka* of the project area. It measures 109 m in length, 47 m wide and 7 m above the surrounding ground surface at its highest point. Feature 22, similar to Feature 23 has been used as a modern dumpsite for domestic trash including automobiles and domestic appliances. In addition there is approximately 3m of modern construction fill atop the rockpile (Figure 28 and Figure 29).

Figure 28. SIHP-5950 Feature 22, view to the south.

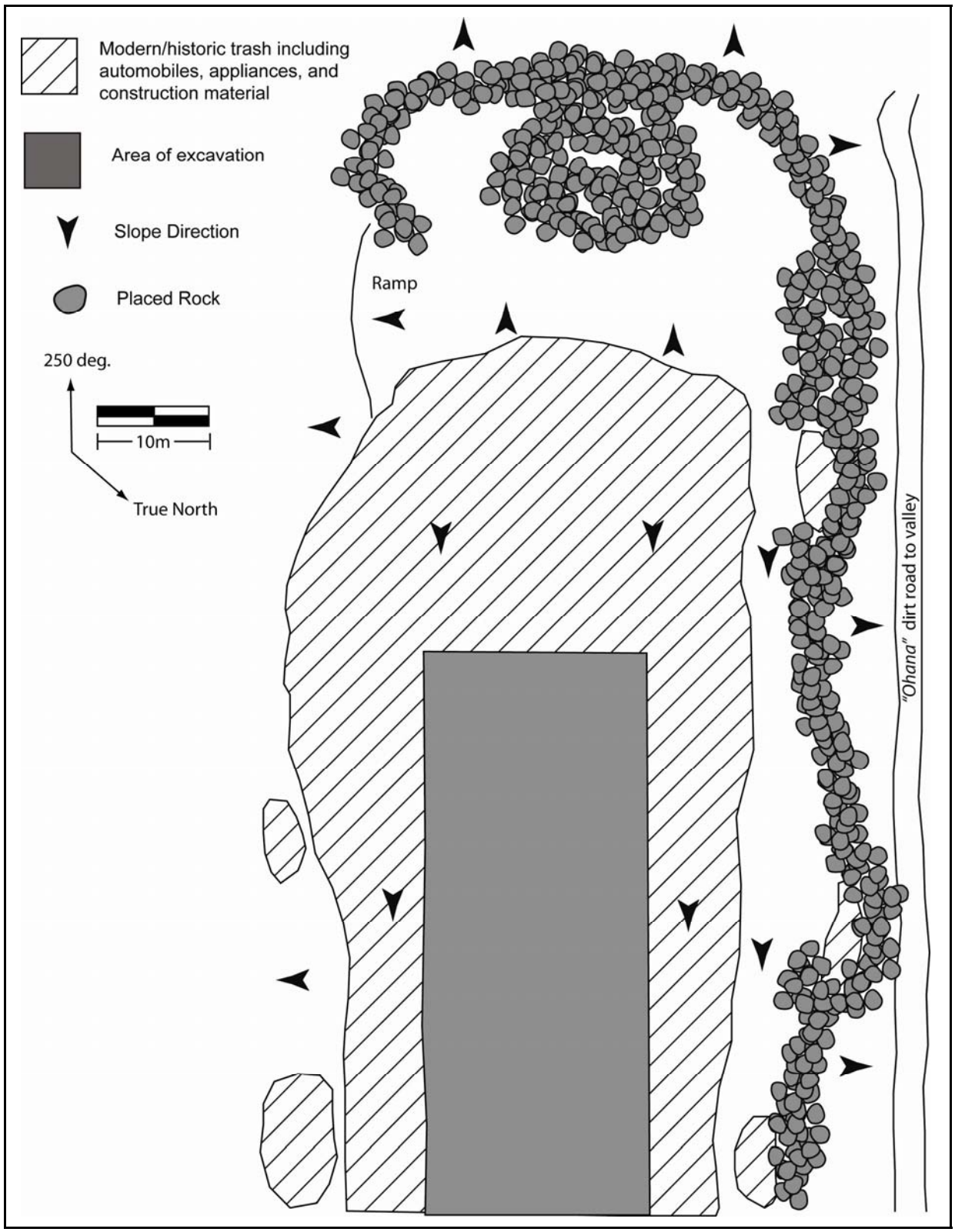

Figure 29. SIHP-5950 Feature 22 plan view.

Excavation of SIHP-5950 Feature 22 began at the lowest point of the rockpile and continued towards the highest point, *mauka* to *makai* (Figure 30). Because of the limited reach of the machine accompanied by the size of Feature 22 it was necessary to remove the modern fill initially to expose the rockpile. While removing the construction fill no less than three pieces of asbestos pipe were observed (Figure 31). At this time a decision was made to abandon the excavation of Feature 22 as it presented HAZMAT concerns. The asbestos pipe sections were marked with yellow caution tape and the rockpile was subsequently backfilled. The excavated area shown in Figure 29 indicates the modern fill that was removed prior to stoppage.

Figure 30. Excavating SIHP-5950 Feature 22, view to the west.

Figure 31. Asbestos pipe exposed at SIHP-5950 Feature 22.

3.2.1.5 SIHP 50-50-03-5950 Feature 21

SIHP-5950 Feature 21 is located approximately 90 m north of the intersection of the Lahaina Bypass Phase 1B-1 Corridor and Kauaula stream. Measuring 60 m in length, 48 m wide it rises around 4 m above the surrounding topography (Figure 32). Approximately 28 percent (815 of 2880 m²) of Feature 21 was excavated during this investigation (Figure 33).

Excavation began at the eastern side of the rockpile and extended west into it, *mauka* to *makai* (Figure 34). A significant amount of water worn cobble was observed in the soils beneath the rockpile suggesting that this feature was constructed atop a dry streambed (Figure 35).

Figure 32. SIHP-5950 Feature 21 view to south

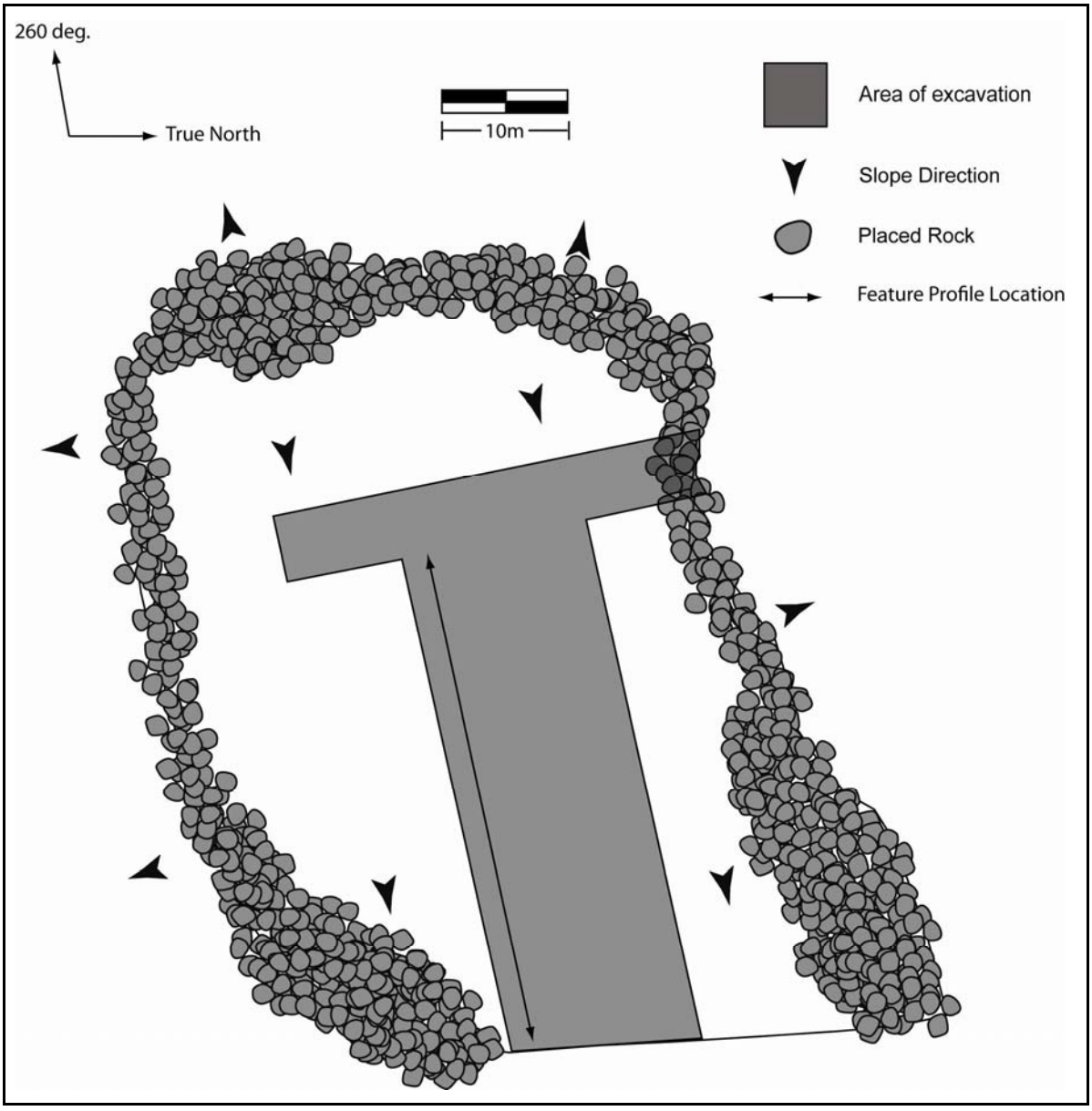

Figure 33. SIHP-5950 Feature 21 plan view

Figure 34. Excavating SIHP-5950 Feature 21, view to west.

Figure 35. SIHP-5950 Feature 21, showing streambed deposits. View to the south.

The mechanical testing of Feature 21 revealed four distinct stratigraphic layers. Stratum I, a 10 YR 4/7 brown sandy loam is the historic A horizon atop the rock pile. Stratum II, 7.5 YR 4/2 brown sandy loam with 90 % basalt boulder and cobble inclusions, is the rock pile proper. Stratum III, a 10 YR 5/4 yellowish brown sandy loam, has approximately 70% water rounded basalt cobble inclusions represents the natural soils prior to the construction of the rockpile. Stratum IV is saprolitic soils.

Figure 36. SIHP-5950 Feature 21, south profile.

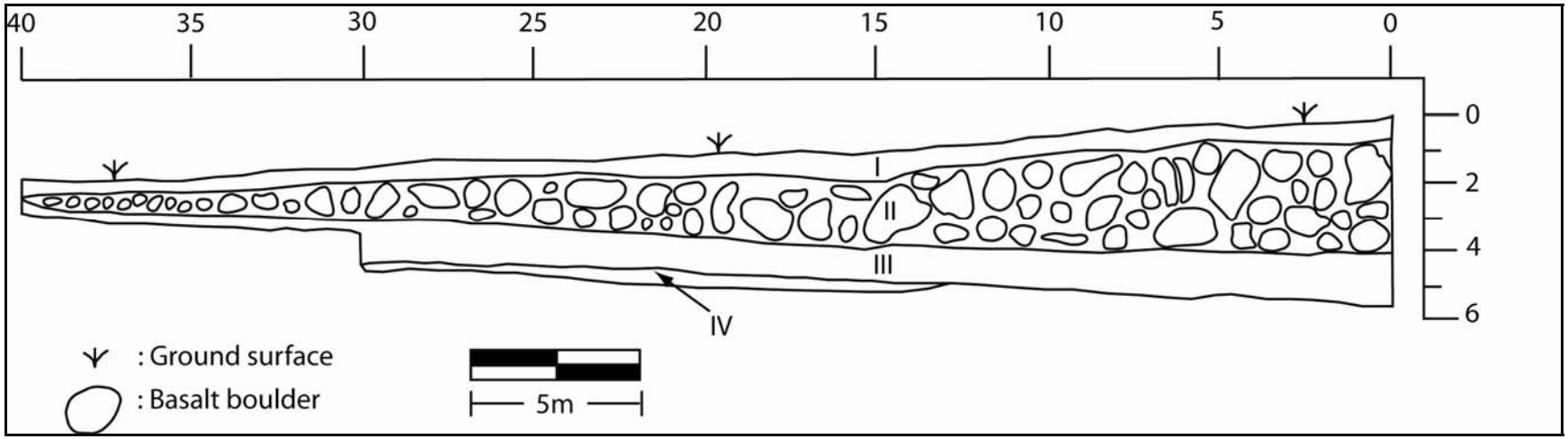

Figure 37. SIHP-5950 Feature 21, south profile.

Table 6. Stratigraphic Summary for Feature 21

Stratum I: 0-80 cmbgs	A Horizon; 7.5 YR 4/7, Brown; sandy loam; weak, fine, granular structure; weakly coherant dry consistency; non-plastic; no cementation; clear smooth lower boundary; Historic A horizon
Stratum II: 50-400 cmbgs	Fill Horizon; 7.5 YR 4/2, Brown; sandy loam; weak, fine, loose dry consistency; non-plastic; no cementation; clear wavy lower boundary; 90 % basalt cobble and boulder inclusions; Plantation era rock pile fill.
Stratum III: 60-550 cmbgs	A Horizon; 10 YR 5/4, yellowish brown; sandy loam; weak, fine, granular structure; weakly coherant dry consistency; non-plastic; no cementation; clear wavy lower boundary; 70% water worn cobble.
Stratum IV: 50-600 cmbgs	10 YR 4/6, dark yellowish brown; Saprolite.

3.2.1.6 SIHP 50-50-03-5950 Feature 20

SIHP-5950 Feature 20 is located approximately 100 m north of Hokiokio Place. The tallest of the rockpiles within the corridor, Feature 20 rises 10 m above the surrounding ground surface (Figure 38). At the time of the Literature Review and Field Inspection (McCurdy and Hammatt 2008) Feature 20 was being actively quarried by the current leaseholder of the property (Figure 39). The rockpile is 85 m in length and 55m wide. Prior to the quarrying Feature 20 may have been as wide as 70 m.

The rockpile appears to be the result of at least two separate building episodes. A portion of the initial phase of construction can be observed at the western end of Feature 21 (Figure 40). Approximately 4 m in height the exposed boulders of this portion are significantly more weathered and contain less soil indicative of a longer exposure to the elements. Approximately 24% (1112 of 4675 m²) of Feature 20 was excavated.

Figure 38. SIHP-5950 Feature 20 viewed north from Hokiokio Place.

Figure 39. Quarried area of SIHP-5950 Feature 20, view to the south.

Figure 40. Close up showing the initial construction phase of Feature 20, view to the north

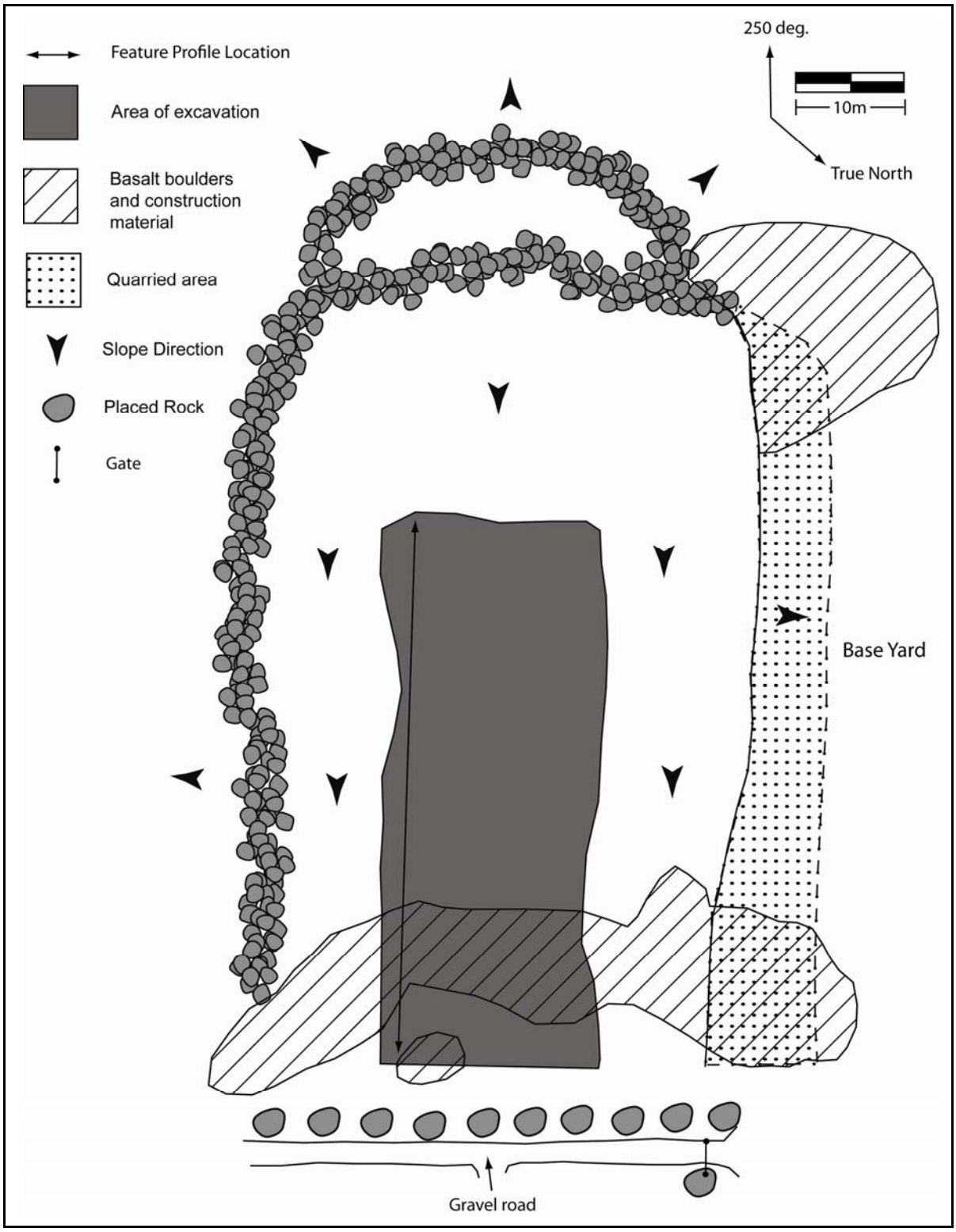

Figure 41. SIHP-5950 Feature 20 plan view.

Excavation began at the eastern portion of the Feature 20 and continued west, *mauka* to *makai*. First we exposed the underlying soils and followed them into the rockpile as far as the mechanical limits of the machine would allow. This rockpile was less stable than others that had been tested and collapsed frequently during the excavation since there was significantly more soil mixed in with the boulders.

Figure 42. Excavating SIHP-5950 Feature 20.

Three strata were identified during the excavation of Feature 20. Stratum I, 7.5 YR 3/3 dark brown sandy loam, is the modern/historic A horizon atop the rockpile. Predominately soil with approximately 25% basalt cobble inclusions, Stratum I also had numerous plastic irrigation hoses common in cultivation operations. Stratum II is the rockpile proper containing up to 80% basalt cobble and boulder inclusions. Stratum III is the original A horizon beneath the rockpile. No cultural materials or features were observed during the excavation of Feature 20. A detailed stratigraphic description is available in Table 7.

Figure 43. SIHP 5950-Feature 20, South profile.

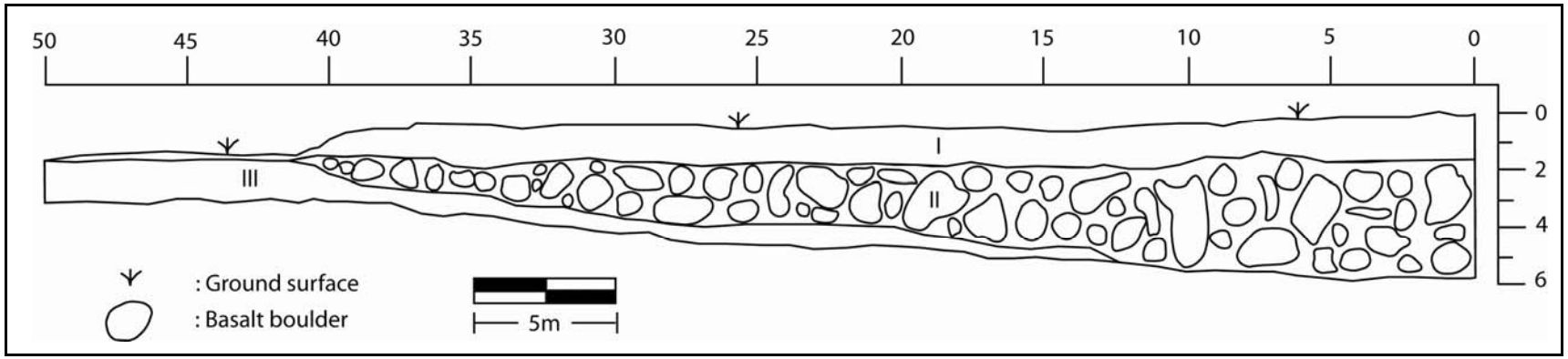

Figure 44. SIHP-5950 Feature 20 South profile.

Table 7. Stratigraphic Summary for Feature 20

Stratum I: 0-170 cmbgs	A Horizon; 7.5 YR 3/3, dark brown; sandy loam; weak, medium, single grain structure; weakly coherant dry consistency; non-plastic; no cementation; clear wavy lower boundary; Modern/Historic A Horizon
Stratum II: 140-580 cmbgs	Fill Horizon; 7.5 YR 3/3, Dark Brown; sandy loam; weak, fine, single grain structure; loose dry consistency; non-plastic; no cementation; abrupt wavy lower boundary; 80 % basalt cobble and boulder inclusions; Plantation Era Rock Pile
Stratum III: 145-580 cmbgs	A Horizon; 5 YR3/4, Dark reddish brown; sandy loam; weak, medium, granular structure; weakly coherant dry consistency; non-plastic; no cementation; clear wavy lower boundary; Natural A Horizon

Section 4 Results of Laboratory Analysis

No artifacts were collected during the investigation although; five charcoal samples were recovered from Stratum IIIa of Feature 23. One was recovered during the initial mechanical testing and four were collected from the subsequent hand excavation. Three charcoal samples were sent to Beta Analytic for Accelerator Mass Spectrometry Carbon Dating (AMS).

4.1 Beta-264067

The calibration of radiocarbon age to calendar years by Beta Analytic for sample Beta-264067 yielded a conventional radiocarbon age of 210±40 BP. When calibrated using OxCal v4.1.3, (Figure 45) the highest probability of the 2 Sigma results is AD 1725-1815 (46.4%) with a calibrated mean date of AD 1770.

4.2 Beta-267474

The calibration of radiocarbon age to calendar years by Beta Analytic for sample Beta-267474 yielded a conventional radiocarbon age of 20±40 BP. When calibrated using OxCal v4.1.3, (Figure 46) the highest probability of the 2 Sigma results is AD 1811-1920 (73.3%) with a calibrated mean date of AD 1867.

4.3 Beta-267475

The calibration of radiocarbon age to calendar years by Beta Analytic for sample Beta-264067 yielded a conventional radiocarbon age of 60±40 BP. When calibrated using OxCal v4.1.3, (Figure 47) the highest probability of the 2 Sigma results is AD 1807-1929 (70.0%) with a calibrated mean date of AD 1868.

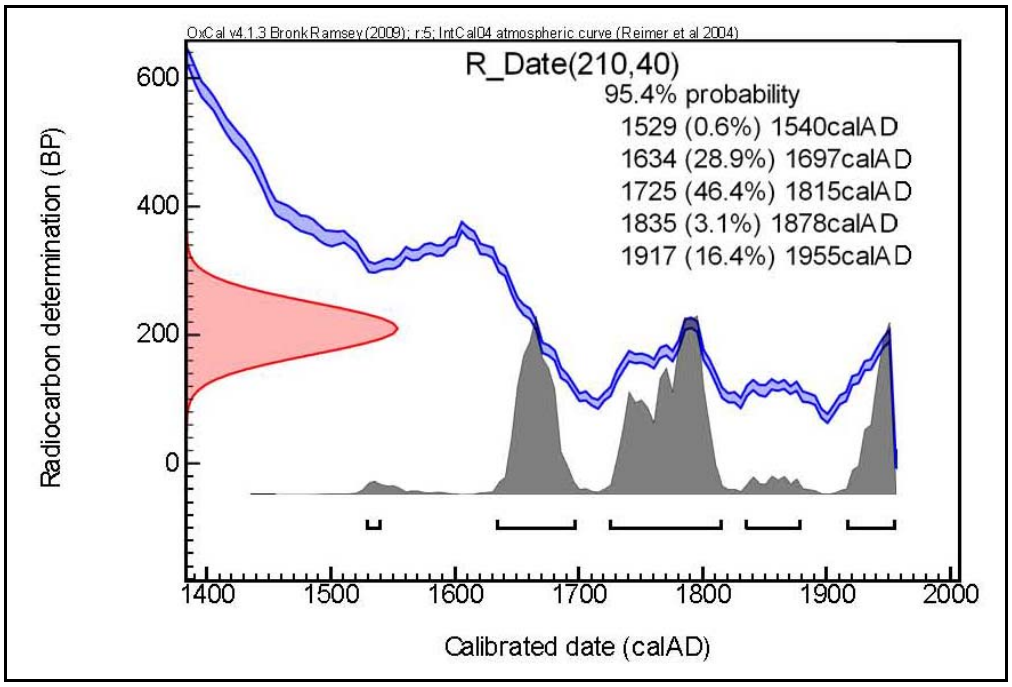

Figure 45. OxCal v4.1.3 results for Beta-264067.

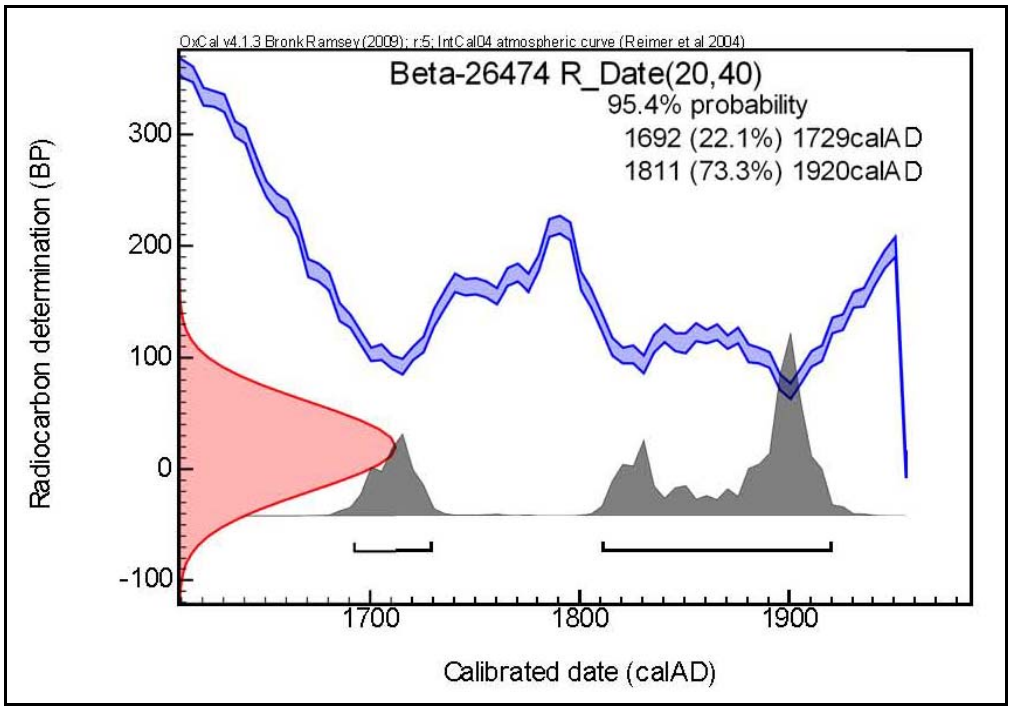

Figure 46. OxCal v4.1.3 results for Beta-267474

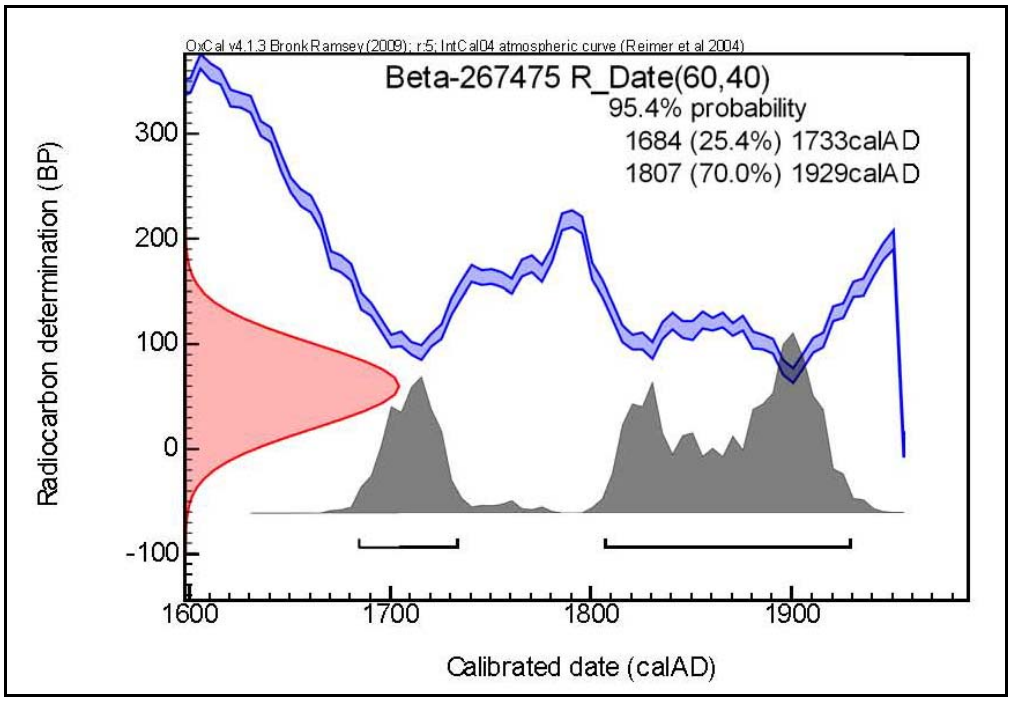

Figure 47. OxCal v4.1.3 results for Beta-267475

Table 8. Radiocarbon age assays from Feature 25 excavations.

Beta-	^{14}C Age Assay	Calibrated Date Range (2σ) (%) = probability	Calibrated Mean Date (2σ)	Stratum
264067	210±40	AD 1725-1815 (46.4%) AD 1634-1697 (28.9%) AD 1917-1955 (16.4%) AD 1835-1878 (3.1%) AD 1529-1540 (0.6%)	AD 1770 AD 1666 AD 1936 AD 1857 AD 1535	IIIa
267474	20±40	AD 1692-1729 (22.1%) AD 1811-1920 (73.3%)	AD 1711 AD 1867	IIIa
267475	60±40	AD 1684-1733 (25.4%) AD 1807-1929 (70.0%)	AD 1709 AD 1868	IIIa

Section 5 Summary and Interpretation

The purpose of this investigation was to assess the probability of intact cultural features and/or material buried within or beneath six plantation era rockpiles proir to the construction of the Lahaina Bypass Phase 1B-1 corridor (SIHP 50-50-03-5950 Features 20-23, 25 and 27).

5.1 Feature 27

SIHP- 5950 Feature 27 is located near the center of a modern banana plantation that is bisected by the current Lahiana Bypass Phase 1B-1 Right of Way (ROW). Measuring 93 m in length and 45 m wide, this structure rises 4m above the surrounding area at its highest point. Approximately 33 percent (813 of 2442 m²) of Feature 27 was excavated. The rocks were piled atop an existing landform/bedrock outcropping, stacked 1-2 m high also falling over the side giving it the appearance of a much larger pile of rocks. No cultural features or materials were observed during the mechanical testing of Feature 27.

5.2 Feature 25

SIHP-5950 Feature 25 is located in the southeastern corner of a modern banana plantation currently located within the project corridor. The rockpile is 53 m in length, 42 m wide and 5 m tall at its highest point. Approximately 31 percent (684 of 2226 m²) of Feature 25 was excavated mechanically. Feature 25 is bound to the north by an unimproved plantation road, to the south by Puamana stream and to the west by a concrete irrigation ditch (SIHP-4787 Feature D).

During the mechanical testing of Feature 25 a stratum with a thin layer of charcoal flecking was observed beneath the rockpile and designated Stratum IIIa. The discovery of Statum IIIa prompted CSH to conduct additional testing by way of two 1 x 1 m hand excavated test units. Although no cultural materials were observed, five charcoal samples were collected, three of wich were sent to Beta Analytic (Miami, Florida) for AMS radiocarbon dating (Table 9).

Table 9. Summary of the highest probability calibrated radiocarbon dates for Stratum IIIa.

Beta-	^{14}C Age Assay	Calibrated Date Range (2σ) (%) = probability	Calibrated Mean Date (2σ)	Stratum
264067	210±40	AD 1725-1815 (46.4%)	AD 1770	IIIa
267474	20±40	AD 1811-1920 (73.3%)	AD 1867	IIIa
267475	60±40	AD 1807-1929 (70.0%)	AD 1868	IIIa

Although it is the outlier, Beta-264067 coincides with the pre-Contact slash and burn deforestation as suggested by Patrick V. Kirch (1974 and 1982). The destruction of native Hawaiian forests in the coastal lowlands began long before European contact, primarily through the use of fire in slash-and-burn deforestation. Excavations at some of the oldest settlement sites

found in Hawai‘i suggest that such agriculture was practiced as early as AD 400-500. By approximately AD1600 the Hawaiian population began to settle areas in the upper lowlands, continuing the process of slash-and-burn deforestation (Kirch 1974 and 1982).

Furthermore, when Captain James Cook visited the Hawaiian Islands in 1778 he found that forests began at middle elevations a considerable distance from the coast. A vast area of grassland stretched from his anchorage on Waimea Bay to the forest belt some distance inland; "not even a shrub grows naturally on this extensive space," he noted, and firewood had to be brought from great distances (Cook 1784). Captain George Vancouver found similar conditions. He noted that the broad belt between the coastal taro fields and the beginning of the forests, that is "at least one half of the' island, appeared to produce nothing but a coarse spiky grass from an argillaceous soil that had the appearance of having undergone the action of fire." Shortly after, he observed a vast grassland actually being fired (Vancouver 1798).

The most probable dates are associated with samples Beta-267474 and 267475. These dates (AD 1867 and 1868) correspond with the introduction of cultivated sugar cane to the lowland areas earlier denuded by deforestation that was well underway in the Lahaina region by the 1870’s (United States Department of Congress 1879). The Pioneer Mill Company had been established in 1862 and used gravity flow water from mountain streams and produced 500 tons of sugar in 1866. In summary, although Stratum IIIa may reinforce the proposal of slash-and-burn deforestation practices and historic referrences to land clearing for sugar cane cultivation no cultural features or objects were observed during the hand excavation to warrant any additional investigation.

5.3 Feature 23

SIHP-5950 Feature 23 is located on along the south side of an unimproved road used to access *kuleana mauka* of the current Lahaina Bypass Phase 1B-1 corridor. It measures 86 m in length, 42 m wide and 6 m above the surrounding ground surface at its highest point. Feature 23 has been used as a dumpsite for modern trash. This includes automobiles, appliances, mattresses and general domestic trash. Approximately 24 percent (861 of 3612 m²) was excavated. No cultural materials or features were observed during the excavation of Feature 23.

5.4 Feature 22

SIHP-5950 Feature 22 is located approximately 50 m west of SIHP-5950 Feature 23 along the south side of an unimproved road used to access *kuleana mauka* of the project area. It measures 109 m in length, 47 m wide and 7 m above the surrounding ground surface at its highest point. Feature 22, similar to Feature 23 has been used as a modern dumpsite for domestic trash including automobiles and domestic appliances. While removing the construction fill no less than three pieces of asbestos pipe were observed. At this time a decision was made to abandon the excavation of Feature 22 as it presented HAZMAT concerns.

5.5 Feature 21

SIHP-5950 Feature 21 is located approximately 90 m north of the intersection of the Lahaina Bypass Phase 1B-1 Corridor and Kauaula stream. Measuring 60 m in length, 48 m wide it rises around 4 m above the surrounding topography. Approximately 28 percent (815 of 2880 m²) of

Feature 21 was excavated during this investigation. A significant amount of water worn cobble was observed in the soils beneath the rockpile suggesting that this feature was constructed atop a dry streambed. No cultural features or materials were observed during the mechanical testing of Feature 21.

5.6 Feature 20

SIHP-5950 Feature 20 is located approximately 100 m north of Hokiokio Place. The tallest of the rockpiles within the corridor, Feature 20 rises 10 m above the surrounding ground surface. At the time of the Literature Review and Field Inspection (McCurdy and Hammatt 2008) Feature 20 was being actively quarried by the current leaseholder of the property. The rockpile is 85 m in length and 55m wide. Prior to the quarrying Feature 20 may have been as wide as 70 m. Feature 20 appears to be the result of at least two separate building episodes. A portion of the initial phase of construction can be observed at the western end. Approximately 4 m in height the exposed boulders of this portion are significantly more weathered and contain less soil indicative of a longer exposure to the elements. Approximately 24% (1112 of 4675 m²) of Feature 20 was excavated. No cultural materials were observed during the mechanical testing of Feature 20.

In Summary, these monolithic structures have recently been designated as additional features of a previously recorded historic property, SIHP 50-50-03-5950 (Paraso and Dega 2006). Dominating the landscape of Lahaina, these features are associated with field clearing activities between 1947 and 1951 as a result of technological advances in the heavy equipment used for large scale agriculture (Lee-Greig and Hammat 2008:87). This afforded Pioneer Mill Co. the ability to consolidate the numerous large boulders within the active sugarcane fields, thus increasing the usable area and production. SIHP 50-50-03-5950 Features 20-23, 25 and 27 are simply a result of the field clearing activities from 1947 to 1951 (Lee-Greig and Hammatt 2008:87).

Section 6 Recommendations

Although data collected may reinforce the proposal of slash-and-burn deforestation practices and historic referrences to land clearing for sugar cane cultivation, no cultural features or objects were observed during this study to warrant any additional investigation of the pushpiles. The recommendation of the State Historic Preservation Division that all of the push piles to be impacted within the Phase 1B-1 corridor be mechanically tested (Nancy McMahon, personal communication; 10 July 2009) has been completed. Archaeological monitoring is still required during the dismantling of SIHP 50-50-03-5950 (Paraso and Dega 2006).

6.1 Disposition of Materials

All of the data gathered and generated during the course of documenting SIHP 50-50-03 5950 Features 20-23, 25 and 27 are currently being curated and housed at the Maui Office of Cultural Surveys Hawai‘i, Inc. (1993 Main Street, Wailuku, HI 96793), with copies on file at the main office of Cultural Surveys Hawai‘i, Inc. (41-1537 Kalanianaole Hwy # 200, Waimanalo, HI 96795-1185).

Section 7 References Cited

Cook, Captain James

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Vancouver, Captain George

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INDEMNIFICATION AGREEMENT

The undersigned (the "Contractor") is a contractor hired by the State of Hawaii (the "State") for that certain Federal Aid Project No. _____ relating to the construction, preservation and protection of_____

_____

_____ (the "Project").

As a material condition of the agreement of _____

_____

(the "Owner") to allow the State and its Contractor to enter onto property identified as being a portion of Tax Map Key No. _____, as shown delineated on Exhibit A attached hereto and incorporated herein by reference (hereafter referred to as the "Property"), pursuant to the terms of that certain Right-of-Entry Agreement, dated _____, 20_____ (the "Agreement"), the Contractor hereby agrees to indemnify, hold harmless, compensate and insure the Owner, its successors and assigns, and each of their respective officers, employees and agents (individually and collectively, the "Indemnitees") against any liability, including all loss, damages, cost, expenses and attorney's fees, incurred by the Indemnitees directly or indirectly, resulting from, arising out of or in connection with any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative, concerning or related to the Contractor's work on the Property, including, without limitation, entry pursuant to the Agreement, any damage to real or personal property, including environmental damage, and any injury to or death of persons.

The Contractor warrants and represents that the Owner is an additional insured on the commercial general liability and automobile liability insurance policies

(individually and collectively, the "Policies") that are prescribed by the contract between the Contractor and the State relating to the Project. The limit of liability for the commercial general liability insurance coverage is not less than TWO MILLION AND NO/100 DOLLARS ($2,000,000.00) per occurrence for the following liability coverages: (a) bodily injury, (b) advertising and (c) property damage. The limit of liability for the automobile liability insurance coverage is not less than ONE MILLION AND NO/100 DOLLARS ($1,000,000.00) per accident for the following liability coverages: (a) bodily injury and (b) property damage. The Contractor covenants that the Policies shall not be cancelled or materially changed without at least thirty (30) days' prior written notice to the Owner and insurance policies shall also provide a waiver of subrogation in Owner's favor and coverage for Contractor's completed operations. In the event that the limits of liability insurance required by the State's contract with the Contractor are less than the limits of liability insurance required by the Right-of-Entry Agreement by the State and the Owner, the Contractor shall procure and provide the limits of liability insurance required by the Right-of-Entry Agreement.

If any provision in this Indemnification Agreement is held invalid or not enforceable to its full extent, such provision shall be enforced to the fullest extent permitted by law, and the validity of the remaining provisions hereof will not be affected thereby. This Indemnification Agreement shall inure to the benefit of, and shall be binding upon, the Contractor, and its heirs, personal representatives, successors and assigns. Any rules of construction to the effect that ambiguities are to be resolved against the drafting party shall not apply to the interpretation of this Indemnification Agreement. This Indemnification Agreement shall be governed by, and construed in accordance with, the laws of the State of

Hawaii. The individual(s) executing this Indemnification Agreement on behalf of the Contractor represent(s) to the Owner that such individual(s) are authorized to do so by requisite action of the Contractor.

IN WITNESS WHEREOF, the Contractor has executed this Indemnification Agreement on the _____ day of _____, 20____.

CONTRACTOR

By_____
Print Name: _____
Its: _____

By_____
Print Name: _____
Its: _____

STATE OF HAWAII)
) SS.
)

On this _____day of _____, 20_____ before me personally appeared _____ and _____, to me personally known, who, being by me duly sworn, did say that they are the _____ and _____, respectively, of _____ _____ and that said instrument was signed on behalf of said corporation by authority of its Board of Directors, and said officers acknowledged said instrument to be the free act and deed of said company.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

_____
Print Name_____
Notary Public, State of _____
My commission expires: _____

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
201.0100	CLEARING AND GRUBBING	LS	LS	LS	$
203.0100	ROADWAY EXCAVATION	661,618	C.Y.	$	$
204.0110	TRENCH EXCAVATION FOR ELECTRICAL CONDUIT	LS	LS	LS	$
204.0120	TRENCH EXCAVATION FOR TELEPHONE CONDUIT	LS	LS	LS	$
204.0130	TRENCH EXCAVATION FOR FIBER OPTIC CONDUIT	LS	LS	LS	$
204.0210	TRENCH BACKFILL FOR ELECTRICAL CONDUIT	LS	LS	LS	$
204.0220	TRENCH BACKFILL FOR TELEPHONE CONDUIT	LS	LS	LS	$
204.0230	TRENCH BACKFILL FOR FIBER OPTIC CONDUIT	LS	LS	LS	$
205.0110	STRUCTURAL EXCAVATION FOR RETAINING STRUCTURE	LS	LS	LS	$
205.0120	STRUCTURAL BACKFILL FOR RETAINING STRUCTURE	LS	LS	LS	$
205.0300	FILTER MATERIAL	LS	LS	LS	$
205.6100	STRUCTURE EXCAVATION FOR KAUAULA BRIDGE ABUTMENTS AND ENDWALLS (WITHIN FOOTPRINT OF ABUTMENT FOOTINGS ONLY)	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
205.6200	STRUCTURE BACKFILL FOR ABUTMENTS AND ENDWALLS	LS	LS	LS	$
206.0100	EXCAVATION FOR DRAIN INLET STRUCTURES	LS	LS	LS	$
206.0110	EXCAVATION FOR STANDARD CONCRETE HEADWALL	LS	LS	LS	$
206.0120	EXCAVATION FOR DRAIN PIPES	LS	LS	LS	$
206.0130	EXCAVATION FOR DRAIN INLET/OUTLET APRONS	LS	LS	LS	$
206.4010	EXCAVATION FOR CULVERT 1 (WITHIN FOOTPRINT OF ARCH-BOX CULVERT ONLY)	LS	LS	LS	$
206.4011	EXCAVATION FOR CULVERT 1 INLET WINGWALLS	LS	LS	LS	$
206.4012	EXCAVATION FOR CULVERT 1 OUTLET WINGWALLS	LS	LS	LS	$
206.4020	EXCAVATION FOR CULVERT 2 (WITHIN FOOTPRINT OF ARCH-BOX CULVERT ONLY)	LS	LS	LS	$
206.4021	EXCAVATION FOR CULVERT 2 INLET WINGWALLS	LS	LS	LS	$
206.4022	EXCAVATION FOR CULVERT 2 OUTLET WINGWALLS	LS	LS	LS	$
206.4030	EXCAVATION FOR CULVERT 3 (WITHIN FOOTPRINT OF ARCH-BOX CULVERT ONLY)	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
206.4031	EXCAVATION FOR CULVERT 3 INLET WINGWALLS	LS	LS	LS	$
206.4032	EXCAVATION FOR CULVERT 3 OUTLET WINGWALLS	LS	LS	LS	$
206.4040	EXCAVATION FOR AG CROSSING (WITHIN FOOTPRINT OF ARCH-BOX CULVERT ONLY)	LS	LS	LS	$
206.4041	EXCAVATION FOR AG CROSSING AND CULVERTS 4 & 5 INLET WINGWALLS	LS	LS	LS	$
206.4042	EXCAVATION FOR AG CROSSING OUTLET WINGWALLS	LS	LS	LS	$
206.4043	EXCAVATION FOR CULVERT 4 OUTLET STRUCTURE	LS	LS	LS	$
206.4044	EXCAVATION FOR CULVERT 5 OUTLET STRUCTURE	LS	LS	LS	$
206.4060	EXCAVATION FOR CULVERT 6 INLET STRUCTURE	LS	LS	LS	$
206.4061	EXCAVATION FOR CULVERT 6 OUTLET STRUCTURE	LS	LS	LS	$
206.4070	EXCAVATION FOR CULVERT 7 INLET STRUCTURE	LS	LS	LS	$
206.4071	EXCAVATION FOR CULVERT 7 OUTLET STRUCTURE	LS	LS	LS	$
206.4080	EXCAVATION FOR CULVERT 8 INLET STRUCTURE	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
206.4081	EXCAVATION FOR CULVERT 8 OUTLET STRUCTURE	LS	LS	LS	$
206.4090	EXCAVATION FOR CULVERT 9 INLET STRUCTURE	LS	LS	LS	$
206.4091	EXCAVATION FOR CULVERT 9 OUTLET STRUCTURE	LS	LS	LS	$
206.4100	EXCAVATION FOR CULVERT 10 INLET STRUCTURE	LS	LS	LS	$
206.4101	EXCAVATION FOR CULVERT 10 OUTLET STRUCTURE	LS	LS	LS	$
209.0100	INSTALLATION, MAINTENANCE, MONITORING AND REMOVAL OF BMP	LS	LS	LS	$
209.0200	ADDITIONAL WATER POLLUTION, DUST, AND EROSION CONTROL	FA	FA	FA	$ 100,000
212.0010	ARCHAEOLOGICAL MONITORING	FA	FA	FA	$ 100,000
304.0100	AGGREGATE BASE	LS	LS	LS	$
305.1110	AGGREGATE SUBBASE	LS	LS	LS	$
312.0100	HOT MIX GLASSPHALT BASE COURSE (8" FOR AC PAVEMENT)	LS	LS	LS	$
401.0400	HMA PAVEMENT, MIX NO. IV	LS	LS	LS	$
411.2112	CONCRETE PAVEMENT	38,019	S.Y.	$	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
503.1013	CONCRETE IN CULVERT 1 FLOOR SLAB	LS	LS	LS	$
503.1014	CONCRETE IN CULVERT 1 OUTLET WINGWALL FOOTINGS	LS	LS	LS	$
503.1015	CONCRETE IN CULVERT 1 OUTLET WINGWALLS	LS	LS	LS	$
503.1016	CONCRETE IN CULVERT 1 INLET WINGWALL FOOTINGS	LS	LS	LS	$
503.1017	CONCRETE IN CULVERT 1 INLET WINGWALLS	LS	LS	LS	$
503.1018	CONCRETE IN CULVERT 1 APRON	LS	LS	LS	$
503.1023	CONCRETE IN CULVERT 2 FLOOR SLAB	LS	LS	LS	$
503.1024	CONCRETE IN CULVERT 2 OUTLET WINGWALL FOOTINGS	LS	LS	LS	$
503.1025	CONCRETE IN CULVERT 2 OUTLET WINGWALLS	LS	LS	LS	$
503.1026	CONCRETE IN CULVERT 2 INLET WINGWALL FOOTINGS	LS	LS	LS	$
503.1027	CONCRETE IN CULVERT 2 INLET WINGWALLS	LS	LS	LS	$
503.1028	CONCRETE IN CULVERT 2 APRON	LS	LS	LS	$
503.1033	CONCRETE IN CULVERT 3 FLOOR SLAB	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
503.1034	CONCRETE IN CULVERT 3 OUTLET WINGWALL FOOTINGS	LS	LS	LS	$
503.1035	CONCRETE IN CULVERT 3 OUTLET WINGWALLS	LS	LS	LS	$
503.1036	CONCRETE IN CULVERT 3 INLET WINGWALL FOOTINGS	LS	LS	LS	$
503.1037	CONCRETE IN CULVERT 3 INLET WINGWALLS	LS	LS	LS	$
503.1038	CONCRETE IN CULVERT 3 APRON	LS	LS	LS	$
503.1042	CONCRETE IN AG CROSSING FLOOR SLAB	LS	LS	LS	$
503.1043	CONCRETE IN AG CROSSING CULVERT PEDESTAL WALLS	LS	LS	LS	$
503.1044	CONCRETE IN AG CROSSING OUTLET WINGWALL FOOTINGS	LS	LS	LS	$
503.1045	CONCRETE IN AG CROSSING OUTLET WINGWALLS	LS	LS	LS	$
503.1046	CONCRETE IN AG CROSSING INLET WINGWALL FOOTINGS	LS	LS	LS	$
503.1047	CONCRETE IN AG CROSSING AND CULVERTS 4 & 5 INLET WINGWALLS	LS	LS	LS	$
503.1048	CONCRETE IN CULVERT 4 OUTLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
503.1049	CONCRETE IN CULVERT 4 OUTLET STRUCTURE WALLS	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
503.1050	CONCRETE IN CULVERT 5 OUTLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
503.1051	CONCRETE IN CULVERT 5 OUTLET STRUCTURE WALLS	LS	LS	LS	$
503.1060	CONCRETE IN CULVERT 6 INLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
503.1061	CONCRETE IN CULVERT 6 INLET STRUCTURE WALLS	LS	LS	LS	$
503.1062	CONCRETE IN CULVERT 6 OUTLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
503.1063	CONCRETE IN CULVERT 6 OUTLET STRUCTURE WALLS	LS	LS	LS	$
503.1064	CONCRETE IN CULVERT 6 APRON	LS	LS	LS	$
503.1070	CONCRETE IN CULVERT 7 INLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
503.1071	CONCRETE IN CULVERT 7 INLET STRUCTURE WALLS	LS	LS	LS	$
503.1072	CONCRETE IN CULVERT 7 OUTLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
503.1073	CONCRETE IN CULVERT 7 OUTLET STRUCTURE WALLS	LS	LS	LS	$
503.1074	CONCRETE IN CULVERT 7 APRON	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
503.1080	CONCRETE IN CULVERT 8 INLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
503.1081	CONCRETE IN CULVERT 8 INLET STRUCTURE WALLS	LS	LS	LS	$
503.1082	CONCRETE IN CULVERT 8 OUTLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
503.1083	CONCRETE IN CULVERT 8 OUTLET STRUCTURE WALLS	LS	LS	LS	$
503.1084	CONCRETE IN CULVERT 8 APRON	LS	LS	LS	$
503.1090	CONCRETE IN CULVERT 9 INLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
503.1091	CONCRETE IN CULVERT 9 INLET STRUCTURE WALLS	LS	LS	LS	$
503.1092	CONCRETE IN CULVERT 9 OUTLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
503.1093	CONCRETE IN CULVERT 9 OUTLET STRUCTURE WALLS	LS	LS	LS	$
503.1094	CONCRETE IN CULVERT 9 APRON	LS	LS	LS	$
503.1100	CONCRETE IN CULVERT 10 INLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
503.1101	CONCRETE IN CULVERT 10 INLET STRUCTURE WALLS	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
503.1102	CONCRETE IN CULVERT 10 OUTLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
503.1103	CONCRETE IN CULVERT 10 OUTLET STRUCTURE WALLS	LS	LS	LS	$
503.1104	CONCRETE IN CULVERT 10 APRON	LS	LS	LS	$
503.1200	CONCRETE IN STANDARD HEADWALL	LS	LS	LS	$
503.1300	CONCRETE IN RETAINING STRUCTURE WALL FOOTING	LS	LS	LS	$
503.1310	CONCRETE IN RETAINING STRUCTURE	LS	LS	LS	$
503.2100	CONCRETE IN TRANSFORMER PAD	LS	LS	LS	$
503.2200	CONCRETE IN STREET LIGHT BASE	LS	LS	LS	$
503.2300	CONCRETE IN CONDUIT ENCASEMENT	LS	LS	LS	$
503.5010	CONCRETE IN KAUAULA BRIDGE ABUTMENT STEM WALLS	LS	LS	LS	$
503.5011	CONCRETE IN KAUAULA BRIDGE ABUTMENT FOOTINGS	LS	LS	LS	$
503.5012	CONCRETE IN KAUAULA BRIDGE END WALLS	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
503.5013	CONCRETE IN KAUAULA BRIDGE APPROACH SLABS	LS	LS	LS	$
503.5014	CONCRETE IN KAUAULA BRIDGE DECK	LS	LS	LS	$
503.5015	CONCRETE IN KAUAULA BRIDGE DIAPHRAGMS	LS	LS	LS	$
504.7400	TYPE IV KEEHI PRESTRESSED CONCRETE GIRDER	LS	LS	LS	$
507.0100	KAUAULA BRIDGE - METAL PEDESTRIAN RAILING	LS	LS	LS	$
507.5000	KAUAULA BRIDGE - CONCRETE RAILING	LS	LS	LS	$
507.7500	KAUAULA BRIDGE - CONCRETE END POST RAILING	LS	LS	LS	$
510.0100	PRECAST CONCRETE ARCH CULVERTS AND HEADWALLS (DELIVERED) FOR CULVERT 1	LS	LS	LS	$
510.0110	INSTALLATION OF PRECAST CONCRETE ARCH CULVERTS AND HEADWALLS FOR CULVERT 1	LS	LS	LS	$
510.0200	PRECAST CONCRETE ARCH CULVERTS AND HEADWALLS (DELIVERED) FOR CULVERT 2	LS	LS	LS	$
510.0220	INSTALLATION OF PRECAST CONCRETE ARCH CULVERTS AND HEADWALLS FOR CULVERT 2	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
510.0300	PRECAST CONCRETE ARCH CULVERTS AND HEADWALLS (DELIVERED) FOR CULVERT 3	LS	LS	LS	$
510.0330	INSTALLATION OF PRECAST CONCRETE ARCH CULVERTS AND HEADWALLS FOR CULVERT 3	LS	LS	LS	$
510.0400	PRECAST CONCRETE ARCH CULVERTS AND HEADWALLS (DELIVERED) FOR AG CROSSING	LS	LS	LS	$
510.0440	INSTALLATION OF PRECAST CONCRETE ARCH CULVERTS AND HEADWALLS FOR AG CROSSING	LS	LS	LS	$
602.0090	REINFORCING STEEL FOR BRIDGE ABUTMENT STEM WALL	LS	LS	LS	$
602.0091	REINFORCING STEEL FOR BRIDGE ABUTMENT FOOTINGS	LS	LS	LS	$
602.0092	REINFORCING STEEL FOR BRIDGE ABUTMENT END WALLS	LS	LS	LS	$
602.0093	REINFORCING STEEL FOR BRIDGE APPROACH SLABS	LS	LS	LS	$
602.0094	REINFORCING STEEL FOR BRIDGE DECK	LS	LS	LS	$
602.0095	REINFORCING STEEL FOR BRIDGE DECK DIAPHRAGMS	LS	LS	LS	$
602.0101	REINFORCING STEEL FOR CULVERT 1 FLOOR SLAB	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
602.0102	REINFORCING STEEL FOR CULVERT 1 OUTLET WINGWALL FOOTINGS	LS	LS	LS	$
602.0103	REINFORCING STEEL FOR CULVERT 1 OUTLET WINGWALLS	LS	LS	LS	$
602.0104	REINFORCING STEEL FOR CULVERT 1 INLET WINGWALL FOOTINGS	LS	LS	LS	$
602.0105	REINFORCING STEEL FOR CULVERT 1 INLET WINGWALLS	LS	LS	LS	$
602.0106	REINFORCING STEEL FOR CULVERT 1 APRON	LS	LS	LS	$
602.0201	REINFORCING STEEL FOR CULVERT 2 FLOOR SLAB	LS	LS	LS	$
602.0202	REINFORCING STEEL FOR CULVERT 2 OUTLET WINGWALL FOOTINGS	LS	LS	LS	$
602.0203	REINFORCING STEEL FOR CULVERT 2 OUTLET WINGWALLS	LS	LS	LS	$
602.0204	REINFORCING STEEL FOR CULVERT 2 INLET WINGWALL FOOTINGS	LS	LS	LS	$
602.0205	REINFORCING STEEL FOR CULVERT 2 INLET WINGWALLS	LS	LS	LS	$
602.0206	REINFORCING STEEL FOR CULVERT 2 APRON	LS	LS	LS	$
602.0301	REINFORCING STEEL FOR CULVERT 3 FLOOR SLAB	LS	LS	LS	$
602.0302	REINFORCING STEEL FOR CULVERT 3 OUTLET WINGWALL FOOTINGS	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
602.0303	REINFORCING STEEL FOR CULVERT 3 OUTLET WINGWALLS	LS	LS	LS	$
602.0304	REINFORCING STEEL FOR CULVERT 3 INLET WINGWALL FOOTINGS	LS	LS	LS	$
602.0305	REINFORCING STEEL FOR CULVERT 3 INLET WINGWALLS	LS	LS	LS	$
602.0306	REINFORCING STEEL FOR CULVERT 3 APRON	LS	LS	LS	$
602.0401	REINFORCING STEEL FOR AG CROSSING FLOOR SLAB	LS	LS	LS	$
602.0402	REINFORCING STEEL FOR AG CROSSING OUTLET WINGWALL FOOTINGS	LS	LS	LS	$
602.0403	REINFORCING STEEL FOR AG CROSSING OUTLET WINGWALLS	LS	LS	LS	$
602.0404	REINFORCING STEEL FOR AG CROSSING AND CULVERTS 4 & 5 INLET WINGWALL FOOTINGS	LS	LS	LS	$
602.0405	REINFORCING STEEL FOR AG CROSSING AND CULVERTS 4 & 5 INLET WINGWALLS	LS	LS	LS	$
602.0406	REINFORCING STEEL FOR AG CROSSING PEDESTAL WALLS	LS	LS	LS	$
602.0407	REINFORCING STEEL FOR CULVERT 4 OUTLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
602.0408	REINFORCING STEEL FOR CULVERT 4 OUTLET STRUCTURE WALLS	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
602.0409	REINFORCING STEEL FOR CULVERT 5 OUTLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
602.0410	REINFORCING STEEL FOR CULVERT 5 OUTLET STRUCTURE WALLS	LS	LS	LS	$
602.0601	REINFORCING STEEL FOR CULVERT 6 APRON	LS	LS	LS	$
602.0602	REINFORCING STEEL FOR CULVERT 6 INLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
602.0603	REINFORCING STEEL FOR CULVERT 6 INLET STRUCTURE WALLS	LS	LS	LS	$
602.0604	REINFORCING STEEL FOR CULVERT 6 OUTLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
602.0605	REINFORCING STEEL FOR CULVERT 6 OUTLET STRUCTURE WALLS	LS	LS	LS	$
602.0701	REINFORCING STEEL FOR CULVERT 7 APRON	LS	LS	LS	$
602.0702	REINFORCING STEEL FOR CULVERT 7 INLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
602.0703	REINFORCING STEEL FOR CULVERT 7 INLET STRUCTURE WALLS	LS	LS	LS	$
602.0704	REINFORCING STEEL FOR CULVERT 7 OUTLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
602.0705	REINFORCING STEEL FOR CULVERT 7 OUTLET STRUCTURE WALLS	LS	LS	LS	$
602.0801	REINFORCING STEEL FOR CULVERT 8 APRON	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
602.0802	REINFORCING STEEL FOR CULVERT 8 INLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
602.0803	REINFORCING STEEL FOR CULVERT 8 INLET STRUCTURE WALLS	LS	LS	LS	$
602.0804	REINFORCING STEEL FOR CULVERT 8 OUTLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
602.0805	REINFORCING STEEL FOR CULVERT 8 OUTLET STRUCTURE WALLS	LS	LS	LS	$
602.0901	REINFORCING STEEL FOR CULVERT 9 APRON	LS	LS	LS	$
602.0902	REINFORCING STEEL FOR CULVERT 9 INLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
602.0903	REINFORCING STEEL FOR CULVERT 9 INLET STRUCTURE WALLS	LS	LS	LS	$
602.0904	REINFORCING STEEL FOR CULVERT 9 OUTLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
602.0905	REINFORCING STEEL FOR CULVERT 9 OUTLET STRUCTURE WALLS	LS	LS	LS	$
602.1001	REINFORCING STEEL FOR CULVERT 10 APRON	LS	LS	LS	$
602.1002	REINFORCING STEEL FOR CULVERT 10 INLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$
602.1003	REINFORCING STEEL FOR CULVERT 10 INLET STRUCTURE WALLS	LS	LS	LS	$
602.1004	REINFORCING STEEL FOR CULVERT 10 OUTLET STRUCTURE WALL FOOTINGS	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
602.1005	REINFORCING STEEL FOR CULVERT 10 OUTLET STRUCTURE WALLS	LS	LS	LS	$
602.0310	REINFORCING STEEL FOR RETAINING STRUCTURE WALL FOOTING	LS	LS	LS	$
602.0311	REINFORCING STEEL FOR RETAINING STRUCTURE	LS	LS	LS	$
603.0010	BED COURSE MATERIAL FOR CULVERT	LS	LS	LS	$
603.0110	24-INCH HIGH DENSITY POLYETHYLENE PIPE, TYPE S	LS	LS	LS	$
603.0120	30-INCH HIGH DENSITY POLYETHYLENE PIPE, TYPE S	LS	LS	LS	$
603.0130	60-INCH HIGH DENSITY POLYETHYLENE PIPE, TYPE S	LS	LS	LS	$
603.0140	30-INCH REINFORCED CONCRETE PIPE, CL III	LS	LS	LS	$
603.0150	36-INCH REINFORCED CONCRETE PIPE, CL. III	LS	LS	LS	$
603.0160	42-INCH REINFORCED CONCRETE PIPE, CL. III	LS	LS	LS	$
603.0170	60-INCH REINFORCED CONCRETE PIPE, CL. III	LS	LS	LS	$
604.0370	TYPE "D" STORM DRAIN MANHOLE (10.00 FT TO 15.00 FT)	2	EA.	$	$
604.0371	TYPE "A" STORM DRAIN MANHOLE (5.00 FT TO 10.00 FT)	1	EA.	$	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
604.2340	TYPE 61616P GRATED DROP INLET (5.00 FT TO 5.99 FT)	16	EA.	$	$
604.2350	TYPE 61616P GRATED DROP INLET (6.00 FT TO 6.99 FT)	9	EA.	$	$
604.2360	TYPE 61616P GRATED DROP INLET (7.00 FT TO 7.99 FT)	3	EA.	$	$
604.2370	TYPE 61616P GRATED DROP INLET (8.00 FT TO 8.99 FT)	2	EA.	$	$
604.2380	TYPE 61616P GRATED DROP INLET (9.00 FT TO 9.99 FT)	3	EA.	$	$
604.2390	TYPE 61616P GRATED DROP INLET (10.00 FT TO 10.99 FT)	1	EA.	$	$
604.2400	TYPE 61616P GRATED DROP INLET (11.00 FT TO 11.99 FT)	2	EA.	$	$
606.3110	GUARDRAIL TYPE 3 - SINGLE WITH STEEL POST	LS	LS	LS	$
606.3500	GUARDRAIL TYPE 3 - THRIE BEAM WITH STEEL POST	LS	LS	LS	$
606.3510	GUARDRAIL TYPE 3 - THRIE BEAM TRANSITION WITH STEEL POST - KAUAULA BRIDGE	LS	LS	LS	$
606.7000	TERMINAL SECTION TYPE "A"	LS	LS	LS	$
606.7010	TERMINAL SECTION TYPE FLEAT-350	LS	LS	LS	$
606.7020	TERMINAL SECTION TYPE W-BEAM END SECTION (ROUNDED RWE03A)	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
606.7030	TERMINAL SECTION TYPE W-BEAM TERMINAL CONNECTOR (RWE02B)	LS	LS	LS	$
606.7040	TRANSITION SECTION THRIE BEAM TO W-BEAM	LS	LS	LS	$
607.0010	4-FEET, CHAIN LINK FENCE	LS	LS	LS	$
607.1100	6-FEET, CHAIN LINK FENCE	LS	LS	LS	$
607.1200	CHAIN LINK GATE, 6-FEET HIGH AND 15-FEET WIDE	LS	LS	LS	$
612.0011	GROUTED RUBBLE PAVING	LS	LS	LS	$
615.0010	MACHINE-LAID RIPRAP	LS	LS	LS	$
623.2000	TRAFFIC SIGNAL SYSTEM	LS	LS	LS	$
627.0101	STORMWATER TREATMENT SYSTEM - WATER QUALITY CONTROL DEVICE A	1	EA.	$	$
627.0102	STORMWATER TREATMENT SYSTEM - WATER QUALITY CONTROL DEVICE B	1	EA.	$	$
627.0103	STORMWATER TREATMENT SYSTEM - WATER QUALITY CONTROL DEVICE C	1	EA.	$	$
627.0104	STORMWATER TREATMENT SYSTEM - WATER QUALITY CONTROL DEVICE D	1	EA.	$	$
627.0105	STORMWATER TREATMENT SYSTEM - WATER QUALITY CONTROL DEVICE E	1	EA.	$	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
629.1011	4-INCH PAVEMENT STRIPING (THERMOPLASTIC EXTRUSION)	LS	LS	LS	$
629.1012	8-INCH PAVEMENT STRIPING (THERMOPLASTIC EXTRUSION)	LS	LS	LS	$
629.1013	12-INCH PAVEMENT STRIPING (THERMOPLASTIC EXTRUSION)	LS	LS	LS	$
629.1030	PAVEMENT ARROW (TAPE, TYPE III OR THERMOPLASTIC EXTRUSION)	LS	LS	LS	$
629.1031	PAVEMENT WORD (TAPE, TYPE III OR THERMOPLASTIC EXTRUSION)	LS	LS	LS	$
629.1032	PAVEMENT SYMBOL (PAINT, TAPE, TYPE III OR THERMOPLASTIC EXTRUSION)	LS	LS	LS	$
629.2010	TYPE A PAVEMENT MARKER	LS	LS	LS	$
629.2030	TYPE C PAVEMENT MARKER	LS	LS	LS	$
629.2040	TYPE D PAVEMENT MARKER	LS	LS	LS	$
629.2070	TYPE H PAVEMENT MARKER	LS	LS	LS	$
631.0100	REGULATORY SIGNS (10 SQUARE FEET OR LESS)	LS	LS	LS	$
638.0100	GUTTER, TYPE 2 (61616)	LS	LS	LS	$
638.0110	CURB, TYPE 2 - 8-1/2" CONCRETE CURB FOR TRANSITION TRHIE BEAM	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
638.0120	CURB, TYPE 3D FOR LEVEL SPREADER	510	LF	$	$
640.5200	4.0-FEET WIDE TRAPEZOIDAL CONCRETE LINED DRAINAGE DITCH	LS	LS	LS	$
640.5300	5.0-FEET WIDE TRAPEZOIDAL CONCRETE LINED DRAINAGE DITCH	LS	LS	LS	$
640.5400	6.0-FEET WIDE TRAPEZOIDAL CONCRETE LINED DRAINAGE DITCH	LS	LS	LS	$
640.5500	28-FEET WIDE (DIVERSION) CONCRETE LINED DRAINAGE DITCH	LS	LS	LS	$
640.5510	30-FEET WIDE (DIVERSION) CONCRETE LINED DRAINAGE DITCH	LS	LS	LS	$
643.0100	MAINTENANCE OF EXISTING LANDSCAPE AREAS	FA	FA	FA	$ 10,000
645.0100	TRAFFIC CONTROL	LS	L.S.	LS	$
645.0200	ADDITIONAL POLICE OFFICERS AND/OR ADDITIONAL TRAFFIC CONTROL DEVICES	FA	FA	FA	$ 192,505
648.0100	FIELD-POSTED DRAWINGS	LS	LS	LS	$
660.0100	ELECTRICAL (MECO) SYSTEM	LS	LS	LS	$
660.0200	TELEPHONE (HTEL) SYSTEM	LS	LS	LS	$
660.0300	FIBER OPTIC (TW OCEANIC) SYSTEM	LS	LS	LS	$

PROPOSAL SCHEDULE

ITEM NO.	ITEMS	APPROX. QUANTITY	UNIT	UNIT PRICE	AMOUNT
696.0010	FIELD OFFICE TRAILER (NOT TO EXCEED $32,000)	LS	L.S.	LS	$
696.0020	PROJECT SITE LABORATORY TRAILER (NOT TO EXCEED $22,000)	LS	L.S.	LS	$
696.0030	MAINTENANCE OF TRAILERS	FA	FA	FA	$ 12,000
699.1000	MOBILIZATION (NOT TO EXCEED 10 PERCENT OF THE SUM OF ALL ITEMS, EXCLUDING THE BID PRICE OF THIS ITEM, AND FORCE ACCOUNT ITEMS)	LS	L.S.	L.S.	$

a. SUM OF ALL ITEMS..... $

b. Either Furnish Foreign Steel Not to Exceed Minimal Amount (Fill in '0') or
Furnish Foreign Steel in Excess of Minimal Amount (Fill in 25% x a)..... $

c. Amount for Comparison of Bids (a + b)..... $

All Bidders must fill in b and complete c

Bidders must complete all unit prices and amounts. Failure to do so may be grounds for rejection of bid.

PRE-BID CONFERENCE HANDOUT

Non-Mandatory Pre-Bid Conference

Honoapiilani Highway Realignment, Phase 1B-1,
Lahainaluna Road To Hokiokio Place
Project No.: NH-030-1(38), CON

District Of Lahaina, Island Of Maui

Date/Time: January 12, 2010; 9:00 a.m.

Place: 601 Kamokila Blvd., Room 609, Kapolei, Hawaii; and Maui District Office

Items to discuss:

1. Meeting responses are for clarification purposes only. Any changes would be made by an addendum.

2. Meeting handout, minutes and attendance will be included as part of an addendum.

3. Right of Entry Agreements with all affected property owners are estimated to be completed by April 30, 2010.

4. Addendum to be issued requiring execution of Indemnification Agreement for entrance/access onto properties designated as construction parcels.

5. Addendum to be issued requiring construction parcel owners be named as additional insured on commercial general liability and automobile liability insurance policies.

6. The Contractor shall coordinate and cooperate with the State's Contractor for the ongoing construction of Honoapiilani Highway Realignment, Future Keawe Street Extension to Lahainaluna Road; FAP No. NH-030-1(35)R, in order for the work to progress on schedule, and without conflict or disruption.

7. Geotechnical Investigation report will be made available by an addendum.

8. Open to questions.

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

PRE-BID CONFERENCE SUMMARY

FOR

HONOAPIILANI HIGHWAY REALIGNMENT, PHASE 1B-1

LAHAINALUNA ROAD TO HOKIOKIO PLACE

FEDERAL-AID PROJECT NO. NH-030-1(38)

DISTRICT OF LAHAINA

ISLAND OF MAUI

2010

The Pre-Bid Conference was held January 12, 2010, 9:00 am, at the Department of Transportation, (DOT) Highways Division Conference Room 609, 699 Kamokila Boulevard, Kapolei.

1. Introductions of attendees. Sign-in list circulated.
2. Meeting responses are for clarification purposes only. Any changes would be made by addendum.
3. Meeting handout, minutes and attendance will be included as part of addendum.
4. Right-of-Entry Agreements with all affected property owners are estimated to be completed around April 30, 2010. NTP to be issued subsequently.
5. Addendum to be issued requiring execution of Indemnification Agreement for entrance/access onto properties designated as construction parcels.
6. Addendum to be issued requiring construction parcel owners to be named as additionally insured on commercial general liability and automobile liability insurance policies.
7. The contractor shall coordinate and cooperate with the State's Contractor for the ongoing construction of Honoapiilani Highway Realignment Phase 1A, Future Keawe Street Extension to Lahainaluna Road; FAP No. NH-030-1(35)R, in order for the work to progress on schedule, and without conflict or disruption.
8. Also noted that Honoapiilani Highway Widening between Dickenson Street and Aholo Road is also on-going.
9. Geotechnical Investigation Report will be made available by addendum.
10. Bid Opening will be February 11.
11. Meeting was opened for questions and responses provided as follows:

QUESTIONS AND RESPONSES

Question 1: Regarding the area containing the banana farm – Are there any special requirements or conditions for use of this area, and prepping of the area?
Response 1: The banana farm areas that are within the ROW and construction parcels will be relocated.

Question 2: Does the new highway ROW include special conditions that contractor needs to know about?
Response 2: DOT does not know of any at this time, but if any come up prior to bid opening then it may be addressed by addendum, otherwise it may be in change order.

Question 3: Was an EA or EIS required?
Response 3: An EIS was completed for the entire realignment. Therefore, no further EIS is required for Phase 1B1.

Question 4: Is it the intent to leave future lanes at future finish grade, and what materials are allowed in the future pavement zone?
Response 4: Future lanes will be graded to finish grade per plans and specs.

Question 5: Will provisions be made for further soil testing due to the variations that may be in the field?
Response 5: No provisions for additional testing. Contractors will have to bid based on best information available.

Question 6: Any plans for landscaping or irrigation?
Response 6: No.

Question 7: For pavement jointing, will vibratory insertion of dowels be allowed?
Response 7: DOT will investigate further.

Question 8: Will shop drawings be reviewed in house or by consultant?
Response 8: Possibly a combination of both.

Question 9: Are there any known archaeological sites within the affected alignment?
Response 9: An additional inventory survey was conducted and the findings of the report can be made available. For example, there are arch sites and push piles that will require monitoring. Any further archaeological requirements from SHPD will require addendum.

Question 10: Is contractor required to provide 3rd party compaction testing?
Response 10: DOT will investigate further.

Question 11: Knowing that there will be surplus of excavated material, is there a place for the excess to be stockpiled?
Response 11: No, surplus material will become the contractor's property.

Question 12: Has a construction yard been located?
Response 12: No, contractor will have to work it out with District Office, coordinate and negotiate with private landowners on their own, or remain within highway ROW.

Question 13: Will CAD files be available during the bidding process?
Response 13: No, only hard copy.

Question 14: What will be the last date to ask questions
Response 14: 10 business days prior to bid opening.

Question 15: Excess material from Phase 1A is approximately 155,000 cubic yards. Does it become the property of the contractor?
Response 15: The excess material is available to the contractor and is their property.

Question 16: What is excess material make-up?
Response 16: No direct response.

Question 17: If it is not usable will it need to be disposed?
Response 17: Yes.

Question 18: Where is the location of the existing stockpile?
Response 18: The stockpile is currently at the south terminus of 1A. It is visible from Lahainaluna Road, and rests within the ROW of 1B1. John Buist, CM, can be contacted at 808-281-9777, to coordinate viewing of the stockpile.

Question 19: Will construction water be made available on-site?
Response 19: No. Water is not available for construction activities.

Question 20: Will the 1B1 contractor have to make separate agreement for use of ag roads with private landowners.
Response 20: Yes.

Question 21: What ag roads are currently used for Widening Project?
Response 21: None currently, but some detouring may take place in the future. 1A contractor may be using ag roads, but they are coordinating directly with private landowner.

Question 22: What is the Phase 1A scheduled completion date and what type of coordination is anticipated to be needed?
Response 22: The Phase 1A contractor has the bridge schedule to be completed at the end of 2011. The pavement area at the interconnection of Phase 1B1 is schedule to be completed beginning of 2011. These are estimates for now, based on info from contractor.

Question 23: Is Hokiokio being designated as a construction parcel?
Response 23: No, only as roadway easement.

Question 24: Can contractor use Hokiokio to haul during construction? Heavy loads impacting Hokiokio and Hokiokio residents may be a concern.
Response 24: Hokiokio is not designated as a construction parcel, but DOT will inform West Maui Land Company and Kauaula Subdivision Association on the use of Hokiokio, through DOT Highways, Rights of Way Branch.

Question 25: Will DOT use a construction manager?
Response 25: District will look into it based on manpower.

The design consultant noted that families in Kauaula Valley need to be provided access across ROW during construction until the ag crossing is built and opened. The current access road will be identified in the addendum.

Tuesday, January 12, 2010, 9:00 am - DOT Kapolei Room 609

Honoapiilani Highway Realignment Phase 1B-1

Lahainaluna Road to Hokiokio Place - Pre-Bid Meeting

Sign-In Sheet

NAME	COMPANY	PHONE	EMAIL
Mike Nakashima	Hawaiian Dredging	735 3325	mnakashima@hdcc.com
Eugene Kumasaki	" "	735-3262	ekumasaki@hdcc.com
Rod Ueunten	Kiewit Pacific Co.	674-1088	rod.ueunten@kiewit.com
Greg Treese	Goodfellow Bros. Inc	268-8620	grest@goodfellowbros.com
DUSTIN L. DIPERSIA	GOODFELLOW BROS. INC	264-7214	DUSTYD@GOODFELLOWBROS.COM
Terrance Arashiro	Austin Tsutsumi	533-3645	tarashiro@atahawaii.com
Kevin Ito	HDOT	692-7548	kevin.ito@hawaii.gov

1/12/10
9:00 a.m.
Maui District Conference Room

HIGHWAYS DIVISION
PRE-BID Meeting
Honoapiilani Highway Realignment, Phase 1B-1, Lahainaluna Rd to Hokiokio Pl
FEDERAL-AID PROJECT NO.:NH-030-1(38)

ATTENDEES:

NAME	COMPANY	TELEPHONE	E-MAIL
Justin Sullivan	PB Sullivan Construction Inc	808 357-8790	Justin @pbsullivanconst.com
GARY WATANABE	ROJAC CONSTRUCTION/INC.	986-1105	garye rojacmaui.com
S. JOHN BUIST JR	BOWERS + KUBOTA CONSULTING	281-9777	jbuist@bowersandkubota.com
Joelle DuBois	Bowers + Kubota	282-0328	Jdubois@bowersandkubota.com
Charlene Shibuya	HWY-MC	873-3535	Charlene. Shibuya@hawaii.gov
Ferdinand Cajigal	Hwy-M	873-3535	ferdinand.cajigal@hawaii.gov

1/12/10
9:00 a.m.
Maui District Conference Room

HIGHWAYS DIVISION
PRE-BID Meeting
Honoapiilani Highway Realignment, Phase 1B-1, Lahainaluna Rd to Hokiokio Pl
FEDERAL-AID PROJECT NO.:NH-030-1(38)

ATTENDEES:

NAME	COMPANY	TELEPHONE	E-MAIL
KEN GIFT	GOODFELLOW BROS.	879.8868	keng@goodfellowbros.com
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