

# **FINAL—Archaeological Monitoring Report for Kamehameha Avenue Resurfacing, Waiākea, Kūkūau 1, Kūkūau 2, and Ponahawai Ahupua‘a, Hilo District, Island of Hawaii‘i**

**TMK: (3) 2-2-002:002**



## **Prepared For:**

Isemoto Contracting Co., Ltd.  
648 Piilani Street  
Hilo, Hawaii 96720

October 2016



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## **MANAGEMENT SUMMARY**

Archaeological monitoring was conducted for the resurfacing of Kamehameha Avenue on TMK: (3) 2-2-002:002 in Waiākea, Kūkūau 1, Kūkūau 2, and Ponahawai Ahupua‘a, in Hilo District, on Hawai‘i Island. No cultural deposits were identified during monitoring, and stratigraphy typically consisted of roads and road bases near the surface with fill layers below. A large historic artifact assemblage was collected, including approximately 1,250 horseshoes in the vicinity of a former blacksmith shop. The assemblage was designated as Site 50-10-35-30616. Much of the cultural material dates to the late 1800s and early 1900s, the same time period that the blacksmith shop was in operation. Per HAR §13-275-6, Site 50-10-35-30616 is assessed as significant under Criterion d (information content) for its potential to provide information about the former blacksmith operation. Archaeological monitoring is recommended for any future ground disturbance in or around the project area because of the potential to encounter additional artifact concentrations or other subsurface features.



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## INTRODUCTION

At the request of Isemoto Contracting, Keala Pono Archaeological Consulting conducted archaeological monitoring for the resurfacing of Kamehameha Avenue on portions of TMK: (3) 2-2-002:002 in Waiākea, Kūkūau 1, Kūkūau 2, and Ponahawai Ahupua‘a, in Hilo District, on Hawai‘i Island. The primary focus of the monitoring was on the identification and appropriate treatment of historic properties that might be affected by construction.

Archaeological monitoring was performed under the authority of Section 106 of the National Historic Preservation Act of 1966, as federal funding was used for the undertaking. Field procedures were conducted in accordance with an Archaeological Monitoring Plan (Wilkinson et al. 2012) accepted by the Hawai‘i State Historic Preservation Division (SHPD). This report meets the requirements and standards of both federal and state historic preservation law. These include Sections 106 and 110 of the National Historic Preservation Act of 1966, as amended, Chapter 6E of the Hawai‘i Revised Statutes, and SHPD’s *Rules Governing Standards for Archaeological Monitoring Studies and Reports* (§13–279).

The report begins with a description of the project area and an historical overview of land use and archaeology in the area. The next section presents methods used in the fieldwork, followed by the results of the archaeological monitoring. Project results are summarized and recommendations are made in the final section. Hawaiian words and technical terms are defined in a glossary at the end of the document.

### Project Location and the Undertaking

TMK: (3) 2-2-002:002 extends through the ahupua‘a of Waiākea, Kūkūau 1, Kūkūau 2, and Ponahawai Ahupua‘a, in Hilo Town (Figures 1 and 2). The project’s Area of Potential Effect (APE) totals 6.6 acres (2.67 ha) along Kamehameha Avenue, from Wailoa Bridge to Ponahawai Street. It is located approximately .09 miles (150 m) from the Hilo Bay shoreline at an elevation of 1–7 feet (.3–2 m) above mean sea level.

The undertaking is a community improvement project that includes reconstruction of roadway pavement; reconstruction of curbs, gutters, and sidewalks; installation of roadway drainage systems; relocation of water, telephone, and gas utility lines; improvements to traffic signals and highway lighting systems; and installation of pavement markings and traffic signs. Trenches were excavated for cement storm drain pipes, including the removal of old pipes and joining existing culverts to the new system, as well as for new propane gas lines, new street lamps and accompanying electrical wiring, as well as modification of water lines. Excavation was also conducted for the removal and replacement of asphalt and cement roadways and sidewalks.

### Physical Environment

Most of the bayfront of Hilo, as well as the project area, have been modified due to the growth of Hilo Town. As a result, much of the landscape is not in its natural state. The natural vegetation of the area formerly included ‘ōhi‘a, koa, uluhe, and tree ferns, but the current vegetation includes various introduced trees, plants, and grasses. The soil is of the Akaka-Honokaa-Kaiwiki association (Sato et al. 1973:oversize map). This is a very porous and moderately fine-textured soil formed of volcanic ash and high in content of organic matter. Specific soils in the project area are Keaukaha extremely rocky muck, 6 to 20 percent slopes (rKFD) (Figure 3). This soil type previously supported native forests before Hilo Town was established. These soils are also continuously wet receiving an annual rainfall of 80 to 200 inches of rainfall (Sato et al. 1973).

The project area is also watered by several streams in the vicinity. North of the project route is the Wailuku River where Hilo Palikū begins, and south is Kanukuokamanu of Wailoa Stream where Hilo Hanakahi begins. There is also the Alenaio Stream which marks the boundary between Kūkūau 2 and Ponahawai.

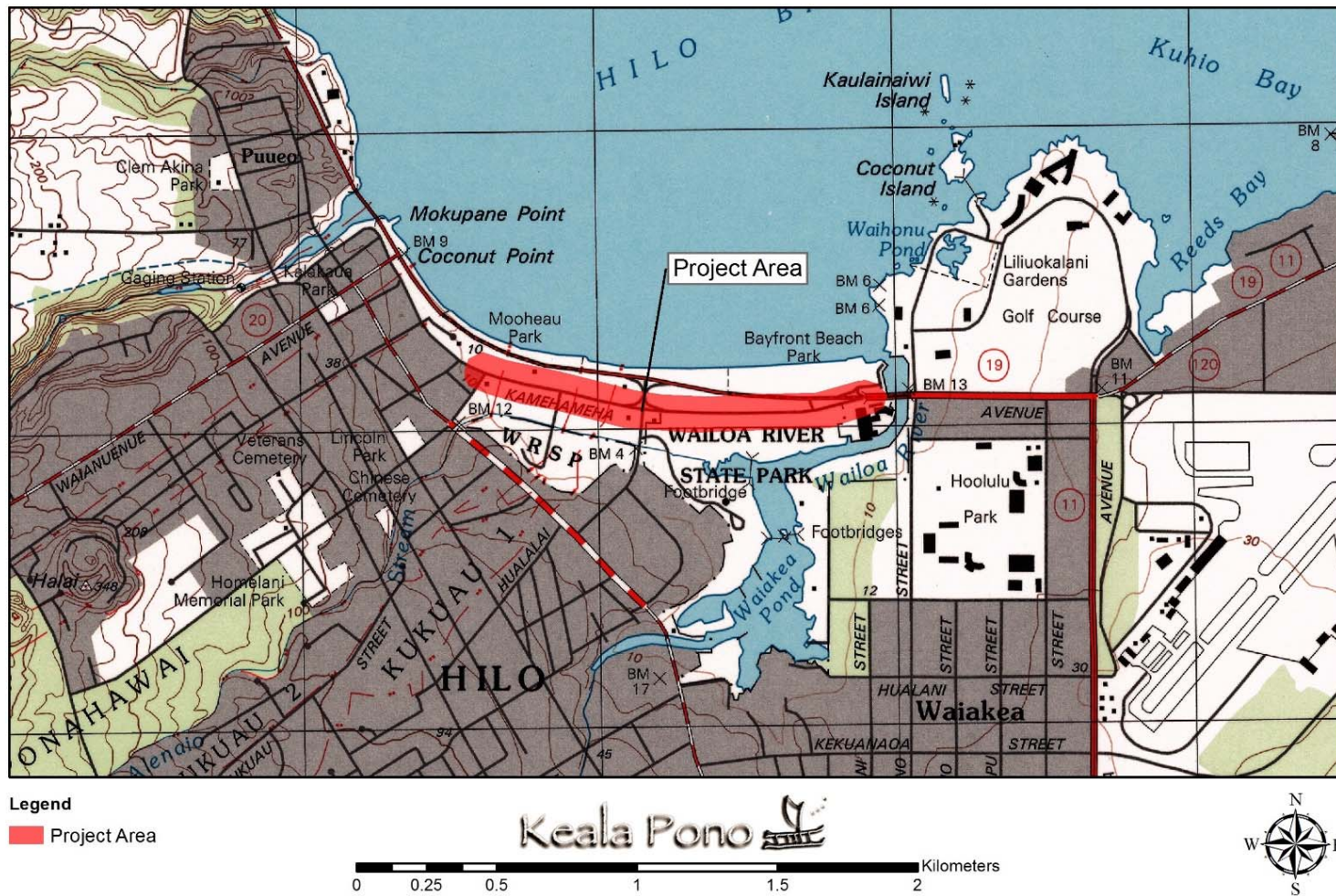


Figure 1. Project location on a 7.5 minute 1995 USGS Hilo quadrangle map.

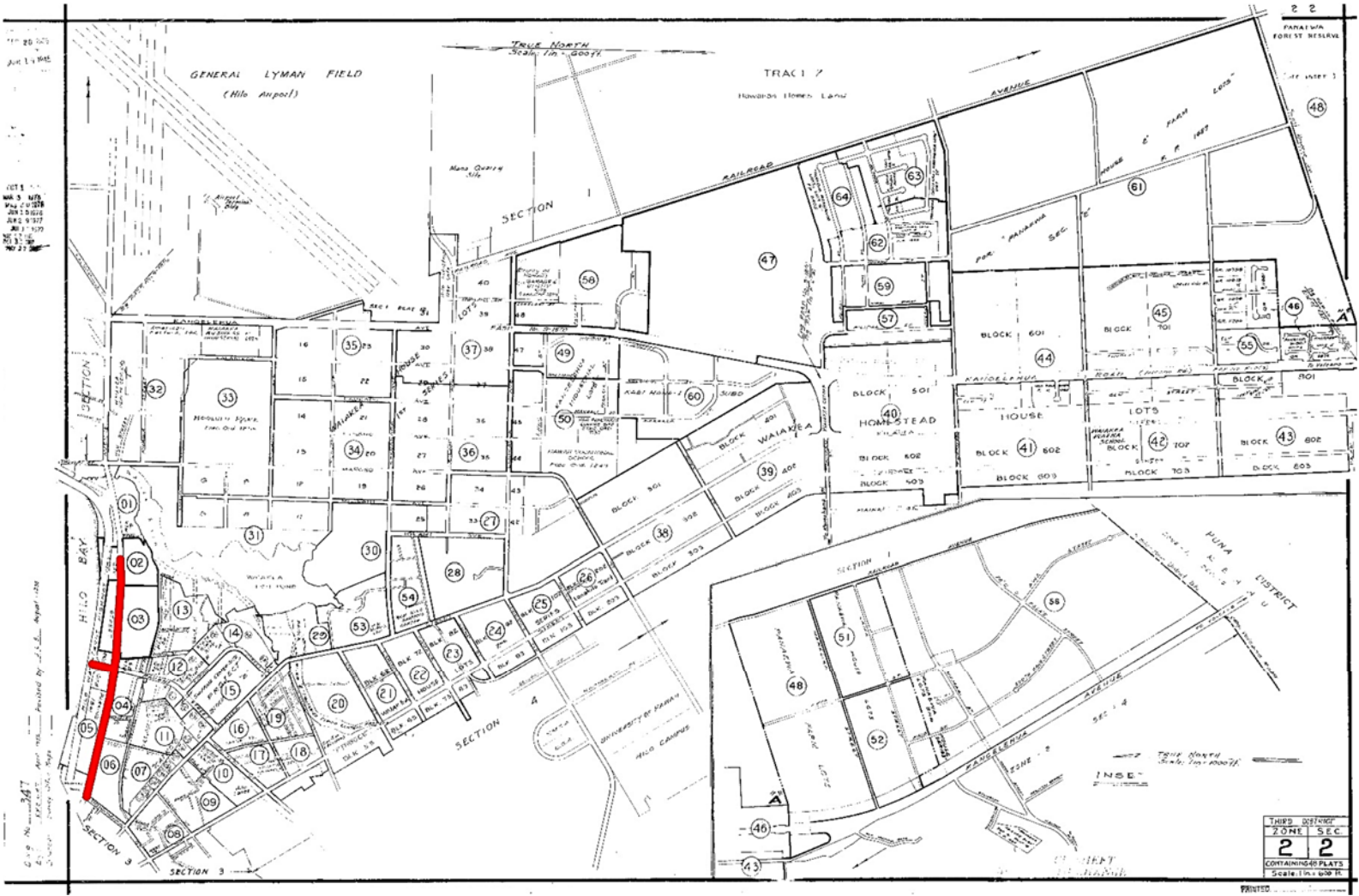


Figure 2. Project area (in red) on TMK plat (3) 2-2.





**Figure 3. Soils within and near the vicinity of the project area.**

## BACKGROUND

A brief historic review of Hilo is provided below, to offer a better holistic understanding of the use and occupation of the project area. In the attempt to record and preserve both the tangible (i.e., traditional and historic archaeological sites) and intangible (i.e., mo‘olelo, ‘ōlelo no‘eau) culture, this research assists in the discussion of anticipated finds. Research was conducted at the Hawai‘i State Library, the University of Hawai‘i at Mānoa libraries, the SHPD libraries, and online on the Office of Hawaiian Affairs website and the Waihona Aina, Huapala, and Ulukau databases. Archaeological reports and historical reference books were among the materials examined.

### Hilo in Traditional Times

Native traditions describe the formation (literally the birth) of the Hawaiian Islands and the presence of life on and around them, in the context of genealogical accounts... As this Hawaiian genealogical account continues, we find that these same god-beings, or creative forces of nature who gave birth to the islands, were also the parents of the first man (Hāloa), and from this ancestor, all Hawaiian people are descended. It was in this context of kinship, that the ancient Hawaiians addressed their environment. (Maly and Maly 2003).

The history of Hilo begins with the history of Hawai‘i Island:

Hawai‘i was another child of Papa and Wākea, their first-born child. He was the brother of Ho‘ohoku-kalani. Hawai‘i became the ancestor of the people of Hawai‘i; the ancient name of Hawai‘i island was Lono-nui-ākea. (Kamakau 1991:129)

Much of the oral accounts which narrate the events from the first peopling of Hawai‘i to the recent period of written documentation has been lost in time. However, there are several renowned Hawaiian historians who diligently tried to record as much of Hawaiian prehistory as possible. Among these historians is the famous scholar, Samuel Mānaiakalani Kamakau, who shared the cosmological story of Hawai‘i Island above.

In the compilation of Kamakau’s writings entitled, *Ke Kumu Aupuni*, one of the earliest accounts of Hilo hints of the significance of the area during the reign of Alapa‘i (translation in italics by D. Duhaylonsod):

Ua ka‘apuni ‘o Alapa‘i i kona noho aupuni ‘ana. Ma Hilo ‘o ia i noho ai i kekahi mau makahiki. I ko Alapa‘i noho ‘ana ma Hilo, ua māhuahua ka ma‘i iā Keōua, ‘o ia ho‘i ‘o Kalanikupuapāikalaninui, a ma Pi‘opi‘o, e pili ana ma Wailoa, ma Waiākea, make ihola ‘o Keōua i ka M.H. 1752. (Kamakau 1996[1866]:11).

*Alapa‘i toured [around the island] during his reign. Hilo is where he lived for some years. While Alapa‘i was living in Hilo, Keōua, also known as Kalanikupuapāikalaninui, became very sick, and it was at Pi‘opi‘o, close to Wailoa, at Waiākea, Keōua died in the year 1752.*

Kamakau also writes that just before the arrival of Captain Cook to Hawai‘i, Keawehano was a chief of Hilo. Keawehano is recorded as providing prized feathers and featherworks to the visitors Kapohu and Ka‘akakai who sought these items to enter the royal house built by Chief Kahekili on Maui (Kamakau 1996[1866]:82).

Besides the chronicles of the early Hawaiian historians, there are other means by which Hawai‘i’s history has been preserved. One often overlooked source of history is the information embedded in

the Hawaiian landscape. Hawaiian place names “usually have understandable meanings, and the stories illustrating many of the place names are well known and appreciated... The place names provide a living and largely intelligible history” (Pukui et al. 1974:xii).

Several places around the project area have storied meanings attached to their names, including Hilo, Hilo One, Hilo Hanakahi, Hilo Palikū, Waiākea, Kūkūau, Ponahawai, Keaukaha, Wailoa, Kanukuokamanu, Huia, Punahoa, Pi‘ihonua, and Wailuku (Table 1). They are listed in *Place Names Of Hawaii* (Pukui et al. 1974:46, 53, 85, 104, 121, 184, 189, 194, 219, 220, 224, 225) as follows:

Hilo. City... bay, district... ancient surfing area... Three sections of Hilo town are: Hilo-one (sand Hilo), near the sea; Hilo-Hanakahi, and inland section toward Ke-au-kaha, named for a chief famous in song...; and Hilo-pali-kū (Hilo of the upright cliff), east of the Wai-luku River. Perhaps [Hilo is] named for the first night of the new moon or for a Polynesian navigator.

Waiākea. Village and land section... bay... A legendary man, ‘Ulu (breadfruit), lived here. He died of starvation and was buried near a running spring. Next morning a breadfruit tree laden with fruit was found there, ending the famine... *Lit.*, broad waters.

Kūkūau. Section of Hilo... named for a grapsid crab.

Ponahawai. Land division, Hilo... *Lit.*, water circle.

Keaukaha. Hawaiian homestead area... *Lit.*, the passing current.

Wailoa... river... *Lit.*, long water.

Kanukuokamanu. Ancient surfing area... *Lit.*, the beak of the bird (the place was thought to be shaped like a bird’s beak).

Huia. Ancient surfing place... Name of a wave for surfing.

Punahoa. Land sections. *Lit.*, companion spring.

Pi‘ihonua. Land sections... ancient surfing place... *Lit.*, land incline.

Wailuku. River... A rock here called Wa‘a Kauhi (canoe [of] Kauhi [a Maui chief]) is said to be the petrified canoe of the demigod Māui... *Lit.*, water [of] destruction.

### **Subsistence and Traditional Land Use**

Since ancient times, the well-watered lands fronting Hilo Bay have attracted and supported permanent settlements.

The population of Hilo was anciently as now concentrated mostly around and out from Hilo Bay, which is still the island’s principal port. The Hilo Bay region is one of lush tropical verdure and beauty, owing to the prevalence of nightly showers and moist warmth which prevail under the northeasterly trade winds into which it faces. (Handy et al. 1972:538)

**Table 1. Place Names in the Vicinity of the Project Area**

Place name	Location
Hilo	District and bayfront where the project is located
Hilo One	Region in Hilo where the project is located
Waiākea	One of the land divisions where the project is located; south portion
Kūkūau	One of the land divisions where the project is located; central portion
Ponahawai	One of the land divisions where the project is located; north portion
Hilo Hanakahi	Region in Hilo south of the project
Keaukaha	Land division in Hilo Hanakahi south and east of the project
Wailoa	River running south of the project
Kanukuokamanu	Surfing area in Hilo Bay; east of project area and closer to the Wailoa River
Huia	Surfing area in Hilo Bay; east of project area
Hilo Palikū	Region in Hilo north of the project
Punahoa	Land division in Hilo One north of the project
Pi‘ihonua	Land division in Hilo One north of the project
Wailuku	River north of the project at the boundary of Hilo One and Hilo Palikū

The missionary William Ellis, during his trip around Hawai‘i Island in 1825, describes the lands around Hilo Bay as luxuriantly vegetated due to fertile soil. He documented the presence of plantations filled with bananas, plantains, sugarcane, potatoes, melons, and taro (Handy et al. 1972).

A century later, the methods of growing taro to fit the landscape of the region was documented in *Native Planters In Old Hawaii*:

In the marshes surrounding Waiakea Bay, east of Hilo [town], taro was planted in a unique way known as *kanu kipi*. Long mounds were built on the marshy bottom with their surface two or three feet above water level. Upon the top and along the sides of these mounds taro was planted. Flood waters which occasionally submerged the entire mound are said to have done no harm, as the flow was imperceptible... We are told that farther seaward in Waiakea taro is still grown by the ingenious method of heaping up stones around a taro *huli* which is submerged in water, and held upright by chunks of lava; the stones presumably accumulate refuse enough to nourish the taro, along with the food taken in by the roots from lava and water... On the lave-strewn plain of Waiakea, and on the slopes between Waiakea and the Wailuku River, dry taro was formerly planted wherever there was enough soil. (Handy et al. 1972:538, 539)

Besides extensive agriculture which marked the lands of South Hilo, there was at least one aquacultural complex documented in the vicinity of the project area. This was the fishpond called Hauna, previously called Hanauna, at the shoreline fronting Ponahawai and Punahoa (Maly and Maly 2003).

For ceremonial purposes, there was also a heiau, named Kanowa, which was erected just north of the project area in Pu‘u‘eo. Kamakau attributes the building of this heiau to Chief Kalani‘ōpu‘u:



I ka hiki ‘ana o Kalani‘ōpu‘u ma Hilo One, ho‘āla a‘ela ‘o ia i ka heiau o ke akua, aia ma Pu‘ueo, ‘o Kanowa ka inoa o ua heiau nei. A pau ke kapu ‘ana, ho‘i a‘ela ‘o Kalani‘ōpu‘u a noho ma ‘Ohele i Waiākea, a ‘o nā ali‘i ho‘i a me nā pūkaua, a me nā māmakakaua, a me nā pū‘ali a me nā koa, hele akula lākou i ke kaua ma Puna. (Kamakau 1996[1866]: 60)

*When Kalani‘ōpu‘u arrived at Hilo One, he raised a heiau at Pu‘ueo, Kanowa was the name of the heiau. After the sacred ceremony [for the heiau], Kalani‘ōpu‘u returned and stayed at ‘Ohele in Waiākea, and the chiefs together with the war leaders, and the companies of warrior went to battle in Puna.*

Kanowa Heiau is also recognized as one of six human sacrificial luakini heiau around Hawai‘i Island that was visited by the Ali‘i Wahine Keakealaniwahine. Her connection to this heiau in Hilo is recorded by the Hawaiian historian John Papa ‘Ī‘Ī:

Keakealaniwahine was once the ruler of all Hawaii, and was succeeded by her son Keawe i Kekahialiokamoku... When she became the ruler, she was in charge of all the heiaus on Hawaii. She offered human sacrifices in the six *luakini* heiaus of the six districts of Hawaii, which were Hikiau in Kona, Punaluu in Kau, Wahaula in Puna, Kanoa in Hilo, Honuau of Waipio in Hamakua, and Mookini in Kohala. (‘Ī‘Ī 1959:159,160)

### **Mo‘olelo**

As mentioned earlier, Hawaiian place names were connected to traditional stories by which the history of the places was preserved. These stories were referred to as:

Mo‘olelo, a term embracing many kinds of recounted knowledge, including history, legend, and myth. It included stories of every kind, whether factual or fabulous, lyrical or prosaic. Mo‘olelo were repositories of cultural insight and a foundation for understanding history and origins, often presented as allegories to interpret or illuminate contemporary life...Certainly many such [oral] accounts were lost in the sweep of time, especially with the decline of the Hawaiian population and native language. (Nogelmeier 2006:429, 430)

Still, a good amount of traditional stories managed to be recorded as Hawaiian society transitioned from an oral culture to a written one, and among those recorded were several versions of stories connected to the South Hilo region.

One such story that had been recorded in the Hawaiian language newspaper *Ka Hoku o Hawaii* is recounted as “Ka‘ao Ho‘oniua Pu‘uwai no Ka-Miki,” or “The Heart Stirring Story of Ka-Miki”:

[This mo‘olelo] is about two supernatural brothers, Ka-Miki (The quick, or adept, one) and Maka-‘iole (Rat [squinting] eyes), who traveled around the island of Hawai‘i along the ancient *ala loa* and *ala hele* (trails and paths) that encircled the island. During their journey, the brothers Ka-Miki and Maka-‘iole competed alongside the trails they traveled, and in famed *kahua* (contest arenas) and royal courts, against ‘*ōlohe* (experts skilled in fighting or in other competitions, such as running, fishing, debating, or solving riddles, that were practiced by the ancient Hawaiians). They also challenged priests whose dishonorable conduct offended the gods of ancient Hawai‘i. Ka-Miki and Maka-‘iole were empowered by their ancestress Ka-uluhe-nui-hihi-kolo-i-uka (The great entangled growth of *uluhe* fern which spreads across the uplands), a body form of the goddess Haumea...The traditions associate place names with people and events in history, and describe a broad range of sites and travel across the Hilo landscape...While the tradition does not specifically name Ponahawai... it is clear that the area described includes those lands [of Ponahawai and of others nearby]. (Maly and Maly 2003:10)

Another mo‘olelo relating to the area, documented by the historian Theodore Kelsey in 1921, points out that the land divisions of Kūkūau and Ponahawai are named after chiefesses. These two chiefesses were sisters, and they once lived in the Ponahawai-Kūkūau area (Maly and Maly 2003).

Kamakau also mentions Hilo in the story of the great navigator Kila. Kila and his brothers were sent to Kahiki to bring back the chief, La‘a. However, when they arrived at Kahiki, the chief, ‘Olopana, refused to allow La‘a to return to Hawai‘i. So the navigators returned to Hawai‘i without La‘a, and after landing in Puna and Hilo, Kila remained there and became a chief of Hawai‘i Island (Kamakau 1991).

## Oli and Mele

The noteworthiness of specific locales in Hawaiian culture is further bolstered by their appearances in traditional chants. An oli refers to a chant that is done without any accompaniment of dance, while a mele refers to a chant that may or may not be accompanied by a dance. These expressions of folklore have not lost their merit in today’s society. They continue to be referred to in contemporary discussions of Hawaiian history, identity, and values.

One such chant, *Hea ‘Oe Kahaiolama*, acknowledges that Hilo belongs to the great chief, Kamehameha. In this chant the chiefess Kalama is in dialogue with Kamehameha I, and he assures her that indeed, all of Hawai‘i Island, including Hilo district, is his (Bacon and Napoka 1995:194, 195):

### Hea ‘Oe Kahaiolama

KAMEHAMEHA: Hea ‘oe Kahaiolama.	KAMEHAMEHA: Where are you, O Kalama?
KALAMA: He maka‘u mai au lā iā Ka‘ahumanu.	KALAMA: I am afraid of Ka‘ahumanu.
KAMEHAMEHA: Mai maka‘u mai ‘oe.	KAMEHAMEHA: Do not be afraid.
No‘u o luna, no‘u o lalo,	All above is mine, all below is mine,
No‘u o Kohala,	Kohala is mine,
No‘u o Hāmākua,	Hāmākua is mine,
No‘u o Hilo,	Hilo is mine,
No‘u o Puna,	Puna is mine,
No‘u o Ka‘ū,	Ka‘ū is mine,
No‘u o Kona,	Kona is mine,
No‘u nā wahi āpau-o-loa	Everywhere is mine
CONTRIBUTOR: Mrs. Kaimu Kihe, Pu‘uanahulu, North Kona, Hawai‘i. <i>Mele kake</i> .	

Hilo is also mentioned in a name chant honoring King Kamehameha II, or Liholiho, who was born in that district. In this mele, performed as a hula pa‘i umauma or chest-slapping chant, a poetic reference is made to the lehua flower for which Hilo is particularly known (Lyrics and translation to this mele along with its accompanied descriptions are from the [www.huapala.org](http://www.huapala.org) database compiled by Kanoa-Martin):

### A Hilo Au (I Was At Hilo)

A Hilo au e lā	At Hilo
----------------	---------

Ho‘olulu ka lehua lā	I gather the lehua
A Wailuku e lā	At Wailuku
I ka lua kanaka lā	The man-destroying pit
A Haili e lā	At Haili
I ke kula manu lā	Is a plain inhabited by birds
A Pana‘ewa e lā	At Pana‘ewa
I ka moku lehua lā	With its groves of lehua trees
A Lele‘iwi e lā	At Lele‘iwi
‘Au‘au i ke kai lā	I swim in the sea
A Moloka‘i e lā	At Moloka‘i
‘Ike ala kāhi lā	I see one road
A Mauna Loa au lā	At Mauna Loa
I ka lua ko‘i hala lā	Is the adze quarry
Ha‘ina mai ka puana lā	Tell the refrain
No ka lani nō he inoa lā	In the name of the chief
He inoa nō Liholiho	The name-song for Liholiho

Source: - This pa‘i umauma or chest slapping chant was composed for Liholiho who ruled the Hawaiian kingdom as Kamehameha II from 1819 to 1824. Verse 1 is in reference to Hilo, his birthplace, and his departure from Hilo to Kona. The lehua is symbolic of a young girl. Verse 2, the man-destroying hole is a cave for prisoners who committed misdemeanors. Verse 5, Lele‘iwi heiau and the surrounding area was named after a despotic chief whose bones were desecrated by throwing them into the sea at this point of land, north of Hilo. The name immortalized this event. The heiau is where people were blessed and protected from harm in the water, for the sea had healing qualities for Hawaiians. Verse 6, Moloka‘i is a reference to: 1) a sea outside of the Hilo coastline and 2) an ancient path on Moloka‘i. This is the poetic kaona for the chief travelling. Verse 7, Maunaloa is a place where adze makers gathered their stone called ‘alā to make stone adzes, another poetic kaona reference. Told to M. Gay by Iolani Luahine and Edith Kanaka‘ole. Edited by Dr. Barbara Price

Hilo is mentioned again, in yet another chant honoring the ali‘i, this time the Ali‘i Wahine Emalani. This chant commemorates her visit to the area and remarks that Hilo and Puna are made more beautiful when decorated with the leis of Waiākea, leis which are for Chiefess Emalani (Pukui and Korn 1979:75–78).

#### **Lei nō Emalani**

E hea aku nō au iā Kalani  
E ō mai ‘oe i kō inoa lei!  
He kākua nō ka lei i Mōkaulele,  
He pewa nō ka lei o ‘Ōhi‘akalani,

#### **Lei Chant for Queen Emma**

I chant this song in praise of my Queen.  
Answer, beloved Queen, to your lei chant!  
The lei-carrier comes from Mōkaulele,  
The bundle-bearer from ‘Ōhi‘akalani,

He kīhene lei o Kani‘ahiku.	The lady with the lei-basket from Kani‘ahiku.
He ‘ahiku ka nani o Puna me Hilo	Puna and Hilo are made seven more times beautiful
He kilohana lei o Waiākea.	When bedecked with the finest leis of Waiākea.
Lawea ka lei a kau i Ka-Maka-o-Kū,	Bring these leis and present them to
Kū mai o ka lani Kaumaka,	The-Eye-Of-Kū, Queen Kaumaka
Ke ali‘i nona ka lei.	Who now stands forth in radiance
O pāpahi i ka lei i ke po‘o,	She whose leis these are takes them
O ho‘onu‘anu‘a ka lei i ka ‘ā‘ī.	To crown her head, fall from her neck
Ke kui lei ‘o Kolopulepule,	Kolopulepule strung them for her,
He amo lei ‘o Wailuku.	Wailuku bore them to her.
O ke ola e	Her shoulders.
O kahua o ka lei ‘o Waiānuenue,	May the Queen long so live! Waiānuenue is keeper,
O ka he‘e o ka lei kai ā Wailoa,	Wailoa is bestower,
O ka ho‘onoho o ka lei iā Waiākea,	Waiākea is arranger,
O ka wili o ka maile kai ā Hina,	Winder of the maile is Hina,
O ka pa‘a o ka ‘omou kai ā Māui.	The bundle-bearer holding the lei pegs is Māui.
Nīnau mai ‘o Kekele-a-Iku:	Kekele-a-Iku asks:
‘O wai ke ali‘i nona ka lei?	Who is the Chiefess these leis are to praise?
‘O wai ho‘i kāmā o kalani ka manomano,	What brought so many givers of garlands here, all to foregather in praise?
O ke ali‘i nona ka lei?	None but the Queen most worthy of honor.
He lei nō Emalani.	A lei chant for Emalani.

Two other mele which mention Hilo have been recorded in the compilation of chants in the book *Nā Mele Welo: Songs of Our Heritage*. Both of these mele similarly convey that Hilo is a place of great rains. The first mele is described as one which can be accompanied with a presentation of string-figures. The other mele is documented as one which utilizes sticks in its dance (Bacon and Napoka 1995:96, 97, 202, 203).

#### **Nā Moku ‘Eono o Hawai‘i Nei**

Ka lā, ka lā, i ke kula o Ahu‘ena	The sun, the sun shines on the plain of Ahu‘ena,
Komo i ka la‘i o Kailua ē, o Kona.	It comes to peaceful Kailua --- that is Kona.
‘O Kona ia o ke kai malino a Ehu,	It is Kona, home of the calm sea of Ehu,
E hele ana i waho o Pulau.	Extending all the way out to Pulau.
Kani ka hoe i Wai‘ula‘ula.	The traveler whistles at Wai‘ula‘ula

I ke ala a ke kanaka e hele nei,	On the much-traveled road.
Hō‘ea i Ka‘ū.	Ka‘ū is reached.
‘Ō Ka‘ū ia, ‘o Ka‘ū nui kua makani,	This is Ka‘ū, great Ka‘ū of the windblown back,
Kū ka ‘e‘a o ka lepo.	Which swirls the dust upward.
Lele koa‘e o ka pali kaulana o Kaumaea.	The game of dust-leaping is at the famous hill of Kaumaea.
Hō‘ea i Puna.	Puna is reached.
‘O Puna ia lā, ‘o Puna i ke kai kōloa,	This is Puna, Puna of the moaning sea,
Ken ū hele ala i ka ulu hala	Which groans to the hala grove
I ke kai o Puna o Kea‘au.	At Kea‘au in Puna.
Hō‘ea i Hilo.	Hilo is reached.
‘O Hilo ia lā o ka ua kinakinai	This is Hilo of the endless rain,
He ua lū lehua ia no Pana‘ewa,	A rain that pelts the lehua of Pana‘ewa,
I kinai i ka ua o ke kila	A beating, relentless rain,
He ua mao ‘ole kaulana o Hilo.	The famous endless rain of Hilo.
Hō‘ea i Hāmākua.	Hāmākua is reached.
‘O Hāmākua ia o kalawa i ka pali,	This is Hāmākua of the sheer cliffs,
He ‘ūlili ke ala e hiki ai.	Steep is the trail to go.
CONTRIBUTOR: Z. P. Kalokuokamaile, Nāpo‘opo‘o, South Kona, Hawai‘i. Mele hei [String-figure chant].	

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#### **Pāuli Hiwa maila ka Lani o Hilo**

Pāuli hiwa mailaka lani o Hilo,	Dark and lowering is the sky of Hilo,
Kalani a ka ua i ‘ō‘ō a nakele,	The rain breaks through the sky and falls.
A nakele Hilo i ka ua a naha,	Hilo is made boggy by the rain with the swelling of the streams.
Nahā mai kekahi maha o ka hala,	The water breaks through to the hala-covered slope,
Mapēpē i holo ka maha o ka ‘ōhi‘a.	It presses down as it rushes through the ‘ōhi‘a-covered slopes.
Hapaina a‘ela e ka ua a kelakela,	The rain seems to raise them up high.
Kelakela Mokulau i ‘a‘ā ka lehua.	High is Mokulau, bright with lehua blossoms,
Lehua noho ma kea nu i uka o Kali‘u.	The lehua which dwells in the upland of Kali‘u.
I nani ka pili e, aia e ka aloha,	Beautiful is the companionship when love abides.

A hele a'e ke aloha, a hemo ka pili.

When love departs, companionship is broken.

CONTRIBUTOR: Samuela Akoni Mika Waiākea Homesteads, Hilo Hawai'i. Hula lā'au. [Stick dance]. Akoni learned this from his parents on Kaua'i.

### **‘Ōlelo No‘eau**

Like *oli* and *mele*, traditional proverbs and wise sayings, also known as *‘ōlelo no‘eau*, have been another means by which the history of Hawaiian locales have been recorded. In 1983, Mary Kawena Pukui published a volume of close to 3,000 *‘ōlelo no‘eau* that she collected throughout the islands. The introductory chapter of that book reminds us that if we could understand these proverbs and wise sayings well, then we would understand Hawai'i well (Pukui 1983).

None of the *‘ōlelo no‘eau* in Pukui's volume mention Ponahawai, and only one was found which specifically refers to Kūkūau, and likewise only one specifically refers to Waiākea. The one referring to Kūkūau recalls a story about the relationship between two brothers who lived in the Kūkūau-Pu'u'eo area. The *‘ōlelo no‘eau* referring to Waiākea recalls a type of fishing which utilizes a snare made from coconut midribs and coconut husks. The two sayings are as follows (Pukui 1983:212, 318):

#### **Kūkūau**

Le'a ka 'ai a ka 'iole, ua nui ka 'ili.

*The rats joyously eat their fill, there are many skins [remaining].*

There were two Hilo brothers who lived at Kukuau and Pu'ueo. The latter was very prosperous but neglectful of his needy brother. One day the Kukuau man decided to visit his wealthy brother and found many friends eating. After watching them for a while he made this remark. It was overheard by someone who reported it to their host. When he came to see who it was he found that it was his own brother. Sadly he realized then how he had neglected his own kin while outsiders enjoyed his wealth. This saying is sometimes used for one who does for outsiders but neglects his own.

#### **Waiākea**

Waiakea pepeiao pulu 'aha.

*Waiakea of the ears that hold coconut-fiber snares.*

Snares for small fish, shrimp, or crabs were made of coconut midrib and the fiber from the husk of the nut. When not in use the snare was sometimes placed behind the ear as one does a pencil. This saying is applied to one who will not heed --- he uses his ears only to hold his snare.

In contrast, there are many *‘ōlelo no‘eau* in which Hilo's name is memorialized. Well over half of these sayings refer to the rains of Hilo in some way, a testament that Hilo is indeed known for its rainy weather. Outside of those *‘ōlelo no‘eau* speaking of the rain, one saying refers to the noted farmers of the district, while the rest of the sayings use Hilo's environment; its sand, sea, and streams; and its famous lehua blossoms; in its imagery. (Pukui 1983:40, 53, 54, 56, 107, 108, 118, 135, 167, 168, 173, 186, 188, 190, 207, 253, 287).

#### **Hilo**

‘Ele‘ele Hilo, panopano i ka ua.

*Dark is Hilo, clouded with the rain.*

Hilo is always rainy.

Halulu me he kapua‘i kanaka la ka ua o Hilo.

*The rain of Hilo makes a rumbling sound like the treading of feet.*

Hana Hilo i ka po‘i a ka ua.

*Hilo works on the lid of the rain.*

Refers to the constant shower typical of Hilo district on Hawai‘i.

Hana mao ‘ole ka ua o Hilo.

*Endlessly pours the rain of Hilo.*

Said of anything that goes on and on, as the pouring rain, or of havoc such as that produced by a torrent.

Hilo ‘ai lū‘au.

*Hilo, eater of taro greens.*

The people of Hilo were said to be fond of cooked taro greens. When storms came to Hilo it was impossible to obtain fish from the streams or the sea. The people had to be content with taro greens.

Hilo ‘āina ua lokuloku.

*Hilo of the pouring rain.*

Hilo i ka ua Kanilehua.

*Hilo of the Kanilehua rain.*

The Kanilehua rain, or the rain that patters in the *lehua* forest, is frequently referred to in the chants and songs of Hilo.

Hilo i ka ua kinakinai, ka ua mao ‘ole.

*Hilo of the constant rain, where it never clears up.*

Hilo mahi ha‘aheo.

*Hilo of the proud farmers.*

The climate makes the soil of Hilo very easy to till, so the farmers used to make a game of planting. They used long digging sticks to make the holes and wore *lei* to work. Working in unison, they make a handsome picture.

Hilo, nahele paoa i ke ‘ala.

*Hilo, where the forest is imbued with fragrance.*

Hilo's forest is fragrant with *hala* and *lehua* blossoms.

Hilo pa'ele ku.

*Hilo is dark all over.*

The rain, mist, and mud make Hilo dark.

Ho'onu'a Hilo i ka lehua.

*Hilo produces the lehua in abundance.*

Inu wai kōli'uli'u o Hilo.

*Drink the waters of the distant sky in Hilo.*

The rain of Hilo is a chief source of drinking water.

Ka ua he'e nehu o Hilo.

*The nehu-producing rain of Hilo.*

The people knew the season when the schools of *nehu* fish followed the rain.

Ka ua Kanilehua o Hilo.

*The Kanilehua rain of Hilo.*

Hilo, where the rain moistens the *lehua* blossoms.

Kai i ka lani ka holowa'a ua o Hilo.

*Placed high in heaven is the rain trough of Hilo.*

An expression of admiration for a person of regal bearing.

Ke kai leo nui o Paikaka.

*The loud-voiced sea of Paikaka.*

Paikaka is in Hilo.

Ke koa ia e laumeki ai kahawai o Hilo.

*That is the warrior who will dry the streams of Hilo.*

A powerful warrior.

Ke one 'anapa o Waiolama.

*The sparkling sand of Waiolama.*

This is an expression much used in chants of Hilo, Hawai'i. Waiolama is a place between Waiakea and the town of Hilo. It was said to have sand that sparkled in the sunlight.



Ku pāpū Hilo i ka ua.

*Hilo stands directly in the path of the rain.*

Noho maialile ka ua o Hilo, ‘elua wale no māua.

*Keep your silence, O rain of Hilo, there are only two of us.*

Uttered by Kanuha in retort when rebuked by Reverend Titus Coan for Sabbath-breaking: “Hold your silence, for there are only two of us in authority” --- meaning Kanuha and Governor Kuakini. Rev. Coan was not to give orders when either was present. Now it is used to mean, “Keep quiet. You’re not the boss around here.”

Pau kea ho i ke kahawai lau o Hilo.

*One’s strength is exhausted in crossing the many streams of Hilo.*

Said of or by one who is weary with effort. First uttered by Hi‘iaka in a chant when she found herself weary after a battle with the lizard god Pana‘ewa.

Pāuli hiwa ka lani o Hilo.

*Black with rainclouds is the sky of Hilo.*

Sometimes said in humor when a dark-skinned person is seen.

### **Hilo in the Historic Era**

Hilo, being on the island of Hawai‘i, witnessed multiple changes in its political rule in the years just prior to Western contact. In the early 18<sup>th</sup> century, Chief Alapa‘i ruled the entire island of Hawai‘i. But due to internal strife, it became divided with Alapa‘i ruling the northern portion and Kalani‘ōpu‘u ruling the southern districts of Ka‘ū and Puna. In 1754, Alapa‘i died, and his son Keawe‘ōpala inherited the governance of Alapa‘i’s lands. However, later that same year, Kalani‘ōpu‘u wrested control of Keawe‘ōpala’s lands, and because of that, Kalani‘ōpu‘u became the ruler of the entire island. When Kalani‘ōpu‘u died in 1782, the governance of Hawai‘i went to his son Kīwala‘ō. However, it was not long before Kīwala‘ō’s rule was challenged by Kalani‘ōpu‘u’s brother’s son, Kamehameha, who was the keeper of the god, Kūkā‘ilimoku. In a subsequent battle between Kīwala‘ō’s and Kamehameha’s forces, Kīwala‘ō was killed, and Kamehameha took his place. Following that decisive battle, the governance of Hawai‘i Island was divided into three parts. Kamehameha ruled the northern half from Hāmākua to Kohala to Kona. Keawema‘uhili, the brother of the deceased Chief Kalani‘ōpu‘u, ruled out of Hilo, and Keōuakū‘ahu‘ula, a son of Kalani‘ōpu‘u, ruled the districts of Ka‘ū and Puna. Eventually, Keawema‘uhili was killed by Keōuakū‘ahu‘ula’s forces after which Keōuakū‘ahu‘ula divided the lands of Hilo between himself and his warriors. Not long after that, Keōuakū‘ahu‘ula was defeated by Kamehameha’s army, giving Kamehameha complete rule over the entire island. From there Kamehameha set out to unify the rest of the Hawaiian Islands under his rule (translations in italics by D. DuHaylonsod):

Ho‘i akula ‘o Alapa‘i i Hawai‘i i ke kaua, a ua lanakila ‘o Alapa‘i ma luna o nā ali‘i o Hawai‘i, a ua luku ‘ia nā ali‘i o Hawai‘i, a ua hui ‘ia i ho‘okahi aupuni ma lalo o Alapa‘i.  
(Kamakau 1996[1866]:1)

*Alapa'i returned to Hawai'i Island to do battle, and Alapa'i emerged victorious over the chiefs of Hawai'i Island, the chiefs were slaughtered, and the entire kingdom was gathered as one under Alapa'i.*

I ke kaua 'ana i Mahinaakāka ke kū ka'awale 'ana o Kalani'ōpu'u e noho mō'i no Ka'ū me Puna, no ka mea, he ali'i kama'āina 'o Kalani'ōpu'u no Ka'ū, a 'o kona one hānau ia o kona mau mākuā. Ho'i maila 'o Alapa'i a noho ma Hilo, a hala ka makahiki, ho'i maila 'o ia a noho ma Waipi'o. A pau kona noho 'ana ma Waipi'o. Ho'i maila 'o Alapa'i me nā ali'i a hiki ma Waimea, a 'o kekahi po'e, ma kai o ka 'au wa'a, a pae i Kawaihae. Ho'i akula 'o Alapa'i mai Waimea aku a Lanimaomao, loa'a ihola i ka ma'i... Ma Kikiako'i, make ihola 'o Alapa'i. I ka A.D. 1754, noho ali'i ihola 'o Keawe'ōpala no ke aupuni o Hawai'i (Kamakau 1996[1866]:13).

*From the battle at Mahinaakāka, Kalani'ōpu'u emerged as the king of Ka'ū and Puna, because Kalani'ōpu'u was a native chief of Ka'ū, and it was the birthplace of his parents. Alapa'i returned to Hilo, and after sometime, he went to live at Waipi'o. After living at Waipi'o, Alapa'i and his chiefs went to Waimea, and others, by way of canoes, landed at Kawaihae. Alapa'i went from Waimea to Lanimaomao, he became ill... At Kikiako'i, Alapa'i died. In the year 1754, Keawe'ōpala (the son of Alapa'i) became the ruler of Hawai'i.*

'Ōlelo aku ke kahuna ma hope o Kalai'ōpu'u [another name for Kalani'ōpu'u], 'o Holo'ae ka inoa, [“]Eia ka mea e make ai 'o Keawe'ōpala, aia a make 'ē ke kahuna ma mua o Keawe'ōpala, a laila, lilo ke aupuni iā 'oe, no ka mea, 'o ke kahuna ka mea e pa'a ai ke aupuni iā Keawe'ōpala.[“]... ua hopu 'ia ke kahuna o Keawe'ōpala, ua pepehi 'ia a kālua 'ia e Kalani'ōpu'u me ka ho'omāinoio 'ia... I ka makahiki A.D. 1754, ua lilo holo'oko'a ke aupuni o Hawai'i iā Kalani'ōpu'u (Kamakau 1996[1866]:13,14).

*The kahuna under Kalai'ōpu'u, whose name was Holo'ae, spoke, “Here is the way Keawe'ōpala will die, first his priest must die, and then, the kingdom will go to you, because it is the priest who keeps the kingdom securely under Keawe'ōpala's rule... the priest of Keawe'ōpala was captured, and he was tortured, killed and burned in the pit by Kalani'ōpu'u... In the year 1754, the entire kingdom of Hawai'i went under the rule of Kalani'ōpu'u.*

I ka pau 'ana o ka wā hī 'ahi o Kalae, mana'o ihola 'o Kalani'ōpu'u e ho'i i Kona, akā, ua loa'a 'ē 'o ia i ka ma'i, no laila, ho'i maila 'o ia a noho ma Ka'iliki'i i Waio'ahukini ma Pākini; māhuahua loa ka ma'i, a make nō ma laila. I ka iwakāluakumamāiwa makahiki [ia] o kona noho ali'i 'ana ma luna o ke aupuni o Hawai'i. A 'o nā makahiki a pau o kona ola 'ana, he kanahikukumamāiwa, a make ihola 'o ia i ka malama 'o Ianuari, i ka A.D. 1782 (Kamakau 1996[1866]:62).

*When he was finished trolling for 'ahi at Kalae, Kalani'ōpu'u decided to return to Kona, but he became sick, and therefore, he went to stay at Ka'iliki'i in Waio'ahukini at Pākini; the illness intensified, and he died there. His reign over the kingdom of Hawai'i lasted twenty-nine years. And he lived for seventy-nine years, and died in the month of January, 1782.*

I ka noho 'ana o Kalani'ōpu'u ma Kohala, ua ho'oholo ihola nā ali'i a me nā kuhina, e kauoha 'ia ke keiki ho'oilina o ke aupuni (Kalanikaukeaoulīkīwala'ō)... Aia a make 'o Kalani'ōpu'u, a laila, e ili aku ke aupuni i ka ho'oilina (Kamakau 1996[1866]:59–60).

*When Kalani'ōpu'u was staying at Kohala, the chiefs and the cabinet members decided, and the command would be given that the child Kīwala'ō would be the next heir to the kingdom... Kalani'ōpu'u died, and then, the heir inherited the kingdom.*

I ko Kamehameha mā hiki 'ana mai ma hope, ua ho'omaka mua aku 'o Ke'eaumoku i ke kaua i ko Kīwala'ō mau koa... A 'ike akula 'o Ke'eaumoku iā Kīwala'ō e huli ana i lalo, kokolo akula 'o ia me ka leiomano ma ka lima, a papa'i a'ela ma ko Kīwala'ō kani'ā'i, a make loa ihola ia... 'O ke 'auhe'e ihola nō ia o nā ali'i a me nā koa o Kīwala'ō. 'O Keōuakū'ahu'ula ho'i a me kekahi po'e ali'i... holo akula i Ka'ū, a lilo ihola 'o Keōuakū'ahu'ula i mō'i no Ka'ū a me Puna... 'O Keawema'uhili nō ho'i ke ali'i kapu i ke au o Alapa'inui... a hele akula a hiki i Hilo, a lilo ihola 'o ia i ali'i no kekahi hapa o Hilo, a me kekahi hapa ho'i o Puna, a pēlā nō ho'i 'o Hāmākua... Lilo ihola 'o Kona, Kohala a me kekahi hapa o Hāmākua iā Kamehameha. Lilo ihola ka mokupuni 'o Hawai'i i mau aupuni 'ekolu, a 'ekolu nō ho'i mau mō'i (Kamakau 1996[1866]:73–74).

*When Kamehameha arrived later, (his warrior-general) Ke'eaumoku had already started the battle with Kīwala'ō's warriors... Ke'eaumoku saw Kīwala'ō facing down, he crawled with a leiomano weapon in his hand, and struck at Kīwala'ō's throat, and Kīwala'ō died... The chiefs and the warriors of Kīwala'ō fled. Keōuakū'ahu'ula and some chiefs sailed to Ka'ū, and Keōuakū'ahu'ula became the king of Ka'ū and Puna... Keawema'uhili also, he was a sacred chief from the time of Chief Alapa'i... Keawema'uhili went to Hilo, and he became the chief of parts of Hilo, Puna, and Hāmākua... Kona, Kohala and a portion of Hāmākua became lands of Kamehameha. The island of Hawai'i was divided into three kingdoms, and with three kings.*

Ki'i maila 'o Keōuakū'ahu'ula e kaua iā Keawema'uhili. Kaua ihola lāua i kinohi, a he'e 'o Keawema'uhili; a kaua hou ihola ma 'Alae, ma Hilo Palikū, ua pepehi 'ia 'o Keawema'uhili, a make pū ihola kekahi ali'i, 'o Kāo'o kona inoa, he kaiko'eke nō ho'i nona. Luku nui akula 'o Keōuakū'ahu'ula i nā koa o Keawema'uhili. A lilo a'ela 'o Hilo iā Keōuakū'ahu'ula... I ko Keōuakū'ahu'ula noho 'ana ma Hilo, a 'oki'oki ihola i ka 'āina no kona mau ali'i a me kona mau pū'ali koa. 'O ka 'anae pū kō momona o Waiākea me Pi'opi'o [na lākou ia]. A pau ko Keōuakū'ahu'ula noho 'ana ma Hilo a mana'o ihola 'o ia me kona mau ali'i me nā pū'ali koa e ho'i i Ka'ū (Kamakau 1996[1866]:105,106).

*Keōuakū'ahu'ula came to do battle against Keawema'uhili. They fought in the beginning, and Keawema'uhili fled; and they fought again at 'Alae, at Hilo Palikū, Keawema'uhili was killed, together with another chief named Kāo'o, who was a brother-in-law of his. Keōuakū'ahu'ula destroyed the warriors of Keawema'uhili terribly. And Hilo fell to Keōuakū'ahu'ula... While Keōkū'ahu'ula was staying at Hilo, he divided the lands for his chiefs and warriors. The mullet also together with the abundance of Waiākea and Pi'opi'o were theirs. Keōuakū'ahu'ula was done staying at Hilo and he decided to return to Ka'ū with his chiefs and warriors.*

Ki'i akula 'o Keaweaeulu a me Kamanawa, nā kuhina o Kamehameha, iā Keōuakū'ahu'ula, ka mō'i o ka 'ao'ao hikina o ka mokupuni 'o Hawai'i... nīnau ihola 'o Keōua, 'He aha kā 'olua huaka'i?' Pane a'ela 'o Keaweaeulu mā, 'I ki'i mai nei nō māua iā 'oe, 'o 'oe nō ke keiki a ko māua kaikua'ana haku; i ki'i mai nei iā 'oe, e holo kākou i Kona, a hui pū me kō kaikaina... E ho'opau i ke kaua 'ana ma waena o 'olua... Holo akula nō lākou nei a kokoke e pili i Mailekini ma Kawaihae... Kū maila nō ho'i 'o Keōuakū'ahu'ula a kāhea mai iā Kamehameha, 'Eia au lā.' Kāhea mai nō ho'i 'o Kamehameha, 'Kū mai, a hele mai e 'ike kāua.' Kū a'ela nō ho'i 'o Keōuakū'ahu'ula me ka mana'o e lele mai i uka; e hou mai ana 'o Ke'eaumoku i ka pololū... A 'o Keōua a me kekahi po'e 'ē a'e ma ko lākou wa'a, ua pau loa lākou i ka make... I ka make 'ana o Keōuakū'ahu'ula, ke keiki a Kalani'ōpu'u, ka mō'i o Hawai'i, a kau 'ia 'o ia ma

Pu'ukoholā ma Kawaihae, a laila, ua holo'oko'a ke aupuni o ka mokupuni 'o Hawai'i iā Kamehameha (Kamakau 1996[1866]:110–113).

*Keaweakeulu and Kamanawa, the cabinet members of Kamehameha, went to get Keōuakū'ahu'ula, the king of the eastern side of Hawai'i Island... Keōua asked, "Why have you two journeyed?" The two travelers answered, "We have come to get you, you are the child of our older brother, Chief [Kalani'ōpu'u]; we have come to get you that we may all sail to Kona and meet with your younger brother [cousin Kamehameha]... to put an end to the warfare between you two... They all sailed and approached close to Mailekini at Kawaihae... Keōuakū'ahu'ula stood and called out to Kamehameha, "Here I am." Kamehameha called back in return, "Stand up and come, let us see." Keōuakū'ahu'ula stood up with the thought of fleeing inland; (Kamehameha's warrior uncle) Ke'eumoku threw his spear... Keōua and the other people on that canoe, they all died... At the death of Keōuakū'ahu'ula, who was the child of Kalani'ōpu'u, the former king of Hawai'i, Keōuakū'ahu'ula was placed on the sacrificial heiau of Pu'ukoholā at Kawaihae, and then, the entire kingdom of Hawai'i Island became under the one rule of Kamehameha.*

### **Arrival of Westerners**

Amid the battles for rule over Hawai'i Island at the end of the 18<sup>th</sup> century, there arrived the first Western explorers to the Hawaiian Islands. Captain Cook is distinguished as being the first to have arrived, in 1778. Following Captain Cook's appearance, knowledge of the location of the Hawaiian Islands spread across the sea. This opened the floodgates of Westerners to Hawai'i's shores, and it would forever change the fabric of the traditional lifestyle.

Among the early arrivals of foreigners to Hawai'i, and noted in the history of Hilo, were sandalwood traders and Christian missionaries. And on the heels of the missionaries and sandalwood traders came the sugarcane industry entrepreneurs. Though each of their agendas differed, they all left their mark on Hawai'i Island as it transitioned from the traditional era to the contemporary.

### **Missionary Activities**

Leading the cause to evangelize the Pacific were the American Board of Commissioners for Foreign Missions (ABCFM) and the London Mission Society. The landing of the American Board of Foreign Missions on Hawai'i's shores in 1820 could not have come at a more opportune time. Just a year earlier, Liholiho, or Kamehameha II, became the new king, and soon after that, he abolished the ancient traditional religion (Ellis 1963[1827]).

In 1823, British missionary William Ellis... [and other missionaries from the ABCFM] toured the island of Hawai'i seeking out primary community in which to establish church centers for the growing Calvinist mission. Within the year following the visit of Ellis and the members of the A.B.C.F.M., a church was established, and by mid 1825, school was being attended by native students. The school evolved into the Hilo Boarding School that was situated in the lands of Punahoa and Ponahawai for nearly 100 years. (Maly and Maly 2003:25, 29)

### **Sandalwood Trading**

Ellis also noted in his journal the active harvesting of sandalwood by the chief of Waiākea, named Ma'alo, and several hundred of the natives of the area. According to Ellis, great quantities of the sandalwood trees were cut down and prepared for ships destined to supply the demand for it in

China. The Hawaiian sandalwood trade resulted in a market exchange for Asian and European goods (Maly and Maly 2003:25, 26).

### **Sugarcane Industry**

Connected to the arrival of Christian missionaries were the eventual start up of large scale capitalist agricultural enterprises throughout the Hawaiian Islands. For Hilo, this initially took the form of the clearing of land for a sugarcane plantation operated out of Ponahawai.

One result of the missionary effort through the islands was to bring the traditionally dispersed native population into western-style towns and population centers, where the fold could be kept under the watchful eyes of church leaders... As foreign crops were introduced Hawaiian agricultural systems and production were significantly modified. In ca. 1839, Governor Kuakini ordered land to be cleared in Ponahawai, and Hilo's largest sugar plantation was planted... This specialization of crop production had a significant impact on native Hawaiian crop production, subsistence agriculture, land use, and the cultural landscape. (Maly and Maly 2003:35, 36)

Thus, the natural landscape and the traditional lifestyle of Hilo would be altered in the first half of the 19<sup>th</sup> century, and for better or worse, these changes would prove to be permanent.

### **Changes in Land Tenure**

Within a decade after the opening of the Ponahawai plantation, and the establishment of other plantations throughout the islands, radical changes were made to the traditional land tenure system of Hawai'i. These changes were instituted by the king at a time when an increased presence of Westerners in Hawai'i brought pressure to Hawaiian governance.

Kamehameha III's government stood upon the crumbling foundations of a feudal autocracy that could no longer handle the weight of geo-political and economic forces sweeping across the islands. Uniformity of law across the realm and the centralization of authority had become a necessity. Foreigners were the source of many of these difficulties. (Sai 2008:62)

"Several legislative acts during the period 1845–1855 codified a sweeping transformation from the centuries-old Hawaiian traditions of royal land tenure to the western practice of private land ownership" (Moffat and Fitzpatrick 1995). Most prominent of these enactments was the Māhele of 1848 which was immediately followed by the Kuleana Act of 1850.

The Mahele was an instrument that began to settle the undefined rights of three groups with vested rights in the dominion of the Kingdom --- the government, the chiefs, and the *hoa'āina*. These needed to be settled because it had been codified in law through the Declaration of Rights and laws of 1839 and the Constitution of 1840, that the lands of the Kingdom were owned by these three groups... Following the Mahele, the only group with an undefined interest in all the lands of the Kingdom were the native tenants, and this would be later addressed in the Kuleana Act of 1850. (Beamer 2008:194, 195)

Although the Māhele had specifically set aside lands for the King, the government, and the chiefs, this need not be interpreted as a selfish act which alienated the *maka'āinana* from the land. The reciprocal relationships between the commoners and the chiefs continued to exist, and for this reason, perhaps the chiefs were expected to better care for the commoners' rights than the commoners themselves who arguably might not have been as well versed in foreign land tenure systems. Indeed, the *ahupua'a* rights of the *maka'āinana* were not extinguished with the advent of

the Māhele, and Beamer points out that there are “numerous examples of *hoa‘āina* living on Government and Crown Lands Post-Mahele which indicate the government recognized their rights to do so” (Beamer 2008:274).

*Hoa‘āina* who chose not to acquire allodial lands through the Kuleana Act continued to live on Government and Crown Lands as they had been doing as a class previously for generations. Since all titles were awarded, “subject to the rights of native tenants.” The *hoa‘āina* possessed habitation and use rights over their lands. (Beamer 2008:274)

For those commoners who did seek their individual land titles, the process they needed to follow consisted of filing a claim with the Land Commission; having their land claim surveyed; testifying in person on behalf of their claim; and submitting their final Land Commission Award to get a binding royal patent. However, in actuality, the vast majority of the native population never received any land commission awards recognizing their land holdings due to several reasons, such as their unfamiliarity with the process, their distrust of the process, and/or their desire to cling to their traditional way of land tenure regardless of how they felt about the new system. In 1850, the king passed another law, this one allowing foreigners to buy land. This further hindered the process of natives securing lands for their families. Still, natives did receive land, and for Hilo One, most of the land awards received were small parcels close to the coast or near the fishponds, hinting to a way of life that was still traditional. Several contemporary sources provide further details:

It is through records for Land Commission Awards (LCA parcels) generated during the Māhele that the first specific documentation of daily activities in Pōnahawai, Kūkūau, and Waiākea Ahupua‘a, as it had evolved up to the mid nineteenth century, come to light. A total of 61 LCAs were granted to individuals within the subject ahupua‘a. (Wilkinson et al. 2012:28)

#### Ponahawai:

A thorough review of all records of the Māhele, revealed that twenty-seven claims for *kuleana* in Ponahawai, under twenty-nine *Helu* were filed before the Commission. Of the total number of claims, four were from foreign residents (including the Hilo Mission Station), and the remainder were native residents. Twenty-two claims were awarded, and contained approximately 44 and 2/10ths acres of the total available land in Ponahawai. Five of those claims also included land situated in Punahoa (two of which were A.B.C.F.M. claims). (Maly and Maly 2003:50)

#### Kūkūau:

Fourteen *kuleana* parcels were awarded within these two ahupua‘a [Kūkūau 1 & 2]. According to Hunt and McDermott (1994:14), “[m]ost of Kukuau 1 Ahupua‘a (LCA 8515) was awarded to Keoni Ana (son of John Young and Kaoanaeha, the daughter of Keli‘imaika‘i). LCA 8521-B included most of Kukuau 2 Ahupua‘a and went to G. D. Hueu, son of Isaac Davis (companion of Kamehameha I). (Wilkinson et al. 2012:31)

#### Waiākea:

As a result of the Māhele in 1848, nearly all of the ahupua'a of Waiākea became Crown Lands (for the occupant of the throne)... twenty-six *kuleana* claims (LCAw.)were registered for lands in Waiākea; most of these lands were centered along fishponds or major inland roads... Most of the awards were for houselots and cultivated sections. One of the Land Commission Awards (LCAw. 7713) was for the ‘ili of Pi‘opi‘o, which was traditionally the residence of chiefs... This land was given by Kamehameha I to his wife

Ka‘ahumanu, and then awarded to Victoria Kamamalu during the Māhele. Kamehameha IV, Alexander Liholiho, as the occupant of the throne during the Māhele, received the rest of the Ahupua‘a. (Rechtman 2007:8)

A total of seven LCAs were awarded in the vicinity of the project corridor (Figure 4). Two are in Pōnahawai, three in Kūkūau, and two in Waiākea. Data for these parcels is shown in Table 2.

**Table 2. LCA Data**

Awardee	Ahupua‘a	‘Ili	LCA	Acreage
Kahalehau	Pōnahawai		11048B	1.56
Kaiana, John, B.	Pōnahawai	Kanewahineiki, Alenoho	2281	2.87
Haac	Kūkūau	Kolea	1106	4.66
Kanaina	Kūkūau		4239B	2.9
Ouluihi	Kūkūau		11144	1.15
Halai, S. Kolona.	Waiākea	Kolea	1279	0.6
Kamāmālu	Waiākea		7713	‘Ili‘āina

### Historic Maps

Historic maps help to paint a picture of Hilo in times past and illustrate the changes that have taken place in the region over the years. Among the earlier maps of Hilo is one which was drafted from surveys done by U.S. Naval Commanders Wilkes and Rodgers in 1841 and 1856 (Figure 5). The map is titled “Harbour of Waiakea, Hilo Bay.” Although the map depicts the majority of the settlement in the project area near the bayfront of Hilo One, it is still quite a sparse settlement. Notice also that the fishpond in Waiākea is labeled as the “King’s Fishpond.”

The next map is labeled “Hilo Town and Vicinity,” and it is dated 1891 and attributed to map and survey work done by E.D. Baldwin (Figure 6). It is evident that this map is from the post-Māhele era because it details all the LCAs in the project area and throughout the larger Hilo One region. On the eve of the 20<sup>th</sup> century, Hilo is shown to have its inland fishponds still intact and presumably still in good working order.

The third map is dated 1912, and it is attributed to the work of the territorial surveyor, Walter E. Wall (Figure 7). The map is titled “Portion of Hilo City, West of Wailoa River, Hawaii,” and indeed, Hilo does appear to be denser by this time though quite a few of the LCAs are still recognized. Also, some of the well-known streets of modern-day Hilo already appear in the map named as such. The section of Kamehameha Highway which corresponds to the project area is labeled “Front Street” on this map.

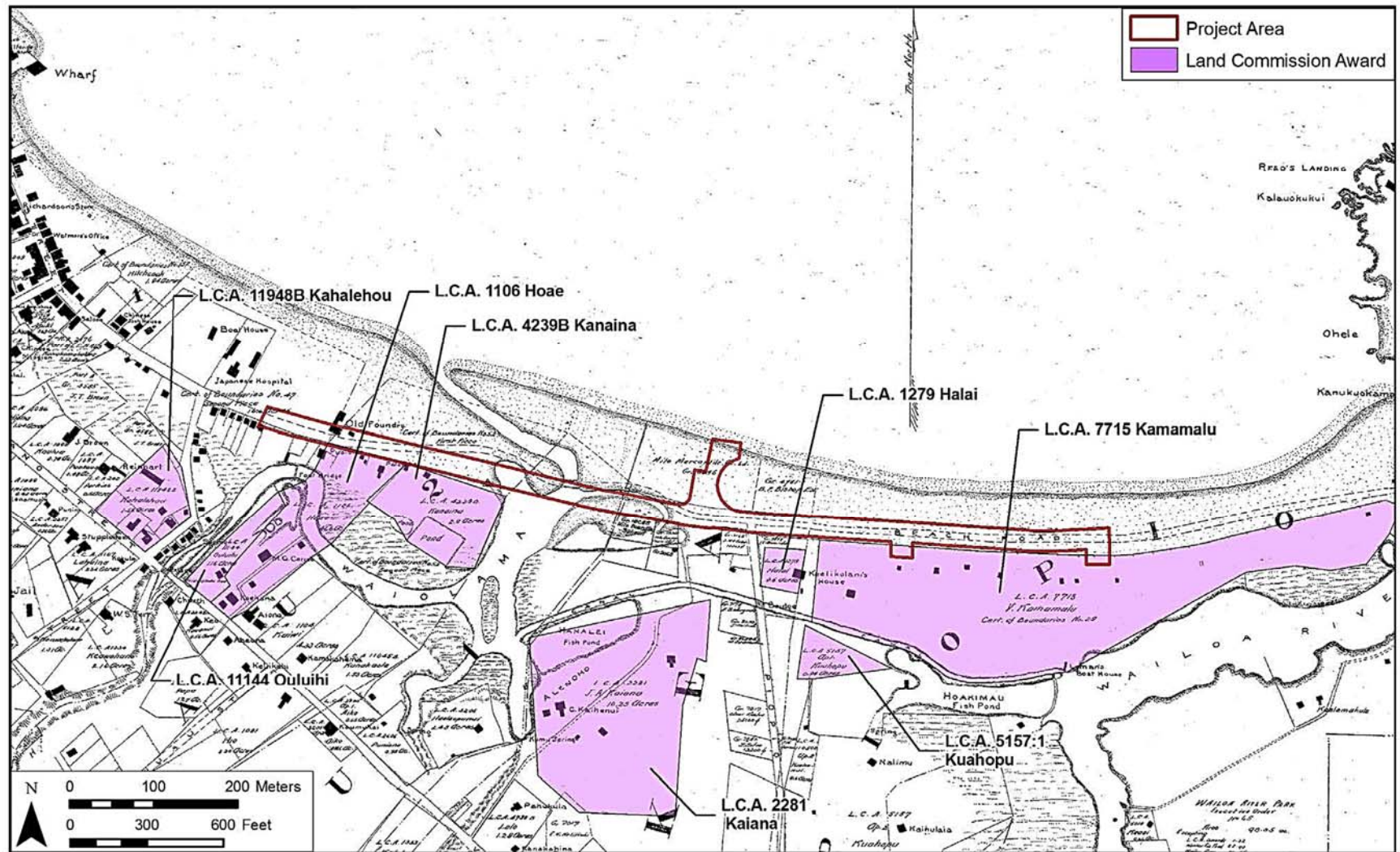


Figure 4. LCAs in the vicinity of the project area, as shown in the Archaeological Monitoring Plan (Wilkinson et al. 2012:29).



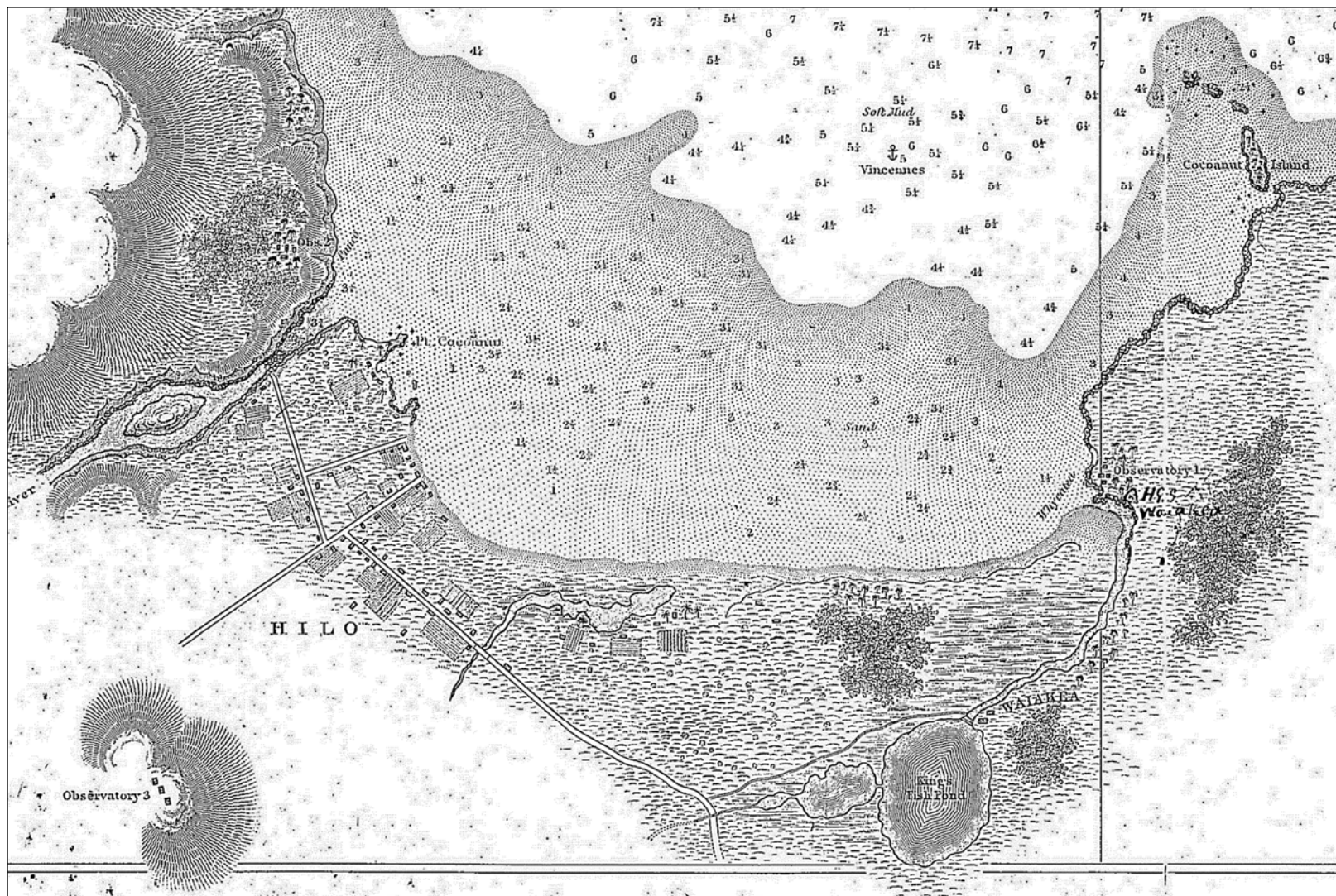
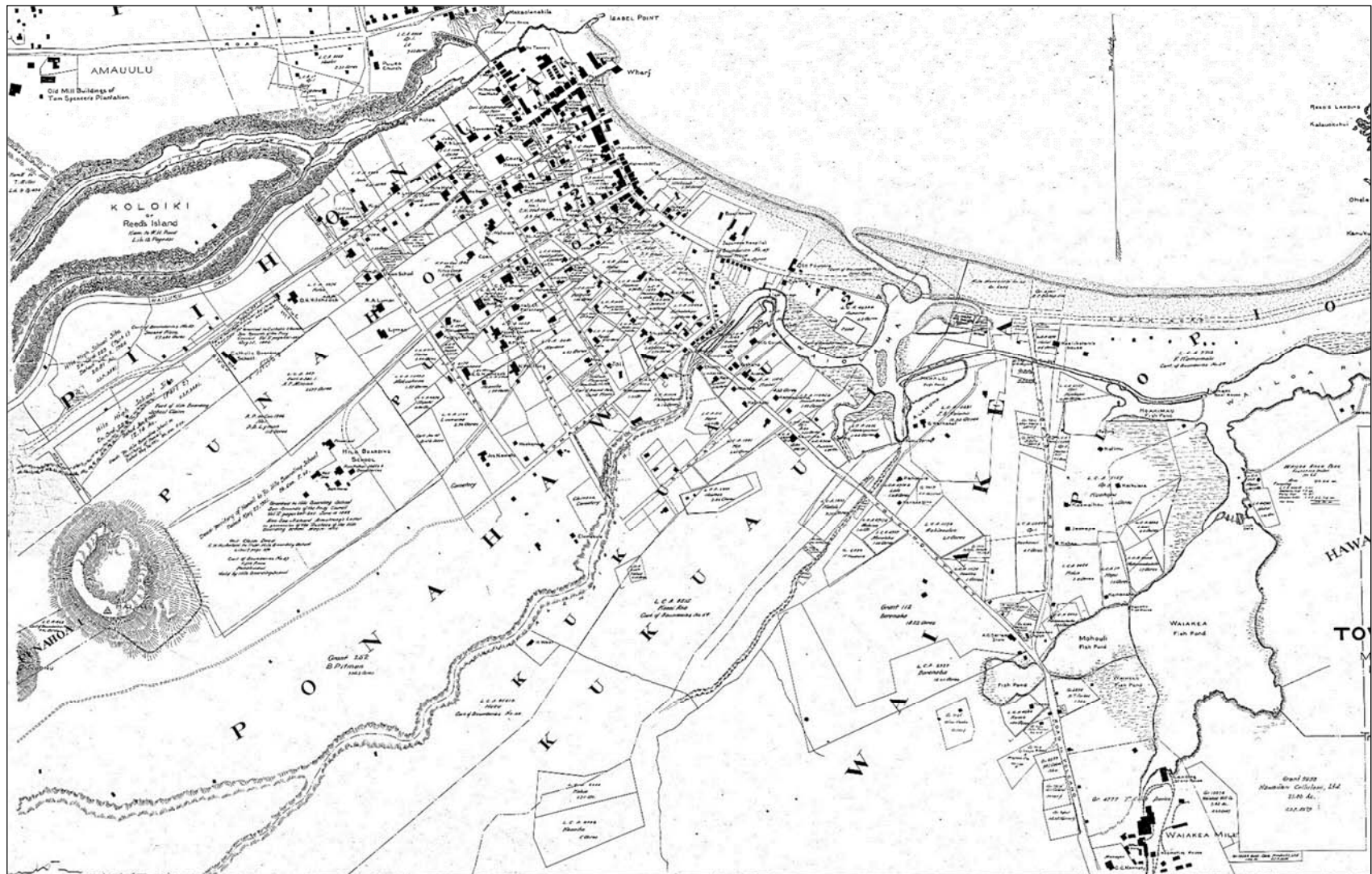


Figure 5. Portion of a map of Hilo Bay (Wilkes and Rodgers 1841/1856).



**Figure 6. Portion of map showing Hilo Town (Baldwin 1891).**





Figure 7. Portion of a Hilo City map (Wall 1921).

## Contemporary History

After transitioning from the 19<sup>th</sup> century to the 20<sup>th</sup> century, Hilo has undergone significant changes into one of the most important towns of Hawai'i Island today. During its transformation, Hilo saw its marshlands filled and open spaces built upon to keep up with the expanding population of its growing town. Records note the previous presence of a large hack stable located in the project area, sugar mills in Waiākea and Ponahawai, and a railroad line running through the district (Wilkinson et al. 2012). Today, Hilo continues to be an important economic and political center for the island, a community made up of residences, hotels, churches, schools, and various businesses.

### Mele

Like the traditional chants from ancient times that give us a window into pre-contact Hawai'i, the modern songs of today also provide a glimpse of the recent time and place that they were composed. Over the years, quite a number of songs have been written about the Hilo area. The song *Hilo* speaks of the beauty of Hilo and its bay with Mauna Kea standing in the distance. Another song, *Hilo E*, also speaks of the beauty of Hilo and especially points out the districts of Waiākea and Pana'ewa. Like *Hilo E*, the *Hilo Hula* points out place names throughout Hilo, and it also acknowledges Hilo's famous rain, the Kanilehua. And then there's the *Hilo March* which sounds indeed like a march. This song proclaims the beauty of Hilo and the flower that Hilo is most known for, the lehua. Finally, there is the song, *Hilo One*. This song is especially about that middle portion of Hilo, Hilo One, and the love that the composer found there. The song *Ka Pua O Kina* speaks of the beauty of a certain family in Hilo which appears to be part-Hawaiian and part-Chinese. All of the songs described thus far were written in the Hawaiian language. In addition to those, there are two written in English which have been included here. *Swept Away*, remembers the great tsunami that hit Hilo in 1946. *Hilo, My Home Town*, is a Hilo favorite. This song speaks of the friendliness of the Hilo people, and it welcomes all visitors to the town (Lyrics and translation to these songs along with their accompanied descriptions are from the [www.huapala.org](http://www.huapala.org) database compiled by Kanoa-Martin). Together, this collection of contemporary mele captures the essence of Hilo today.

#### **Hilo** - Words & Music by E. Keali'i Blaisdell

He mele kēia no Hilo Ka nani o ka 'āina Ke kaiku 'ono hala'i 'Āina i ka 'ehu o ke kai	This song is for Hilo A land of much beauty The bay resting in the calm, Land freshened by the sea spray.
Makemake wale ka 'ikena Ka nani o Mauna Kea E ho'opulu 'ia nei Ka ua kilihune	It is a delight to see The beauty of Mauna Kea Freshened by The light rain
Puana 'ia me ke aloha I ka nani a'o Hilo Ke kaiku 'ono hala'i 'Āina i ka 'ehu o ke kai	Thus ends my song with affection For the beauty of Hilo The bay resting in the calm, Land freshened by the sea spray

Source: E. Keali'i Blaisdell Album "Keeping It Traditional - This song was written to honor the composer's hometown of Hilo. Translation by E. Keali'i Blaisdell

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**Hilo Ē** - Words & Music by Mary Heanu

Aia ē a i Hilo ē O ka nani ē pua ka lehua ē	There at Hilo Is the beautiful flower of the lehua
I lei ē no ka malihini ē Kipa'aku ai ē i ka 'āina ē	It's a lei for the visitors That come to this island
E ake au ē a e 'ike ē I ka nani ē o Waiākea ē	I desire to see The beauty of Waiākea
Kilohi au ē 'o ka nani ē I ka ulu lehua ē a'o Pana'ewa ē	I glance to see The lehua grove of Pana'ewa
Ha'ina ē mai ka puana ē 'O ka nani ē pua ka lehua ē	Tell the refrain Of the beautiful lehua flower

Source: Noble's Hawaiian Hulas

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**Hilo Hula** - Joe Kalima

Kaulana mai nei 'o Hilo 'eā Ka ua Kanilehua 'eā Ka ua ho'opulu 'ili 'eā Ka 'ili o ka malihini 'eā	Famous is Hilo And it's rain called Kanilehua Rain that wets one's skin Especially those of the newcomers
Nani wale ho'i ka 'ikena 'eā Ka nani o Waiākea 'eā Ka wai o Waiolama 'eā Mālamalama Hawai'i 'eā	Lovely is the scenery And beauty of Waiākea The water of Waiolama Brightens Hawai'i (the island)
Kaulana ho'i Mokuola 'eā He moku au i ke kai 'eā E ho'opulu 'ili nei 'eā Ka hunchune kai 'eā	Situated here is Mokuola An island set apart in the sea Drenching the skin The mist of the sea
Lei ana i ka lei nani 'eā Ka pua o ka lehua 'eā Ha'ina mai ka puana 'eā No ka ua Kanilehua 'eā	Wear the lei of loveliness The blossom of the red lehua Tell the refrain The rain called Kanilehua

Source: Kanilehua is the misty rain of Hilo that gives drink to the lehua blossoms. Verse #2, Waiākea or broad waters, was the home of 'Ulu, a legendary man who died of starvation and was buried near a spring. The next morning, an 'ulu (breadfruit) tree, laden with fruit, marked his grave and put an end to the famine. Verse #3. Mokuola was the son of 'Ulu and the name of an island in Hilo bay. There was a spring on the island with water that had healing qualities. The old Hawaiians would swim to the island and hide the umbilical cords of infants in the crevices of a flat stone called Papa o Hina. Many Hawaiians today honor this tradition of hiding umbilical cords from rodents, believing it saves the child from becoming a thief. Translated by Mary Pukui

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### **Hilo March** - Words & music by Joseph Kapaeau Ae'a

'Auhea wale 'oe e ke 'ala tuberose	Heed the fragrance of the tuberose
He moani 'a'ala i ke ano ahiahi	Fragrance wafted at at evening time
Ua like me ka lau vabine	Like verbena leaves
I ka hoene i ka poli pili pa'a	Singing in the heart, tightly clasped

Hui:	Chorus:
'Ike hou ana i ka nani a'o Hilo	Behold again the beauty of Hilo
I ka uluwehiwehi o ka lehua	And the beautiful grove of lehua
Lei ho'ohihi	Cherished lei
Hi'i a ka malihini	Worn by visitors
Mea 'ole i ke kono a ke aloha	Nothing deters the invitation of love

E aloha a'e ana i ka makani Pu'ulena	Greeting the Pu'ulena wind
Ka makani kaulana o ka 'āina	Famous wind of the land
Home noho a na 'i'iwi polena	Home of scarlet honey-creepers
Mea 'ole i ke kono a ke aloha	Not indifferent to the call of love

Nani wale no Hilo	Hilo is so beautiful
I ka ua Kanilehua	With the rustling of lehua in the rain
Me he mea ala e 'i mai ana	As though saying
Eia iho a hiki mai	Wait until the princess comes

Source: Nā Mele o Hawai'i Nei – Ae'a, a member of the Royal Hawaiian Band composed this song in the summer of 1881, on the eve of the band's departure to Hilo. They accompanied Princess Lydia Lili'uokalani Kamakaeha Kaalaniali'i Neweweli'i on a 10-day tour of the Big Island. The original title was Ke 'Ala Tuberose and was set to a slower tempo. Berger arranged it as a march for the band and first played it in Hilo. It has been adopted as the island song of Hawai'i, the big island. Pu'ulena is the cold wind at Kīlauea. Translated by Sam Elbert & Noelani Mahoe.

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### **Hilo One** – Traditional

Aia i Hilo One ka 'eha a ka mana'o remembrance	There in Hilo One is the painful
'O sweet 'Emalia 'o ko'u aloha ia	Of sweet Emily, my beloved
Nānā ke kolohe ki'ina i ka liko	Mischievous looks trap the young man
'I'iwi pōlena 'o ka manu o ka uka	The 'i'iwi polena, a bird of the uplands
Kohu 'ole 'o ia ala i ka'i 'ana mai	No one can compare to her flirtation
Eia me a'u ka 'iwi a'o Heneri	Here with me is Henry, the 'i'iwi
Ha'ina ka puana aia i Hilo One	Tell the refrain, there in Hilo One
'O sweet 'Emalia 'o ko'u aloha ia	Is sweet Emily, my beloved

Source: Composed in 1894, Sweet Emalia or Emalia Kaihumua was a hula dancer in the court of King Kalākaua. Verse 2, the liko is a very young, attractive man. The 'iwi or bone in the 3rd verse is an old Hawaiian expression in songs, that means love rooted deep in the bones. The three sections of Hilo are: 1) Hilo One, the sands of Hilo, near the sea; 2) Hilo Palikū, the upright cliff of Hilo, east of the Wailuku river toward Hāmākua; and 3) Hilo Hanakahi, named for the beloved and benevolent chief of Hilo, inland toward

Keaukaha. Translated by Kaiu Kanoa based on the interpretation and notes of Kini Sullivan.

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**Ka Pua O Kina** - Irmgard Farden Aluli

Aia i Hilo one	There in the land of Hilo
Ka pua a'o Kina	Is the flower of China
Pili ia pu'e one	Close to the sandbar
He one kaulana nō	On the shores of the homeland
I loku i ka ua	Drenched by the Kanilehua
Kanilehua	The rain the lehua flower drinks
Ka lehua kea pili	Is the rare while lehua flower
A me ka mamo	Next to the yellow
'Ike 'ia nā kini	They are known by the people
'O Kawaikapu	Of Kawaikapu
Ua kapu i ke one	And are sacred to
A'o Hanakahi	The land of Hanakahi
Ho'okahi ke kupuna	They are descendants
'O keawehiku	Of Keawehiku
'Elima nā pua	The five blossoms
Lawa ku'u lei	That complete my lei
Lei ho'oheno	This cherished lei
No 'elima hua	Of five daughters
He lehua 'ohelo	A lehua lei, red as the 'ohelo
Ka'u 'ike	Which I now behold
No ka wahine ala	The lei worn by their ali'i mother
Kū onaona	Surrounded by soft fragrance
No ka wao e ka pua	The lady of the uplands
'O Kawaipu'ilani	The flower of Kawaipu'ilani
Ha'ina 'ia mai	This is the end
Ana ka puana	Of my song
Aia i Hilo one	There in the land of Hilo
Ka pua a'o Kina	Is the flower of China

Source: CD: Kuuipo Kumukahi CD -Nā Hiwa O Ku'u One Hānau Translation by Mary Kawena Pukui

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**Swept Away** - Words and Music by Gordon Manuel Freitas

Old Hilo town in forty-six , waking up April Fool's Day  
Hilo sugar sendin' smoke in the sky, a harbor wave coming their way  
Hilo bay waters receded while people ran down to the shore  
To marvel at mother ocean exposing her secret sea floor

Who can predict what can happen when ocean is up to her tricks  
The first wave arrived with the sunrise, it roared in at seven 'o six  
No time to run, high ground too far; the town was a bone to be chewed  
A wall of water came pounding down Kamehameha Avenue

Keaukaha houses pushed in the street; the frontage road homes washed away  
Threads of existence worn and frayed, a lot of good folk lost that day  
Hilo Theater still standing not too much around it was saved  
The Kress building stood the highest above the crests of the incoming waves

Swept away, swept away,  
A tiny town by the ocean  
Got swallowed up by her bay  
Swept away

God bless the folks of Hilo town who lost something down by that shore  
They say don't turn your back on the ocean; It'll swallow you up for sure

Swept away, swept away  
A tiny town by the ocean  
Got swallowed up by her bay  
Swept away, swept away, swept away...

Source: Recorded by Gordon M. Freitas "Local Folks" CD. April 1, 1946 at 6:33 a.m., the first tsunami (tidal wave) hit Kaua'i with minimal damage. Less than a hour later, it hit the North Shore of O'ahu with some destruction. On to Moloka'i, pass Maui and finally hitting Hilo, the wave pushed 4 blocks inward to Kamehameha Avenue, the main street. What was not destroyed in the initial force was taken away with the tsunami when it receded. The withdrawal left the reef exposed and the harbor without water. Then the second wave hit. Final tally left 83 dead, 13 missing and \$25 million in destruction. The composer was inspired by a series of black and white photos of the tsunami on display at Hilo's Hawaiian Airlines terminal. He jotted down a few notes about the tsunami that hit Hilo at sunrise on April Fools Day, 1946. The whole song was completed by the time he got off the plane in Honolulu. This is his tribute to the Hilo people and has been performed in conjunction with the "tsunami awareness" programs.

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### **Hilo, My Home Town - Betty Lou Yuen**

Come along, join the throng  
Visit my Aloha Land  
Take a train, or a plane  
Travel any way you can  
See the smiling faces  
Of the many races  
You'll be smiling too  
You will want to linger  
Learn to do the hula  
Make some whoopie too

Start the day, wear a lei  
And a colored mu'umu'u  
Hear the crowd sing aloud,



"Aloha nui to you!"  
For there's no place on earth  
Where friends prove their worth  
More than Hilo, my home town  
Oh, there's no place on earth  
Where friends prove their worth  
More than Hilo, my home town!

Source: Leilehua Yuen - Written in the 1930's, this was the winning song in a competition that was held to encourage more songs about the town of Hilo.

### **Previous Archaeology**

Many archaeological projects have been carried out in Hilo (Table 3). The following paragraphs summarize the most relevant studies which lie in the vicinity of the project area. Project summaries are presented chronologically. Their locations are illustrated in Figure 8.

In 1982, an archaeological pedestrian survey was conducted for the Alenaio Stream Flood Damage Reduction project. In addition, long-time Hilo residents were interviewed as part of the historical research for the project (Kelly and Athens 1982). The research suggested that depending on where the future construction would take place, post-contact burials could be expected to be found and/or traditional Hawaiian habitation and agricultural sites uncovered. More ethno-historical research for this study was recommended and also preliminary subsurface testing prior to the construction phase of the project.

In 1988, an archaeological reconnaissance survey was conducted on potential sites of the Hilo Judiciary construction project (Rosendahl 1988). No archaeological sites were identified, but subsurface testing was recommended.

Also in 1988, a set of human remains belonging to one individual was identified across of the Suisan Fish Market at the mouth of Wailoa Stream. After documenting the remains (Pietrusewsky 1989), it was excavated, studied and reported on (Smith and Tourtellotte 1988). The remains were recorded as State Inventory of Historic Places (SIHP) 11115.

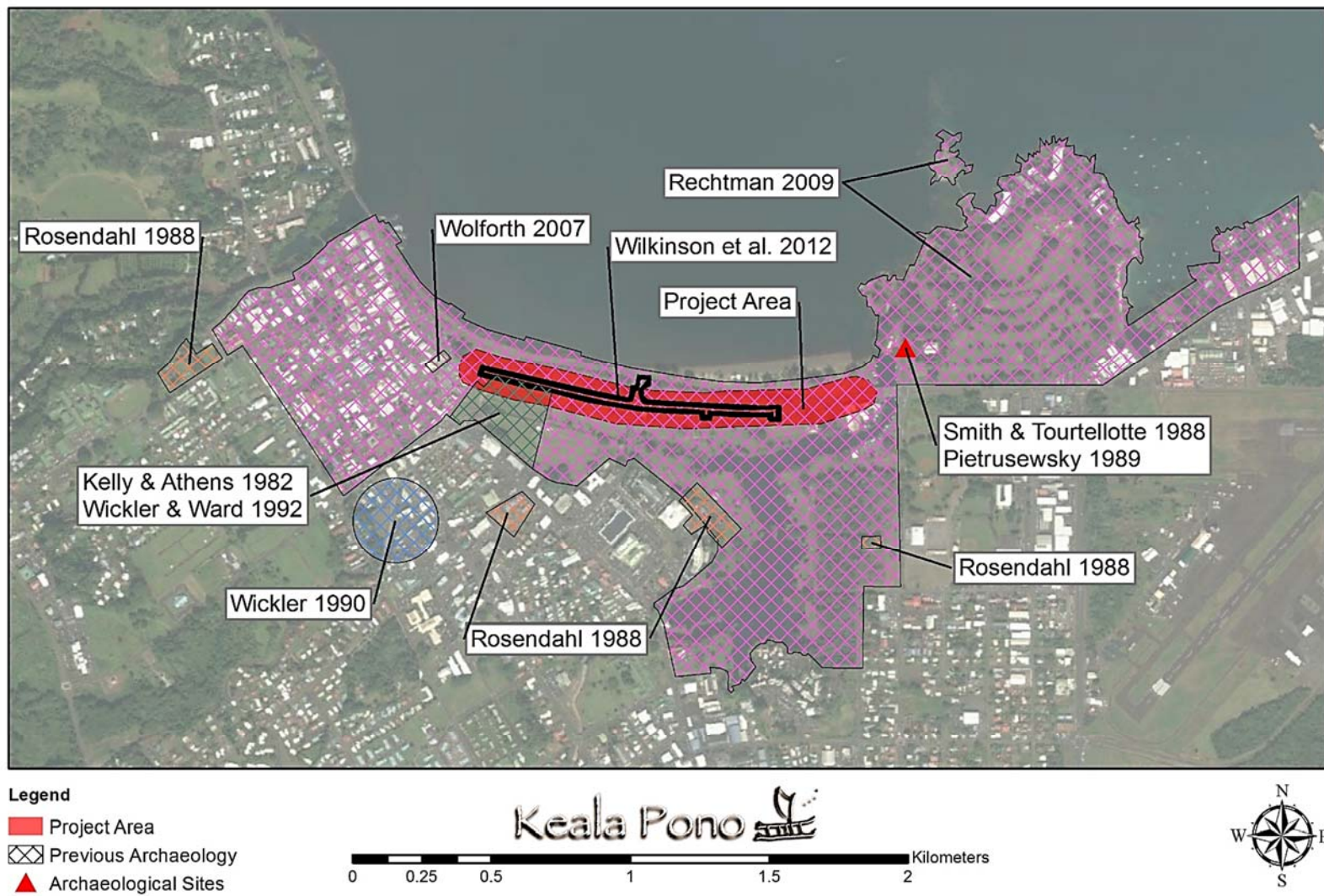
As a follow up to the initial archaeological survey conducted for the Alenaio Stream Flood Damage Reduction project in 1982, subsurface testing was conducted in 1990 within the boundaries of the Hilo Chinese Cemetery (Wickler 1990). Historical artifacts identified include Chinese porcelain sherds and a Chinese coin. No burials were uncovered, and no further work was recommended. In addition to the 1990 subsurface testing, 30 more excavation units were opened throughout downtown Hilo as areas of potential impacts (Wickler and Ward 1992). From this portion of the subsurface testing, two sediment cores were analyzed and were interpreted to point out a change from Hilo's marshlands to a drier environment. Also, some artifactual material was collected, although it was recovered from depths too deep to be impacted by the proposed construction. Therefore, no further work was recommended.

In 2003, archival research was conducted to compile the traditional and historical accounts of Ponahawai and Punahoa (Maly and Maly 2003). A final report was generated and submitted.

In 2007, an archaeological assessment was conducted for the expansion of the Hilo Farmers' Market (Wolforth 2007). Based on archival research and a pedestrian survey of the project area, no archaeological sites were identified and none were expected to be identified in the future. No further work was recommended.

**Table 3. Previous Archaeology in the Vicinity of the Project Area**

<b>Author</b>	<b>Year</b>	<b>Location</b>	<b>Work Completed</b>	<b>Findings</b>
Kelly and Athens	1982	Alenaio Stream	Archaeological survey and ethno-historical research	No archaeological sites identified; more ethno-historical research recommended
Rosendahl	1988	Various sites throughout South Hilo	Reconnaissance survey	No sites identified; subsurface testing recommended
Smith and Tourtellotte	1988	Mouth of Wailoa Stream	Excavation and study of human remains	Recorded as SIHP 11115
Pietrusewsky	1989	Mouth of Wailoa Stream	Initial documentation of the finding of human remains	Recorded as SIHP 11115
Wickler	1990	Hilo Chinese Cemetery	Archaeological subsurface testing	Some historical artifacts found; no further work recommended
Wickler and Ward	1992	Alenaio Stream with excavation units in Downtown Hilo	Subsurface testing and sediment core analysis	No major archaeological material identified; no further work recommended.
Maly and Maly	2003	Ponahawai and Punahoa	Archival research	Reported on traditional and historical accounts of the area
Wolforth	2007	Hilo Farmers' Market	Archaeological assessment	Nothing found and no further work recommended
Rechtman	2009	Along the Hilo Bayfront	Archaeological assessment	Nothing found; an archaeological monitoring plan was recommended for future construction with an archaeological monitor present
Wilkinson et al.	2012	Kamehameha Avenue, current project area	Archaeological monitoring plan	On-site archaeological monitor recommended to be present for future ground disturbing activities



**Figure 8. Previous archaeological studies in the vicinity of the project area.**

In 2009, a pedestrian survey was conducted as part of an archaeological assessment survey for the proposed Hilo Bayfront Trails Project (Rechtman 2009). No archaeological sites or features were observed. An archaeological monitoring plan was recommended to be drafted before any future construction work was to begin, at which time, an archaeological monitor was recommended to be present.

In 2012, an archaeological monitoring plan was drafted for the proposed Kamehameha Avenue Construction project (Wilkinson et al. 2012). An on-site monitor was recommended to be present during any future ground disturbing activities.

### **Summary of Environmental and Cultural Background**

Hilo's fertile lands, abundantly blessed with fresh water and other natural resources from mountain to sea, has made it a prime location for habitation since the beginning of time. The area of Hilo called Hilo One, situated in the middle of the district and fronting the bay, has especially been an attractive area for settlement. Both traditional accounts and post-contact historical accounts attest to the wealth that Hilo provided from its forests, its farmlands and its fishponds.

While Hawai'i Island was still an independent chiefdom, Hilo was a place of importance for royals and commoners, and was visited by travelers from other Hawaiian Islands as well as by navigators going to and from distant lands across the ocean. From its storied past, Hilo remained a significant place as the Hawaiian Islands became united under one rule and was thrust into the modern era with the arrival of Westerners. After the appearance of foreigners and following their influences, Hilo saw the development of plantations and Christian missions within its boundaries and the increased use of its port for commercial enterprises.

As its population expanded, Hilo continued to grow. The district has raised generations of families who have memorialized their home in chants, songs and dances that have become a part of the oral and cultural traditions known throughout Hawai'i. Snapshots of Hilo from times past are preserved this way, as Hilo has evolved from the traditional village it once was to the bustling town, the seat of county government, and the famous tourist destination it is today.

## METHODS

Archaeological monitoring was conducted between February 7, 2014 and July 13, 2015, by Lizabeth Hauani'o, BA, Leischene Calingangan, BA, and U'ilani Macabio, BA. At least one archaeological monitor was on site full time for ground disturbing activity during this period, for 252 days of monitoring. A second archaeological monitor was on site for 10.5 days, when excavation was particularly busy. In addition, night work was monitored on 5.5 nights. Windy McElroy, PhD, served as Principal Investigator, conducting several site visits during the monitoring and overseeing all aspects of the project.

Archaeological monitoring was guided by a SHPD-approved monitoring plan (Wilkinson et al. 2012). The monitoring plan stated the following:

On-site archaeological monitoring is recommended for all ground disturbing activities conducted beyond 12 inches (one foot) below the existing ground surface. A qualified archaeologist will monitor all ground disturbance associated with the project's construction. Any departure from this will only follow consultation with, and written concurrence from, SHPD/DLNR.

The monitoring fieldwork may encompass the documentation of subsurface archaeological deposits (e.g. trash pits and structural remnants) and will employ current standard archaeological recording techniques. This will include drawing and recording the stratigraphy of excavation profiles where cultural features or artifacts are exposed as well as representative profiles. These exposures will be photographed, located on project area maps, and sampled. Photographs and representative profiles of excavations will be taken even if no historically significant sites are documented. As appropriate, sampling will include the collection of representative artifacts, bulk sediment samples, and/or the on-site screening of measured volumes of feature fill to determine feature contents.

If human remains are identified, no further work will take place, including no screening of back dirt, no cleaning and/or excavation of the burial area, and no exploratory work of any kind unless specifically requested by the SHPD. All human skeletal remains that are encountered during construction will be handled in compliance with HRS Chapter 6E-43 and HAR Chapter 13-300 and in consultation with SHPD/DLNR. (Wilkinson et al. 2012:52–53)

These methods were followed throughout the duration of the project, although no subsurface archaeological deposits or human remains were found. On February 3, 2014, before the start of the first work day, archaeological monitor Lizabeth Hauani'o met with the construction team to discuss the monitoring plan to ensure that they understood the purpose of the monitoring and that the monitor has the authority to halt construction activity. Ground disturbing work included trenching, grading, drilling/augering, hand shoveling, and backfilling. This was accomplished with a variety of heavy equipment, including backhoes, excavators, mini excavators, bulldozers, augers, and bobcats (Figure 9).

Representative profiles were drawn and photographed. Sediments were described using Munsell Soil Color Charts and a sediment texture flow chart (Thien 1979). The scale in all field photographs is marked in 10 cm increments. Throughout this report rock sizes follow the conventions outlined in *Field Book for Describing and Sampling Soils*: Gravel <7 cm; Cobble 7–25 cm; Stone 25–60 cm; Boulder >60 cm (Schoeneberger et al. 2002:2–35). Collected artifacts are temporarily being curated with Keala Pono's Hilo staff before being returned to the landowner. Keala Pono will facilitate the transfer/loan of as many items as possible to appropriate facilities,

such as the Pacific Tsunami Museum, the Paniolo Preservation Society, the Hawai‘i Plantation Museum, or the Anthropology Department of the University of Hawai‘i at Hilo.



**Figure 9. Example of equipment used on the construction site. A backhoe and mini excavator are shown.**

## RESULTS

The Kamehameha Avenue Reconstruction Project is a 3,350 foot (1,021 m) community improvement project that includes excavation of trenches for a 24 inch (60 cm) cement storm drain pipe; including the removal of old pipes and joining existing culverts to the new system, a new propane gas line, new street lamps and accompanying electrical wiring, locating and modifying water lines, and complete removal of existing asphalt and cement roadway and sidewalks.

Archaeological monitoring was conducted between February 7, 2014, and July 13, 2015, for a duration of approximately 18 months. A variety of historic artifacts were collected during archaeological monitoring, although no cultural layers or features were encountered. Stratigraphy of the project corridor and the artifact assemblage are described below.

### Stratigraphy

The drain trench excavation was the most extensive, extending the full length of the project area (east-west) on both the north and south sides of Kamehameha Avenue at the edges of the roadway, with trenches averaging 4 feet (1.22 m) wide by 6 feet (1.83 m) long. Spaced along the 24-inch (61-cm) pipe segments are large cement boxes that facilitate drainage and give maintenance workers access to the drain system after installation. These drain boxes range in size from 4 feet (1.22 m) x 4 feet (1.22 m) x 4 feet (1.22 m) deep to 4 feet (1.22 m) x 6 feet (1.83 m) x 7 feet (2.13 m) deep and required an excavated area as large as 14 feet (4.27 m) x 11 feet (3.35 m) x 9 feet (2.74 m) deep to install. If the water table was encountered the construction crew was required to dig 2 feet (.61 m) deeper and utilize gravel and waterproof felt. Water was encountered in the majority of the drain line excavations at 3–6 feet (91–183 cm below surface [cmbs]), with the extreme west and east ends of the drain line not encountering water.

The drain and box trenches first excavated exposed a thick, 100% all sand layer, dark brown, negligibly compacted sand (with minimal inclusions; no shells, water worn rocks) with thin grey, intermittent, mucky, debris-filled (glass, wood) layer, and more sand below. All trenches and boxes exhibited sand at the base of excavation. The deepest was 12 feet (3.65 m) and showed a dark black coarse sand with waterworn pebbles. From 1911–1923 more than 250,000 cubic yards of sand was pumped from Hilo Bayfront to fill in not only the entire project area but much of the surrounding marshy areas to the south; Ponohawai, Waiākea, and the Waiolama Stream which emptied into Hilo Bay at roughly the Pauahi Street north terminus. This is likely the source of the sand.

The asphalt, cement, and road base courses are the uppermost layers through most of the project area with the exception of several areas with asphalt and base course but no cement. Also, the sidewalks, located along the north perimeter of work area, adjacent to the roadway on the *makai* side were poured directly on a filled dirt surface.

Stratigraphic profiles were drawn at various locations along the length of the project corridor. A total of four profiles are presented below to characterize the stratigraphy over the project area (Figure 10 and Table 4).

Profile 1 was taken on the far west end of the project corridor. The trench was excavated to 100 cmbs, and stratigraphy consisted of cement and base course with sand fill below (Figure 11). Within the fill layer was a pulpy organic layer that may be decomposing wood. In the fill above the organic layer were several pieces of rusty metal and a metal pipe.



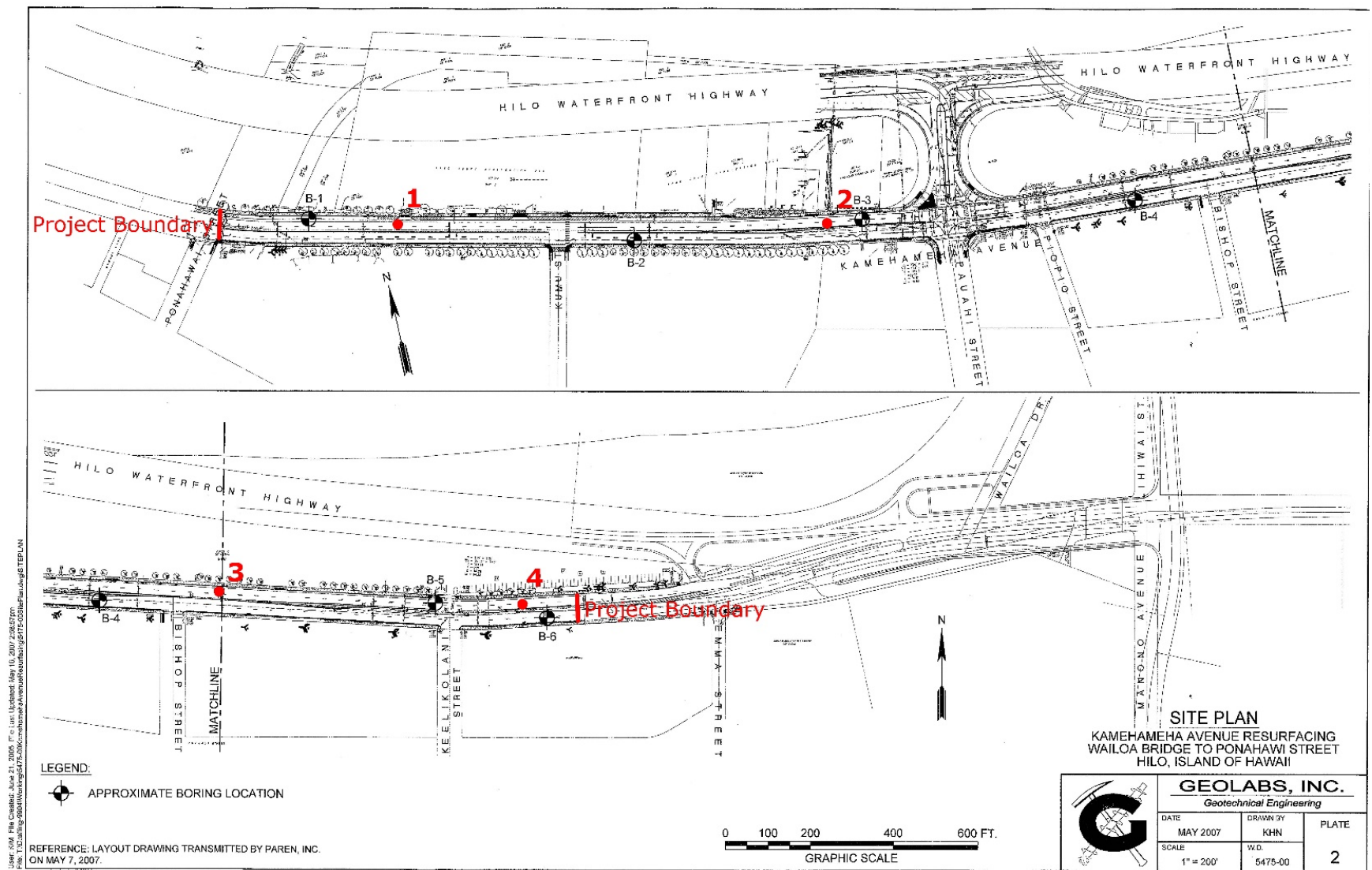


Figure 10. Location of Profiles 1–4 on construction plans.



**Table 4. Sediment Descriptions**

Location	Layer	Depth (cmbs)	Color	Description	Interpretation
1	I	0–12	N/A	Cement; smooth, very abrupt boundary.	Road
	II	12–27	N/A	Gravel base course; smooth, very abrupt boundary.	Road Base
	III	27–57	10YR 2/2	Fine sand; 5% roots; <5% basalt cobbles and gravel; smooth, abrupt boundary.	Fill
	IV	57–87	N/A	Organic layer 20% roots; smooth, abrupt boundary.	Possible Decomposing Wood
	V	87–100+	10YR 2/2	Fine sand; >5% basalt cobbles and gravel; base of excavation.	Fill
2	I	0–25	N/A	Asphalt; smooth, very abrupt boundary.	Road
	II	25–55	N/A	Gravel base course; smooth, very abrupt boundary.	Road Base
	III	55–65	N/A	Gravel base course; smooth, very abrupt boundary.	Road Base
	IV	65–155	10YR 2/2	Fine sand; smooth, abrupt boundary.	Fill
	V	155–190+	10YR 2/1	Fine sand; base of excavation.	Fill Contaminated with Petroleum
3	I	0–15	N/A	Asphalt; smooth, very abrupt boundary.	Road
	II	15–30	N/A	Cement; smooth, very abrupt boundary.	Road
	III	30–50	N/A	Gravel base course; smooth, very abrupt boundary.	Road Base
	IV	50–150+	10YR 2/2	Fine sand; 5% roots; base of excavation.	Fill
4	I	0–20	N/A	Asphalt; smooth, very abrupt boundary.	Road
	II	20–42	N/A	Gravel base course; smooth, very abrupt boundary.	Road Base
	III	42–48	N/A	Gravel base course; smooth, very abrupt boundary.	Road Base
	IV	48–60	10YR 8/1	Coarse sand; 40% basalt and coral cobbles and gravel; natural marine shell, modern debris; smooth, very abrupt boundary.	Fill
	V	60–162+	10YR 2/2	Very fine sand; 30% basalt and coral cobbles and gravel; base of excavation.	Fill

Profile 2 was drawn in the west-central portion of the project route. The trench was excavated to 190 cmbs, and stratigraphy was composed of asphalt, two layers of base course, and the sand fill, the bottom portion of which was contaminated with petroleum (Figure 12).

Profile 3 was taken in the east-central segment of the project corridor. The excavation was 152 cmbs, and stratigraphy consisted of asphalt, cement, base course, and the sand fill (Figure 13).

Profile 4 was drawn in the east end of the project route. The trench was excavated to 162 cmbs, and stratigraphy consisted of asphalt, two layers of base course, and two layers of sand fill (Figure 14).

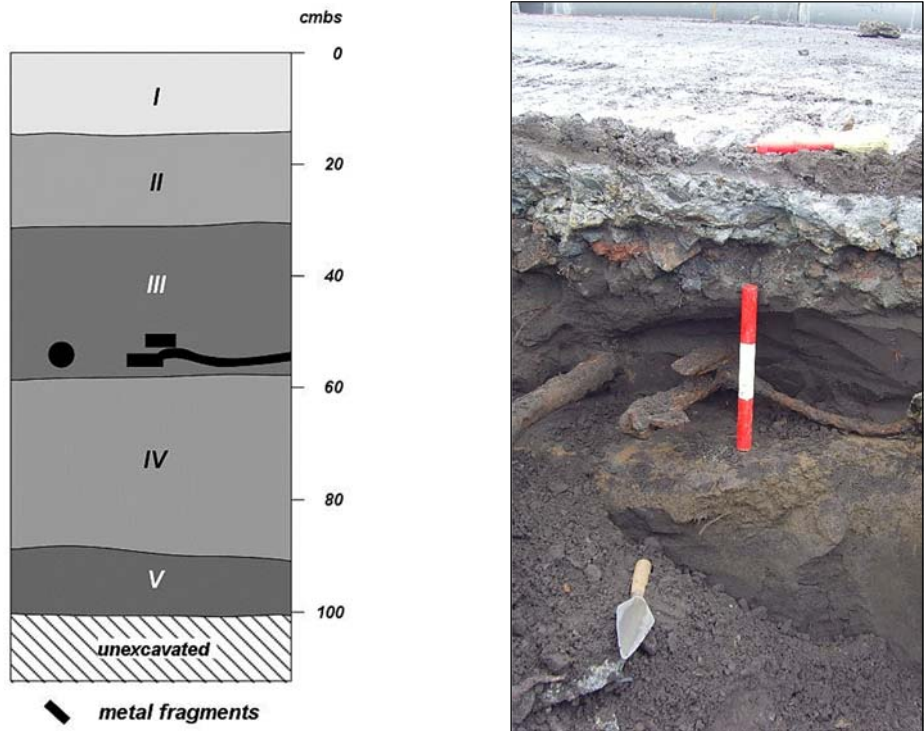


Figure 11. Profile 1, southeast face profile drawing and photo.

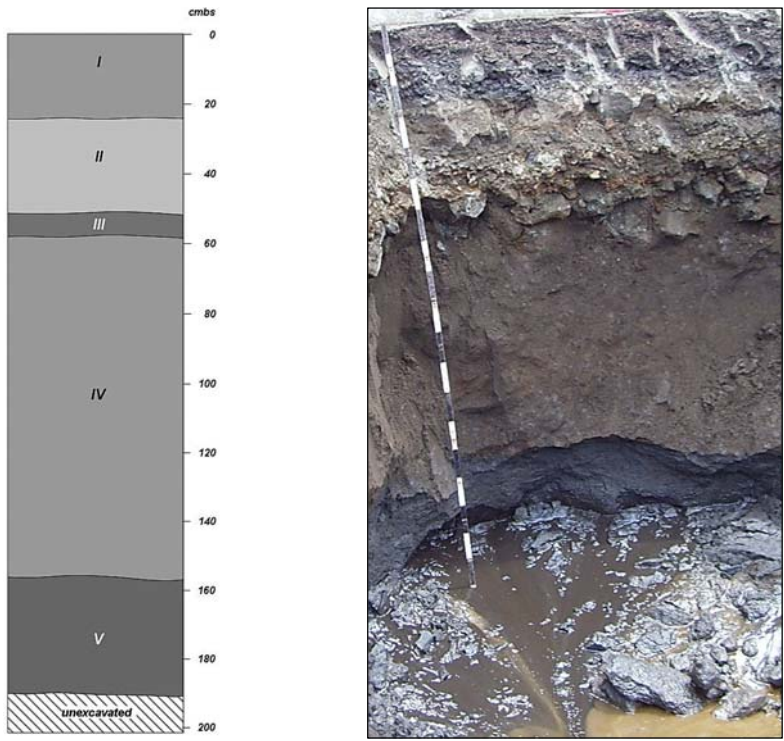


Figure 12. Profile 2, south face profile drawing and photo.

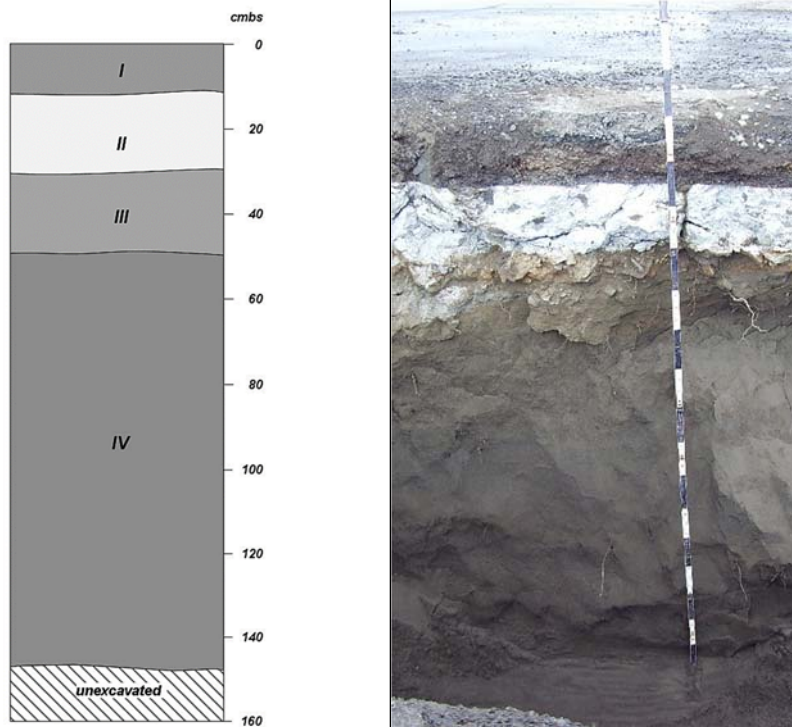


Figure 13. Profile 3, west face profile drawing and photo.

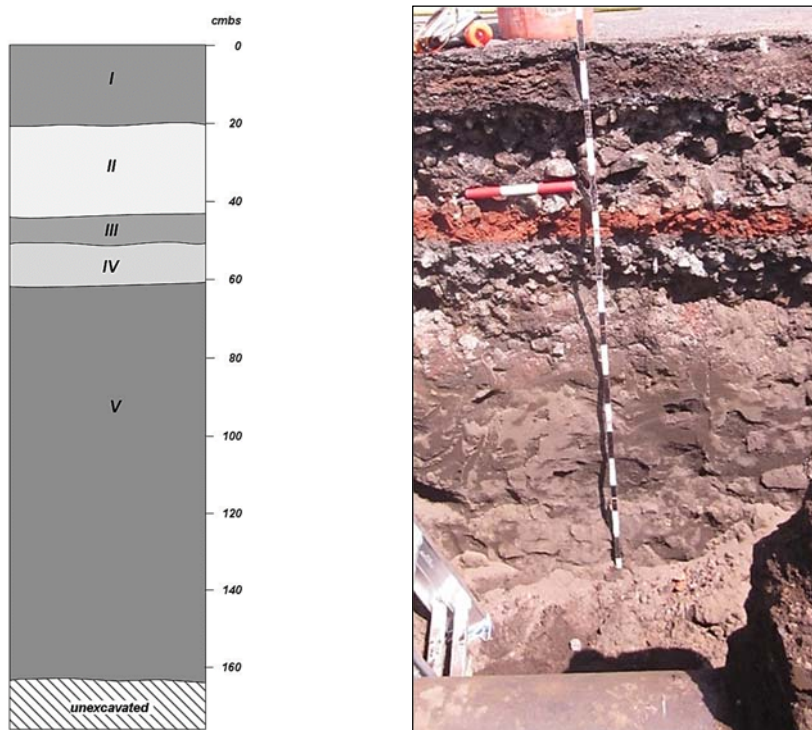


Figure 14. Profile 4, north face profile drawing and photo.

## Cultural Material

A variety of historic cultural material was recovered during the course of archaeological monitoring. These include metal horseshoes, glass bottles, ceramic fragments, and various other wooden and metal artifacts (see Appendix A). They were not found within a cultural layer nor were they associated with a surface or subsurface cultural feature. These items total approximately 1,620 pieces (Table 5). The most common materials were metal horseshoes and glass; these are discussed in detail below.

**Table 5. Artifact Count by Material**

<b>Material</b>	<b>Count</b>
bone	2
brass	1
brick	1
cement	2
ceramic	88
clay	2
coconut shell	1
coral	1
glass	175
iron	13
leather	4
metal (other than horseshoes)	59
metal horseshoes	1,250 (approx.)
plastic	9
rubber	1
shell	2
unknown	5
wood	4
<b>Total</b>	<b>1,620</b>

## Horseshoes

The majority of the artifact assemblage consists of metal horseshoes (Figure 15). There were 1,162 individual horseshoes along with several fused clumps (Figure 16) of approximately 90 horseshoes that could not be counted precisely. Thus the approximately 1,250 horseshoes make up 77.2 % of the collection. The horseshoes were mostly collected from two adjoining areas and given two accession numbers, 171 and 175 (see Appendix A); these were assigned as SIHP 50-10-35-30616. The main portion of the first cache (Acc. 171) was located 50–55 m west of the Bishop Street/Kamehameha Avenue intersection at 30–80 cmbs (Figure 17). The main portion of the second cache (Acc. 175) was located 64–67 m west of the Bishop Street/Kamehameha Avenue intersection at 30–100 cmbs (Figure 18).





**Figure 15. Horseshoes on site, after excavation.**



**Figure 16. Example of fused clump of horseshoes.**





**Figure 17. Portion of in situ horseshoe cache, Acc. 171. View is to the north.**



**Figure 18. Portion of in situ horseshoe cache, Acc. 175. View is to the northwest.**

A sample of 1,000 horseshoes were analyzed by Peter Mills, Phoebe Mills, Margaux Mellott, and Mei Hua Xie of the University of Hawai'i at Hilo (see Appendix B). Each item was weighed, measured, and individually photographed. Horseshoes were categorized by style (with or without toe clip, base bar, forged caulkins, and apex wear), and a sample were taken to the North Hawai'i Education and Research Center (NHERC) in Honoka'a to show them to retired Parker Ranch cowboys Donnie DeSilva and Charlie Kimura, who agreed that the shoes were not from ranching horses but likely from carriage or cart horses. Wayne Subica at the Hawai'i Plantation Museum was also consulted. He indicated that the horseshoes were found in the vicinity of the former Riverside Blacksmith Shop which took over at or near the location of an old foundry. The foundry is marked on an 1891 map of downtown Hilo (Figure 19), and it was replaced by the blacksmith shop soon after that time.

Several historical accounts were found of the Riverside blacksmith operation. They date from 1892 to the early 1900s. An unnamed blacksmith shop was also in existence as early as 1873 in the Hilo Bayfront area, although it is unclear if this is the Riverside shop:

The sea at that time came right up to the bank edge of Front street, so that in heavy weather the spray blew more or less up into the street. Along Front street tall coconut trees of great age towered up over the street. From the foot of Church street extending along the beach it was open country, with the exception of one Hawaiian home, one canoe-builder's workshop – or halau, as it is called by the Hawaiians – and a tumbled down little blacksmith shop some distance farther on. (Lydgate 1922:102)

The first mention of the Riverside shop by name comes from the *Directory and Hand-Book of the Kingdom of Hawaii* (Polk 1892). The operation is noted three times but called Riverside Horseshoeing Shop, rather than Riverside Blacksmith Shop: “ANDERSON ANDREW proprietor Riverside Horseshoeing Shop, Bridge, Hilo” (Polk 1892:291); “Riverside Horseshoeing Shop Bridge Street, Hilo, Hawaii” (Polk 1892:304); and “RIVERSIDE HORSESHOEING SHOP, Andrew Anderson proprietor, Bridge, Hilo” (Polk 1892:321).

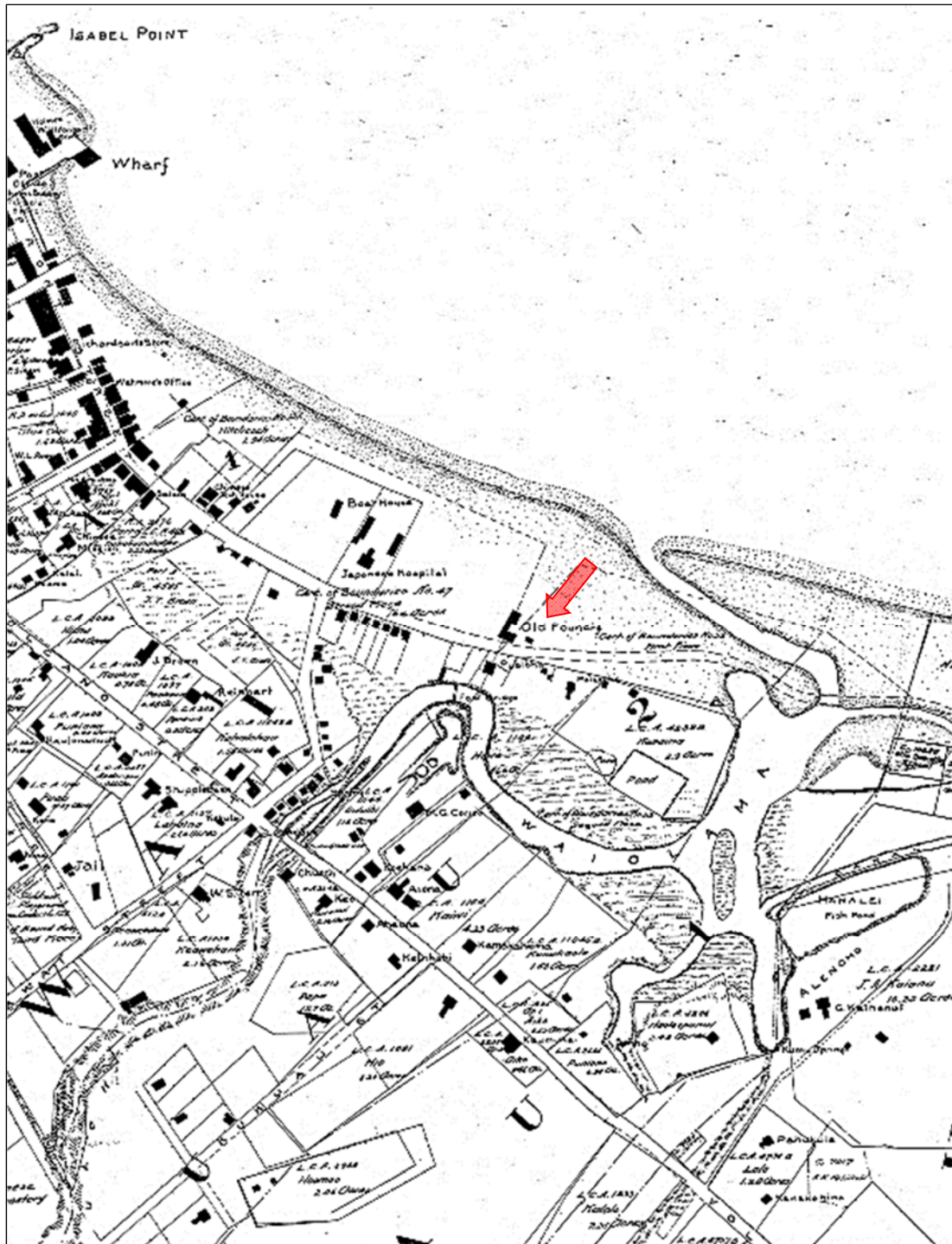
Beginning in 1896, the operation was referred to as the Riverside Blacksmith Shop:

The Riverside blacksmith shop is undergoing a complete change in appearance, the old building disappearing and a new one 75 feet deep with a 40-foot frontage taking its place. This is to accommodate the wagon making department as well as the blacksmithing. (Sept. 16 1896 *Pacific Commercial Advertiser*, p. 2, column 1)

Another 1896 article reported again on the expansion of the shop: “The Riverside Blacksmith and Carriage Works are being enlarged. The main building is being widened and made higher in order to accommodate the increase of business” (Sept. 17, 1896 *Evening Bulletin*, p. 6, column 1).

The operation was also listed in a Hilo business directory in *Godfrey's Handbook of Hawaii* as follows: “Riverside Carriage & Blacksmith Shop, The Volcano Stables & Transportation Co., prop'rs, J.R. Wilson, mgr, Bridge nr Shipman” (Godfrey 1899:77).

On July 28, 1901 *The Honolulu Republican* (Page 10, column 1) indicated that the Department of Public Works paid \$299.25 to the Riverside Blacksmith Shop for bills owed to it. Then on August 3, 1901 *Pacific Commercial Advertiser* article (p. 11, column 3) reported the same bill paid to the Riverside Blacksmith Shop by the Territory of Hawaii.



**Figure 19. Portion of a historic map of Hilo Town (Baldwin 1891) showing the Old Foundry, indicated with the red arrow. See Figure 6 for a larger view of the same map.**



The last mention of the blacksmith operation comes from an April 17, 1903 *Hilo Tribune* article (Vol 8, no. 24, p. 5, column 1) that states “John Riley, who recently returned from the Coast, is now installed as foreman of the Riverside Blacksmith Shops.” It is interesting to note the plural on ‘shops,’ possibly indicating that by this time the company had expanded.

A related operation was the Volcano Transportation and Stables Co., Ltd., established in 1873, where tourists would rent a horse to go to the volcano, or travel around town. This company was located closer to Waianuenue Avenue, but there is some indication that the Riverside Blacksmith Shop worked with the transportation company. The sizes of the horseshoes in our collection suggest very few draft horses, but a good number of mid-sized horses and mules of the kind that would have been ridden on roads.

According to the 1891 map (see Figures 6 and 19), a large oxbow in the Waiolama/Wailoa River would have approached the shop (hence, the name of the shops), but by 1913, dredging had filled in this oxbow, and at least four large structures were in the immediate vicinity. Given that the shoes were found without a lot of other debris, they were not likely part of a tsunami deposit. It is possible that the blacksmith shop was trying to stabilize the bank of the oxbow before the dredging changed the location of the river, which would date the deposit between the 1890s and the first decade of the 1900s.

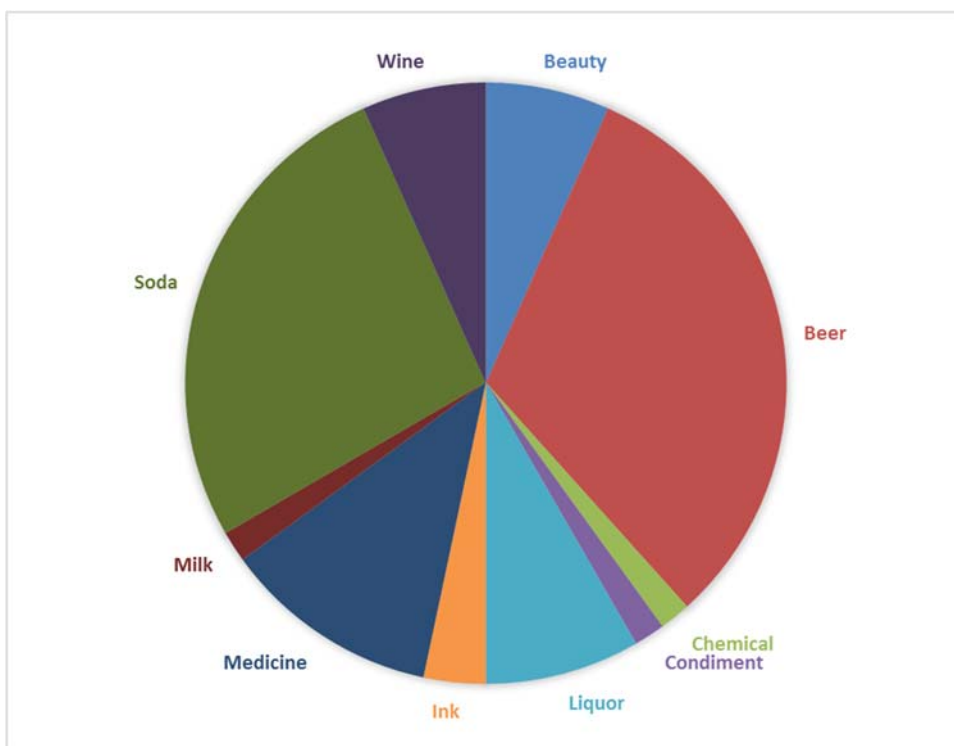
In sum, the horseshoes match well with small to medium sized mules and horses being reshod from bar-stock. Many of these animals were probably used as rentals for tourists either for saddle-horses or small carriages on trips to Kilauea and around town. It is possible that old shoes were discarded along the former river to stabilize the bank. Distinctive patterns of shaping the shoes, including the use of forged toe clips and calks, will make for interesting comparisons with shoes found around Hawaiian ranches and in other urban/suburban settings, and may provide the basis for regional and temporal differences in horseshoes (both in relation to style and function), much like studies of New England gravestones (e.g., Dethlefsen and Deetz 1966). These detailed analyses are underway.

### **Glass**

A sample of 96 glass items were analyzed by Peter Mills, Phoebe Mills, Margaux Mellott, and Mei Hua Xie of the University of Hawai‘i at Hilo (see Appendix B). Each item was measured and individually photographed. Of the 96 glass pieces, 90 were bottles or bottle fragments, three were jars, one was a vase, one was a flask, and one was a plate glass fragment. Information recorded for the bottles includes a general description, identifying marks, base markings, type of mold, date of manufacture, contents, and top type.

The majority of bottles dated from the late 1800s to the early 1900s. They consist of 19 beer bottles, 16 soda bottles, seven medicine bottles (including one for horse medicine), five liquor bottles, four wine bottles, four containers for beauty products (cologne/perfume, lotion, nail polish), two ink bottles, one condiment bottle (pickle vinegar), one chemical bottle (photography-related), and one milk bottle (Figure 20).

The horse medicine bottle was not found with the caches of horseshoes, and dates to a time when the blacksmith and stables mentioned above were already closed. This was a Humphrey’s cure oil bottle which was manufactured after 1940. Humphrey’s cure oil was used for pain relief, arresting bleeding and inflammation, as well as promoting healing (Federation of Historical Bottle Collectors 2005).



**Figure 20. Contents of glass bottles.**

### **Other Artifacts**

A diverse array of other artifacts was collected, mostly dating from the late 1800s to the mid 1900s (see Appendix A). Taken together, the artifacts indicate that a wide variety of activities were occurring in historic Hilo, including economic, transportation, and industrial pursuits. Some of the more interesting items include part of a 1960 credit card (Acc. 200) (Figure 21), a metal gear (Acc. 316) (Figure 22), a decorative grate fragment (Acc. 317) (Figure 23), a railroad spike embedded in wood (Acc. 341) (Figure 24), an 1883 Kalakaua dime (Acc. 374) (Figure 25), and a portion of a metal hand drill (Acc. 408) (Figure 26).

### **Summary of Results**

A variety of historic artifacts were collected during archaeological monitoring and stratigraphy typically consisted of roads and road bases near the surface with fill layers below. The overwhelming majority of artifacts were metal horseshoes, which were mostly collected from two adjacent caches in the location of a former blacksmith shop. The caches of horseshoes were designated as SIHP 50-10-35-30616. It is proposed that the discarded horseshoes were used to stabilize the riverbank along the area near the shop. Glass bottles are another common artifact type in the assemblage. Most were beer or soda bottles, and many of the items dated to the late 1800s to early 1900s, the same time period that the blacksmith shop was in operation.



Figure 21. Portion of a 1960 credit card (Acc. 200).



Figure 22. Metal gear (Acc. 316).





**Figure 23. Decorative metal grate fragment (Acc. 317).**



**Figure 24. Railroad spike in wood (Acc. 341).**



Figure 25. 1883 Kalakaua dime, front and back (Acc. 374).



Figure 26. Metal hand drill fragment (Acc. 408).

## CONCLUSION AND RECOMMENDATIONS

Approximately 18 months of archaeological monitoring was conducted for the resurfacing of Kamehameha Avenue on portions of TMK: (3) 2-2-002:002 in Waiākea, Kūkūau 1, Kūkūau 2, and Ponahawai Ahupua‘a, in Hilo District, on Hawai‘i Island. Archaeological monitoring was conducted for all ground disturbance below 12 inches, as set forth in the monitoring plan for the project (Wilkinson et al. 2012).

A variety of artifacts were collected during monitoring, and stratigraphy typically consisted of roads and road bases near the surface with fill layers below. A large historic artifact assemblage was collected, including approximately 1,250 horseshoes and 175 glass items, many of them bottles. The horseshoes were mostly collected from two adjacent caches in the location of the former Riverside Blacksmith Shop. The caches were designated as SIHP 50-10-35-30616. The horseshoes were not from ranching animals, but instead match well with small to medium sized mules and horses being reshod from bar-stock. Many of these animals were probably used as rentals for tourists either for saddle-horses or small carriages on trips to Kīlauea and around town. It is proposed that the old shoes were discarded along the former river near the blacksmith shop to stabilize the bank. The glass bottles were primarily beer or soda bottles, and many of the items dated to the late 1800s to early 1900s, the same time period that the blacksmith shop was in operation.

Per HAR §13-275-6, Site 50-10-35-30616 is assessed as significant under Criterion d (information content) for its potential to provide information about the former blacksmith operation. It is recommended that archaeological monitoring is conducted for any future work in or near the project area, because of the large number of historic artifacts that were found. Future research will involve more in depth analyses of the horseshoe collection, as an assemblage of this size is a rare find for Hawai‘i. Keala Pono will also facilitate the transfer/loan of as many items as possible to appropriate facilities, such as the Pacific Tsunami Museum, the Paniolo Preservation Society, the Hawai‘i Plantation Museum, or the Anthropology Department of the University of Hawai‘i at Hilo, so they can be appreciated by students, other researchers, and the larger community.

## GLOSSARY

<b><i>ahupua‘a</i></b>	Traditional Hawaiian land division usually extending from the uplands to the sea.
<b><i>ali‘i</i></b>	Chief, chiefess, monarch.
<b>boulder</b>	Rock 60 cm and greater.
<b>cobble</b>	Rock fragment ranging from 7 cm to less than 25 cm.
<b>gravel</b>	Rock fragment less than 7 cm.
<b><i>heiau</i></b>	Place of worship and ritual in traditional Hawai‘i.
<b><i>‘ili</i></b>	Land division, next in importance to <i>ahupua‘a</i> and usually a subdivision of an <i>ahupua‘a</i> .
<b><i>Kahiki</i></b>	A far away land, sometimes refers to Tahiti.
<b><i>kuleana</i></b>	Right, title, property, portion, responsibility, jurisdiction, authority, interest, claim, ownership.
<b><i>koa</i></b>	<i>Acacia koa</i> , the largest of the native forest trees, prized for its wood, traditionally fashioned into canoes, surfboards, and calabashes.
<b><i>lehua</i></b>	The native tree <i>Metrosideros polymorpha</i> , the wood of which was utilized for carving images, as temple posts and palisades, for canoe spreaders and gunwales, and in musical instruments.
<b><i>luakini</i></b>	Large <i>heiau</i> of human sacrifice.
<b>Māhele</b>	The 1848 division of land.
<b><i>maka‘āinana</i></b>	Common people, or populace; translates to “people that attend the land.”
<b><i>makai</i></b>	Toward the sea.
<b><i>mauka</i></b>	Inland, upland, toward the mountain.
<b><i>mele</i></b>	Song, chant, or poem.
<b><i>mo‘olelo</i></b>	A story, myth, history, tradition, legend, or record.
<b><i>‘ōhi‘a</i></b>	Two kinds of forest trees. See also <i>o ‘ōhi‘a ‘ai</i> and <i>‘ōhi‘a lehua</i> .
<b><i>‘ōlelo no‘eau</i></b>	Proverb, wise saying, traditional saying.
<b><i>oli</i></b>	Chant.
<b><i>paniolo</i></b>	Cowboy.
<b>stone</b>	Rock fragment ranging from 25 cm to less than 60 cm.
<b><i>uluhe</i></b>	Ferns of the genera <i>Dicranopteris</i> , <i>Hicriopteris</i> , and <i>Sticherus</i> . Also known as the false staghorn fern, they form dense thickets.
<b><i>wahine</i></b>	Woman, wife; femininity. <i>Wāhine</i> is the plural.



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## **APPENDIX A: DATA FOR COLLECTED ARTIFACTS**



Acc. #	Provenience*	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
3	signal pole #7, 125cmbs	metal	7.7	0.4		8			rusted, round head nail
5	makai side Kam Ave	glass			14.5		"P" on base	1940s or later	fragment of clear Pacific Soda Works bottle 7 fl oz
10a	ST3+00, sidewalk	ceramic	7.2	4.8	0.4	33			fiestaware blue plate base fragment
10b	ST3+00, sidewalk	ceramic	4	3.4	0.5	12			tan rim fragment
10c	ST3+00, sidewalk	glass, n=2	6.0	2	0.6	36			flat industrial glass
11	ST3+00, 100cmbs, drain	glass						late 1800s early 1900s	multiple frags clear square medicine bottle
13	ST3+20, drain, 150cmbs	metal, steel		30	10.5			early 1900s	industrial steel wheel
14	soil sample from inside of #13 wheel	soil sample							
15	ST7+50, cold plane	ceramic n=2	3.9x3.8, 4.4x2.6		0.5	14	double blue lines on inside		body fragments
16a	ST8+20, drain trench, 60cmbs	ceramic n=5	largest 4.4x3.9		0.5	25.3			textured (exterior), dish base fragments
18b	ST8+20, drain trench, 60cmbs	ceramic	2.5	2.6	2.6	10.2			cylindrical fragment, possibly a type of insulator
17	ST8+20, drain trench, 60cmbs	glass n=2	8.3x6.8, 6.3x4.8		0.6	89.3			thick, flat industrial glass w/patina
18	ST8+20, drain trench, 60cmbs	leather	15.6	3.8	4	13.1			belt fragment with holes
20	ST4+25, drain trench, 80cmbs	cement	10	5.9	1.4	76.1			tile fragment
21	ST4+25, drain trench, 80cmbs	leather	16	1.9	0.4	9.5			strap fragment

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
22	ST4+25, drain trench, 80cmbs	metal	12.7	1.2		68.8			bolt
25a	ST10+25, drain trench, 100cmbs	soil sample							possible tsunami layer; grey, mucky, w/debris
25b	ST10+25, drain trench, 100cmbs	glass n=8	1.8-2.5-14x11		0.25				flat glass fragments with rusted metal and grey, mucky soil (see soil sample 25A)
25c	ST10+25, drain trench, 100cmbs	metal n=2		2.1, 2.2	0.1	4.9, 5.2			washers
25d	ST10+25, drain trench, 100cmbs	ceramic	5.5	4.7	1.5-2.3	61.5			molding fragment; rounded on the outside, square cut on the inside
25e	ST10+25, drain trench, 100cmbs	metal							nails
26	ST10+25, drain trench,	glass				26	SB & G Co 5 (base)	1881-1905	brown beer bottle with broken top
27	ST10+50, drain trench, 130cmbs	brick	21	10	6		Richmond		whole red brick
28	ST10+25, drain trench, 100cmbs	bulk sample							mixed metal, nails, bolts, glass with grey mucky soil
29	makai side Kam Ave	bulk sample							
30	ST6+25, drain trench, 92cmbs	coral	12.5	9.5	10.5	481			dredged coral
33	makai side Kam Ave	glass				29.3	McFarlane & Co Honolulu	late 1890s-1910	whole brown whiskey bottle; thick seams, pulled neck
34	makai side Kam Ave	glass				28.7	SB & G Co 4 (base)		whole brown bottle, thick seams, pulled neck, with cork

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
35	ST4+00, drain trench, 80cmbs	metal	48	1		353			chain with large link on one end
36	ST3+20 sidewalk, 20cmbs	glass	14.8	14.8	1.5	803		post 1926	clear, square ashtray. Ashtrays were not a common part of life until the early 20th century, when cigarette manufacturers began to encourage the development of ashtrays as an American consumer product. The word itself did not come into common use until 1926. [wikipedia]
37	ST13+00, drain trench, 75cmbs	ceramic	4.4	16-18		28.5			white, square poss. porcelain, 0.5cm hole "9172" "T.1. 91"
38a	ST13+00, drain trench, 80cmbs	glass	7	5.2	0.2	21.2			green, slightly curved glass fragment. Bubbles, ripples
38b	ST13+00, drain trench, 80cmbs	ceramic	3	2	0.3	2.8	brown band with blue bands on either side		rim fragment
38c	ST13+00, drain trench, 80cmbs	ceramic	7	5.5	0.02				base to rim fragment, small bowl
38d	ST13+00, drain trench, 80cmbs	ceramic n=4					red line on exterior just below rim		plate/shallow bowl; base, side and rim fragments
38e	ST13+00, drain trench, 80cmbs	ceramic n=4			0.3				plate; rim and side fragments
38f	ST13+00, drain trench, 80cmbs	metal		10.5	>.1	40			top of can?
38g	ST13+00, drain trench, 80cmbs	metal, iron	10.4	0.7		18.2			square nail
38h	ST13+00, drain trench, 80cmbs	metal	17, 19	5, 5	.5-1.5				flat, rectangular
39	makai side Kam Ave	glass				24		post 1910	light green bottle
40	ST13+00	glass				23.4	SB & G Co (base)	1881-1905	beer, whole brown bottle

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
41	ST3+65, drain box, 300cmbs	soil sample							
42	ST6+75, drain trench, ND	ceramic	5.5	3.2	.4-1.2	13.7	double blue lines on inside		bowl or cup; side fragment
43	makai side Kam Ave	glass							aqua cylindrical body frag no markings
44	makai side Kam Ave	glass			24		"FEHRS" IN FANCY DECO EMBLUM on shoulder, "12" AT BOTTOM of body	post 1910	whole bottle w/ wood frags Fehr's Beer Co in Louisville, KY in operation from 1870s to 1970s.
45	makai side Kam Ave	glass			23.5		embossed "P" on side edge of base	post 1910	aqua whole cylindrical bottle fully automatic, crown top
46	makai side Kam Ave	glass			24.2			late 1800s to early 1900s	whole green bottle
48	ST15+35, drain, ND	glass	9.2	8		597			green glass insulator
49	ST3+25, drain trench, no depth	metal	36	33					wedge shaped hoe
50a	ST4+25, lateral water trench, 80cmbs	glass		1.8			5 thin, red stripes		marble; stripes are a spiral hand painted
50b	ST4+25, lateral water trench, 60cmbs	ceramic	3.8	3.5	0.6	10.7			tan fragment
50c	ST4+25, lateral water trench, 75cmbs	ceramic	2.8	2.5	0.3	4.1	white/blue		
50d	ST4+25, lateral water trench, 80cmbs	ceramic	1.7	1.2	0.1	0.9			



Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
50e	ST4+25, lateral water trench, 80cmbs	glass	5	3	0.6	23.6			white, with a lip fragment, possible industrial use
51	ST5+75, under sidewalk,	metal, iron							horseshoe
55a	ST4+20, drain, ND	metal	19	8.5	2	566			u-shaped, flat with a 1cm hole in the long side
55b	ST4+20, drain, ND	metal	20.5	4	2.5	445			flat metal with 2 large bolts at each end
60	ST14+35, drain, 100cmbs	wood	75	38			hand chiseled end, snapped end		possible pier section, hand chiseled on one end
61a	ST14+35, drain, 120cmbs	wood	55	9.5	5		chiseled on one end		stake like plank
61b	ST14+35, drain, 120cmbs	wood	66	9.5	5		chiseled on one end		stake like plank
65	ST11+35, drain, 60cmbs	glass				22.8		early 1900s?	whole, clear, square tapered bottle, hand tooled finish
66a	ST11+35, GDI19, 275cmbs	animal bone							sample
66b	ST11+35, GDI19, 275cmbs	wood	12	7	2.3				cut board
66c	ST11+35, GDI19, 275cmbs	coconut shell fragment	10	8.5	1				no use wear or working seen
66d	ST11+35, GDI19,	glass			23.3			early 1900s	green beer bottle base and neck
66e	ST11+35, GDI19	glass			18.5			early 1900s	aqua bottle neck and finish, tooled top no collar
67	ST11+35, GDI19	glass			20.4		Pacific Soda Works	1900-1909	whole "Pacific Soda Works" w/ ceramic stopper & wire

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
69	ST10+50, drain trench, 60cmbs	metal							square nail
70	ST11+05, drain trench, 100cmbs	glass					UNION SODA WORKS HILO, H.I.	1900	whole aqua "Union Soda Works" w/ ceramic stopper & wire inside
71a	ST10+60, drain trench, 35cmbs	glass			25.3			post 1910	light aqua whole bottle, heavy irregular glass in bottle base
71b	ST10+60, drain trench, 35cmbs	glass			11.9			post 1910	
72	makai side Kam Ave	leather	29	1.6	0.2	13.6			strap w/nail fragment
76a	ST3+20, electric trench, 50cmbs	glass	3.6	2.6-4.8				1900s	brown prescription medicine bottle base
76b	ST3+20, electric trench, 50cmbs	Slag?	6	1.8	1.7	26.1			black, rectangular piece. "obsidian like" but lightweight
76c	ST3+20, electric trench, 50cmbs	cement	5.7	5	1	36.8			tile; painted on one side
76d	ST3+20, electric trench, 50cmbs	ceramic n=4	2x2.5, 3.5x2.5, 4.5x3.7, 7.5x4	.1-.8		38.2	med. blue line on inside on one fragment		rusted metal stuck to one fragment
77	ST3+30, electric trench, 100cmbs	glass			23.3		vacuum imprint	early 1900s	dark aqua whole bottle; many bubbles irregular glass distribution, crudely made with rough glass for crown tops
78a	ST3+00, electric trench, 45cmbs	metal	10.2	0.8					nail
78b	ST3+00, electric trench, 45cmbs	glass	10	4.5					curved, white glass w/grid-like texture design on outside
78c	ST3+00, electric trench, 45cmbs	ceramic	17	7.5	0.3				cup; base and side fragment

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
78d	ST3+00, electric trench, 45cmbs	ceramic							unknown
78e	ST3+00, electric trench, 45cmbs	ceramic	4.5	4.5	0.5				unknown
80a	ST2+60	glass			12.8		COCA-COLA TRADE-MARK REGISTEREDBOTTLE PAT. D-105529, COCA-COLA TRADE-MARK REGISTERED MIN. CONTENTS 6-FL. OZS	1942 (Owens glass trademark)	light green Coca Cola bottle base and midsection
80b	ST2+60	glass			8			late 1800s early 1900s	aqua bottle neck and finish, medicine
81a	makai side Kam Ave	glass			13.5		AH combined TM 0-7401	mid 1900s	clear cylindrical bottle (relatively small) missing neck and finish
81b	makai side Kam Ave	glass							display glass/ plate glass fragment
81c	makai side Kam Ave	glass						1969-1973	turf/avocado green colored fiestaware plate fragment
82	ST1+00, electric trench, 100cmbs	bone		1.6	0.2	0.6			4 hole button, broke in 2
83a	ST1+00, electric trench, 80cmbs	ceramic	7.8	5.4	0.4	20.9			unknown; side fragments
83b	ST1+00, electric trench, 80cmbs	ceramic	6.7	2	0.3	5.8			unknown; side fragments
84a	ST2+00, electric trench, 65cmbs	glass			8			1900	aqua neck and finish bottle fragment
84b	ST2+00, electric trench, 65cmbs	shell?		0.12	0.2				2-hole button

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
84c	ST2+00, electric trench, 65cmbs	ceramic	4.5	2.7	0.6	14			off white body fragment
85	ST2+80, electric trench, 60-80cmbs	unknown	2.5	1.5	1	4			possible slag
86	ST3+00, electric trench, 40cmbs	glass		1.4		3.9			marble; blue w/yellow
88	ST3+30, electric trench, 60cmbs	metal	12	2.5		1570		pre 1946	rr spike
90	ST3+55, electric trench, 100cmbs	metal, iron							horseshoe
91a	makai side Kam Ave	glass						late 1800s	beer? amber brown bottle base
91b	makai side Kam Ave	ceramic						1800s	Southern China porecelaneous stoneware bowl
92	makai side Kam Ave	glass			25.4		pontil mark	1800s	champagne bottle with wire
93	makai side Kam Ave	glass			25.9		pontil mark	1800s	champagne bottle
94	makai side Kam Ave	glass			17.7		embossed on base 35/{pitchfork like symbol]	early 1900s	liquor bottle
99	makai side Kam Ave	glass			26.9		R G & B Co. 4 (base)	1901-1919	brown bottle and neck, finish broken Rhodes Glass and Bottle Co, Ohio
100	makai side Kam Ave	glass							aqua cylindrical bottle shoulder frag no markings
106	ST14+00, GBI , 180cmbs	glass & metal	9.8	3.8		53			light bulb w/glass
110	ST9+40, GDI, 150cmbs	glass			11.2			1900s	whole jar with white powder and metal screwtop lid

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
112	ST14+60, GDI, 100cmbs	unknown	15	2					cylindrical, sometimes found chiseled/sharpened on one end
113	ST14+60, GDI, 100cmbs	glass			11.9		HUMPHREYS MEDICINE [with horse head motif] all on one panel with words in arc over motif	post 1940	clear square jar, horse medicine
114	ST14+60, GDI, 30cmbs	ceramic	22.5	22	1	914			roof tile
115	ST14+60, GDI, 60cmbs	metal	145	2.9	0.6	1337			chain (removed from trench wall) 6.3cm dia. hoop on one end
116a	ST10+75, 60cmbs	glass			16.5				aqua bottle base and neck
116b	ST10+75, 60cmbs	glass			10.4				green bottle base with large kickup
116c	ST10+75, 60cmbs	ceramic			3.5			early 1900s	porcelain light bulb base
119	ST11+60, gas trench	unknown							ceramic frag, possible charcoal
121	ST14+45, gas trench, 60cmbs	metal		25	3				hoop shaped metal
125	ST13+40 gas trench, 70-80cmbs	metal, bulk sample							
126	ST13+40 gas trench, 70cmbs	metal, iron							horseshoes n=4
127	ST13+40 gas trench, 70cmbs	metal, bulk sample							
128	ST13+40 gas trench, 70cmbs	metal	21.5	10	3.5	1783			industrial hook
129	ST13+40 gas trench, 70cmbs	metal, bulk sample							

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
131	makai side Kam Ave	glass							thin clear glass medicine bottle frag
132	ST16+00, drain box, 80cmbs	ceramic	7.5	4.8	0.9	55.5			tile fragment
134	ST12+80, drain trench, 60cmbs	glass	5.7	8	2.7	263			insulator w/writing "PETTICOAT" "HEMMINGRAY PATENTED MAY 2 19"
135	ST12+80, drain trench, 60cmbs	metal	24	3				pre 1946	bolt/spike
136	makai side Kam Ave	glass			30		ABGM Co V0	1908-1920	whole aqua beer bottle with remnant of label on neck
137	makai side Kam Ave	glass			18.8				aqua beer base and midsection
138	makai side Kam Ave	glass			23.6			post 1910	whole aqua bottle
139	makai side Kam Ave	glass			23.7		AB logo with "C 11" underneath	1905-1917	aqua bottle base and neck, finish broken
142	makai side Kam Ave	leather							
143	ST11+90, lateral drain trench, 120cmbs	glass			20		HIGH TEST SODA WORKS HILO	1908	whole aqua High Test Soda Works bottle
144	ST11+90, lateral drain trench, 100cmbs	glass			7.7			mid to late 1800s early 1900s	dark olive green/black glass base with pontil mark
145	ST11+90, lateral drain trench,	ceramic	5.4	3.1	0.4		blue circles		
146	ST14+30 road subgrade	metal							chain

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
147	ST14+30, road subgrade	metal							shackle
148a	ST10+60, probe for line, 45cmbs	glass	2.4	3.2		24.8	half-sphere 'dots' around circumference		white stopper
148b	ST10+60, probe for line, 45cmbs	ceramic	3.2	1.8		11.8			stopper like but hollow
148c	ST10+60, probe for line, 45cmbs	glass	5	1.2		7.5			tube fragment
148d	ST10+60, probe for line, 45cmbs	glass n=3	10.8	2.5	1	88.6	lines across body (flat), rough pebble-like border around edge		serving plate?
149	ST15+00, electric trench, 60cmbs	glass			23.7		AB logo with "P 19" underneath	1905-1917	whole aqua beer bottle
151	ST23+90, GDI44, 220cmbs	ceramic	5	3		68			cylindrical insulator with wire through center
153	ST26+50, GDI50 approx.	glass			30		AB logo with "H-10" underneath	1905-1917	large aqua bottle found by foreman, see SH web page for AB mark
155	ST28+25, drain, 160cmbs	metal		20.5	0.4	190			white lid for pot
156	ST31+90, no depth	metal, iron	10	1.2-3.2		120		pre 1946	rr spike, found by crew
157	ST26+35, sidewalk, 8cmbs	metal, iron							horseshoe(s)
158	ST26+85, electric trench, 75cmbs	metal, brass	2.5	2.9		76			fitting
160	ST24+70, sidewalk, 75cmbs	glass			17.2		No deposit no return. Not to be refilled...	mid 1950s	brown beer bottle with eroded tin/paper label (Primo?) broken off top
161	ST26+10, GDI57	glass			18.6		Pacific Soda Works	1900-1908	aqua Pacific Soda Works bottle broken neck and finish

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
162	ST29+40, electric trench, 30cmbs	ceramic	5	5.3	1	75			1/2 of a spool
163	ST28+40, electric trench, 70cmbs	ceramic n=14				211			plate; base body & rim fragments, "TONE CHINA" "EXTRA QUALITY" double lion makers mark (green) George Scott pottery, American
164	ST23+50, electric trench, 60cmbs	glass	7.5	8	2.5	341			insulator, green
166	ST23+90, electric trench, 10cmbs	plastic	14	6.2	.0.1	125		post 1943	"Do Not Disturb" sign Inter-Island Resorts (bought Naniloa 1943)
167	ST23+50, electric trench, 60cmbs	glass	8.4	7.6	2.3	339			insulator fragment
168a	ST23+40, electric trench, 75cmbs	glass			28.8			mid 1900s	aqua beer bottle whole
168b	ST23+40, electric trench, 75cmbs	glass			21.6			1900s	aqua beer bottle broken top
168c	ST23+40, electric trench, 75cmbs	glass			8.9			1900s	olive green beer bottle base
170	makai side Kam Ave	glass			24.5			post 1910	brown beer bottle
171	ST22+20/GDI41, 30-80cmbs	metal, iron							horseshoe cache 1
173	ST23+90, drain trench, 100cmbs	ceramic	14	6.2	0.8	125	blue on white flowers in baskets		bowl base fragment; white background w/blue flower pattern
175	ST21+90, electric trench, 30-100cmbs	metal, iron							horseshoe cache 2
176	ST19+03, GDI34, 245cmbs	glass			28.9		small dot?	late 1800s early 1900s	dark green beer bottle



Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
177	ST19+03, GDI34, 245cmbs	metal	36						nail like, large
180	ST21+60, electric trench, 50cmbs,	glass			5.9			1900s	brown cylindrical bottle base
181	ST19+99, lateral drain trench, 75cmbs	ceramic	10.5	6.5	6	241			
182	ST20, electric trench	glass					circular embossed motif: Eastman Kodak Co Roc[hester] NY/ TESTED CHEMICALS		clear Eastman Kodak embossed chemical bottle
183	ST20+35, HiTel, 20-85	bulk sample							
184	ST20+35, HiTel, 20-85	ceramic/wire							insulators with wire
185	ST20+10, 80cmbs, electric trench	metal	9.5	8.5		150			cup
187	ST20+50, HiTel, 20cmbs	ceramic/metal	6	6.5		179			door handle
188	ST20+25, 80cmbs, electric trench	glass	12	12	0.4	244	2 orange stripes		pitcher fragment; port. of rim, handle
189	makai side Kam Ave	glass			19.7		COCA-COLA TRADE-MARK REGISTEREDBOTTLE PAT. D-105529, COCA-COLA TRADE-MARK REGISTERED MIN. CONTENTS 6-FL. OZS	1944	whole aqua Coke bottle

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
191	makai side Kam Ave	glass			18		One Pint Liquid/EXSELSIOR DAIRY/TEL 5A4/HILO HAWAII/ BBC Co 48 [on rim of base]	1948	Excelsior Dairy milk bottle whole
195	ST20+20, 50cmbs, electric trench	glass			19.9		TRADE C MARK, REGISTERED OCT. 1923/ SODA WORKS LTD; PROPERTY OF CITY HONOLULU TH	post 1923	"Honolulu Soda Works" aqua bottle
197	sidewalk/curb	glass			7.1			late 1800s early 1900s	aqua bottle neck and finish
198	ST7+40, 15cmbs, sidewalk/curb	glass			4.7		16	mid 1900s	nail polish bottle, still retains pigment from polish
199	ST7+25, 15cmbs, sidewalk/curb	ceramic					yellow fiestaware plate fragment		olive green/avocado fiestaware base fragment
200	ST4+90, under curb, 10cmbs	plastic	7.2	5.3	>0.1	3.4		195?-1960	credit card; "KAMAAINA Charge Club" "International Credit Card" "...8 078 268 NOV 60" "... Butaka Kaido" "...rnational Charge, Inc.
201a	ST4+90, under curb, 25cmbs	glass, n=3							white & teal 'AW' bottle
201b	ST4+90, under curb, 25cmbs	glass	11	5.6		130			Coke bottle fragment
201c	ST4+90, under curb, 25cmbs	ceramic	11.2	4.2	0.6	64			ashtray fragment
201d	ST4+90, under curb, 25cmbs	plastic/metal n=4	6.3	1		2			tubes
202a	ST3+80, root barrier, 60cmbs	ceramic	10	6	0.5	56			green plate; base fragment' possible fiestaware

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
202b	ST3+80, root barrier, 60cmbs	ceramic	4.5	4.3					cylindrical w/ a hole through the middle
203	ST4+80, 60cmbs, root barrier	glass			5.8		CARTER'S USA	1900s	clear glass ink jar
206	ST5+40, 60cmbs, root barrier	glass			19.7		COCA-COLA TRADE-MARK REGISTERED IN US PATENT OFFICE/MIN CONTENTS 6 FL OZS/ 56-18	1956	coke bottle whole
207	ST5+50, 15cmbs, root barrier	glass			21.4		PROPERTY OF/HILO SODA WORKS/HILO, HAWAII/Net Contents 6 1/2 Fluid Oz/ 1A [stippled texture]	1959	clear Hilo Soda Works bottle whole, based on Owens TM
208	ST5+45, 60cmbs, root barrier	metal	15.8	4.5		608			canister, unknown purpose
209	ST5+90, 25cmbs, root barrier	glass			4.3			late 1800s early 1900s	base of dark olive green case gin bottle
212	ST31+70, root barrier, 30cmbs	ceramic	6.4	4.5	0.4	20.7			"Thomas Hughes & Son" "Semi-porcelain" "England" mark
213	ST20+25, 30-50cmbs, electric trench	glass			9.8		JERGENS	1900s	Jergens Lotion bottle with screwtop lid still present
214	ST29+00, 70cmbs, root barrier	glass		1.2		5			blue marble
215	makai side Kam Ave	glass					"e..."	mid 1900s	clear soda bottle frag with orange and white color design

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
216	ST25+65, 80cmbs, root barrier	metal	11	0.3		137			"Ford" hubcap cover
217	makai side Kam Ave	metal							horseshoe(s)
218	ST24+75, root barrier, 70cmbs	metal, iron	15.8	1.7/4.3		273		pre 1946	rr spike
219	ST25+00, 70cmbs, root barrier	glass					raised dot at center automatic mold	1900s	olive green bottle base
220	ST23+75, root barrier, 50cmbs	metal, iron	15	3.2/4		621			chisel/spike
221	makai side Kam Ave	metal							horseshoe(s)
222	ST21+75, 65cmbs, root barrier	glass			13.3			late 1800s early 1900s	clear long-necked bottle (cologne/perfume?) (tall)
223	ST21+75, 60cmbs, root barrier	glass			11.7			late 1800s early 1900s	clear long-necked bottle (cologne/perfume?) (short)
224	ST21+75, 60cmbs, root barrier	ceramic	4.2	6.2		71			cup fragments base, body
225	ST22+25, 50cmbs, root barrier	ceramic/meta'	8	1.5					"Champion" spark plug
227	ST21+55, root barrier, 25cmbs	ceramic	7.8	2.6	1.3	53			molding fragment
228	makai side Kam Ave	glass			11.9			late 1800s early 1900s	aqua bottle neck and finish

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
230	LP29, no depth	glass			3.1		Owens TM with 1940 date code	1940	clear glass flask base
231	ST20+25, 30- 40cmbs, elec trench	glass			19.6		COCA-COLA TRADE- MARK REGISTEREDBOTTLE PATD DEC 25, 1923/ MIN. CONTENTS 6- FL. OZS	1940- 1950s?	coke bottle whole
232	ST20+25, 30- 40cmbs, elec trench	glass			16.4		Net Contents 6 1/2 Fluid Ozs/ 5 / IPG Co	1902-1925	aqua soda bottle, missing top
233	ST20+25, 30- 40cmbs, elec trench	glass					floral motif below rim pieces and on base	1900s	light green floral motif vase in 5 fragments
234	ST20+25, 30- 40cmbs, elec trench	glass			19.1		WHISTLE/ Registered 6 1/2 fl OZ/ Whistle Bottling Co. [stippled texture]	post 1919	clear whistle soda bottle, chipped but nearly whole
235	ST20+25, 30- 40cmbs, elec trench	glass			21.7		T Ikeda [script]/ Property of/T Ikeda Soda Works/Net Contents 7 Fl. Oz. [stippled texture design]	1929-1940s	clear T Ikeda soda bottle whole
236	ST1+00 (Tesoro, lateral gas line) ND	metal/wood	14.5	1.4	1.4	300		pre 1946	rr spike w/wood
237	ST19+50, 60cmbs, remove HiTel lines	metal	4.8	2.2	8	171			padlock
238	ST19+60, 45cmbs, HiTel line	ceramic		2	3.3	19			drawer pull, stem broken

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
239	ST19+50, 60cmbs, remove HiTel line	glass			on base only		Owens trade mark code	1938	whole brown cylindrical bottle
240	ST19+45, 70cmbs, remove HiTel line	glass			10.2		DR H F PEERY'S/ DEAD SHOT/ VERMIFUGE	late 1800s early 1900s	whole aqua medicine bottle
241	ST19+40, 45cmbs, HiTel lines	ceramic	13.5	8.8	1.1	156			green tile fragment with texture design
242	ST19+20, 40cmbs, remove HiTel line	glass							fragmented clear solid cylinder with faceted sides (probably not a stopper)
243	ST19+00, 30cmbs, HiTel lines	metal		10.5	5.5	294			lock mechanism n=2 with cover plate
244	ST15+ /SL24, no depth	glass			22.5		"CCW"	late 1800s early 1900s	aqua near complete cylindrical bottle
245	ST15+ /SL24, no depth	glass			26		PONTIL MARK	1800s	olive green beer bottle, cracked but whole
246	ST15+ /SL24, no depth	glass			24.7			1900s	aqua complete long narrow cylindrical bottle
247	ST15+ /SL24, no depth	glass			27.7		concentric circles from turn paste	late 1800s early 1900s	brown cylindrical complete bottle
248	ST15+ /SL24, no depth	glass			19.8		M inside circle	late 1800s early 1900s	clear whole glass bottle
249	ST15 no depth	glass			20			late 1800s to 1917	clear small case gin bottle
250	ST15 no depth	glass			14.7		STEPHENS/ GLOUCESTER	late 1800s early 1900s	aqua glass bottle base and neck, STEPHENS GLOUCESTER Condiment (pickle vinegar)

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
252	ST19+85, root barrier, ND	metal, iron							horseshoe
253	ST19+30, 70cmbs, root barrier	glass							square glass fragment, heavy grinding on 1 end, apothecary related?
254	ST4+00, root, ND	metal		12.5	2.4	716			ring
300	ST33+36 GDI60, 80cmbs	glass			5.2			early 1900s	small, whole Aqua ink jar w/blue patina
301	ST21+80 GDI40, 40-50cmbs	glass			19.8		decorative fluted lines and stipples	post 1910 maybe 1965?	clear cylindrical bottle with decorative embossing and stipples; Big Island picture
302	ST21+80 GDI40, 40cmbs	glass						early 1900s	base of dark green bottle in 2 fragments
303	ST28+00, under sidewalk, 15cmbs	metal							horseshoe
304	ST25+30, water line probe, 30cmbs	metal	5.5	15	2	236			headlight bezel
305	ST26+10, under sidewalk, 20cmbs	plastic	6.2		>0.1	>1	1963 Hi. County Vehicle Safety Check	1963	"1963 Hi. County Vehicle Safety Check" windshield sticker
306	ST30+80, under sidewalk, 20cmbs	ceramic	5.3	5	1.2	29	fragment, "pottery" in blue, between stipes (potter mark)		fragment of large crock, 5gal style
307	ST33+10, electric trench, 35cmbs	glass			8.3			1900s	small brown cylindrical bottle
308	ST32+25, electric trench, 45cmbs	glass			6.4		stipple decoration	mid to late 1900s	clear small vial with screw top
309	ST32+20, electric trench, 40cmbs	glass			5.9		Vicks Vaporub with TM	ca. 1940s?	blue ointment jar (Vick's vapor rub) w partial lid and still with ointment inside!

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
310	ST32+20, electric trench, 65cmbs	glass			16.7		No deposit no return. Not to be refilled Anchorglass	1960s-1977	brown beer bottle crown top
311	ST30+60, electric trench, 100cmbs	glass					no 87674 also with Japanese	post 1890 (first electricity in Hilo)	porcelain wire holder
312	ST30+50, electric trench, 30cmbs	unknown	5.4	1.3		11			cylindrical w/chiseled tip
313	ST28+25, electric trench, 30cmbs	metal							horseshoe
314	ST24+60, electric trench, 40cmbs	glass							red molded glass with design, Perhaps part of an old tail light on a car?
315	ST25+45, 25cmbs	glass			21.2		"Property of Excelsior Soda Works, Hilo Hawaii/ Contains 6 1/2 fluid ounces decorative motif; EX on base with Owens TM	1936 based on Owens TM	"Excelsior Soda Works" Clear embossed soda bottle broken off top
316	ST28+50, 40cmbs	metal		10.5	1.3	299			gear
317	ST26+05, electric trench, 30cmbs	metal	22.5	10	0.2	230			decorative grate fragment
318	ST22+20, drain trench, 40cmbs	glass			14.7		No deposit no return. Not to be refilled...	1960s	brown whole Primo Beer bottle paper label partially intact
319	ST29+30, electric trench, 75cmbs	ceramic	5.4	4.5	0.4-0.8	25	swirls, blue on grey		Asian bowl body fragment
320	ST28+65, electric trench, 50cmbs	metal							horseshoe
321	ST28+65, electric trench, 50cmbs	metal						pre 1946	possible rr spike



Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
322	ST28+65, electric trench, 50cmbs	ceramic		2.8		27			scuffed marble
323	ST28+65, electric trench, 50cmbs	ceramic	6.3	0.6		39	"T. FURNIVAL & SONS" TRADE MARK ENGLAND (BASE)		plate fragment
324	ST33+50, sidewalk, 20cmbs	metal, iron							horseshoe
325	ST22+65, electric trench, 40cmbs	metal	17	11	2.5	957			large industrial hook
326	ST22+70, electric trench, ND	glass			23		AB M8	1905-1917	aqua beer bottle with broken top, see web page on the connected AB mark
327	ST22+70, electric trench, 20cmbs	metal, iron							horseshoe (full 360 degree)
328	ST22+70, electric trench, 20cmbs	glass	5	4	1.4	41	terrace like bands, vertical		glass fragment with a lip, texture on both sides
329	ST22+10, electric trench, ND	metal, iron							horseshoe
330	ST21+90, electric trench, 40cmbs	ceramic	7.5	6	0.6	48	bamboo		Japanese cup fragment, base to rim
331	ST21+90, electric trench, 45cmbs	rubber							ball
332	ST22+10, electric trench, 60cmbs	ceramic	7.3	6	0.7	113	dragon, flames blue on white		Japanese cup fragment, base to rim (clouds? dragons?)
333	electric trench, mauka side Kam Ave	glass	19.7	5.8			SPRITE TRADE MARK 7 fl oz A product of Coca Cola Company (screen printed)	1960s	Sprite bottle, whole

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
334	60cmbs, electric trench, mauka side Kam Ave	metal							horseshoe
335	ST21+87/LP33, ND	ceramic	8.5	5.3	0.2	27	blue iris, green leaves		Asian bowl fragment
336	ST24+00, electric trench, 115cmbs	glass	5.3	1.2					Chinese medicine bottle, top broken off
337	ST24+25, electric trench, ND	ceramic	14.2	10.5	0.5	152	gold petal, red star center black lines		bowl; rim & body fragment
338	ST24+25, sidewalk, 20cmbs	glass	29	7.5					whole aqua bottle, 3 seams
339	ST9+02, LP15, 50-100cmbs	metal	27.5	5.3		can't weigh			window weight
340	ST28+00, drain, 30cmbs	metal	17	1.4	1.4	157		pre 1946	possible rr spike
341	ST1+43, LP3, 30-80cmbs	metal/wood	26			480		pre 1946	rr spike
342	ST5+60, drain, 100cmbs	glass	24	6.6					whole aqua bottle seams
343	ST4+00, drain, nd	glass	24	6			A B Co 11 on base		whole brown long necked bottle; 3 seams [2 vertical, 1 around base]
344	ST4+20, electric trench, 60cmbs	glass	5.9	1-1.5 (oval)					Chinese medicine bottle, top broken off
345	ST3+80, electric trench, 100cmbs	ceramic	5.2	8.2	0.2	142	light green with dark blue chevrons		Asian cup, almost whole; rim broken
346	ST5+30, electric trench, ND	glass	15.5	5.8			"Excelsior Soda Works, Ltd., Hilo, Hi"		aqua bottle body & base fragment, torpedo bottom
347	ST4+20, electric trench, 60cmbs	metal							horseshoe

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
348	ST6+60, electric trench, 90cmbs	ceramic/metal		6.5	2.2	110	CAT#60124		round, with metal; electrical part
349	ST4+70, electric trench, 85cmbs	glass, metal, ceramic(?)	5	3.5	1	46			top of bottle with metal/ceramic stopper
350	ST2+75, electric trench, 60cmbs	metal							horseshoe
351	ST2+30, electric trench, ND	glass/metal	9	11	0.9	170			clear glass with chicken wire embedded inside, undulating
352	ST2+15, electric trench, 106cmbs	glass/cork	13	5/2.5	0.5	121	432		clear rectangle whole bottle w/cork inside
353	ST11+75, drain, >100cmbs	glass	19.5	5.8			"Pacific Soda Works"		whole aqua bottle w/ceramic & wire stopper, 2 seams
354	ST6+70, drain, 80cmbs	glass	24	6					whole, green bottle; no seams
355	ST7+15, drain, 120cmbs	glass	16.2	5.4	0.5				whole, clear round bottle
356	ST2+70, electric trench, 80cmbs	glass	19.6	5.8	0.4		"Coca-Cola"		Coke bottle, whole
357	ST10+65, electric trench, 140cmbs	ceramic	7.3	6.3	0.3	188	white w/blue design dragon wrapping around, border		Asian cup, whole,
358	ST12+25, sidewalk, 60cmbs	ceramic				39	orange stripes, leaves		base/body fragment, hand painted
359	ST10+85 GDI18, 100cmbs	glass	30	7.3	0.3				whole bottle, lt. aqua, seams, bubbles
360	ST10+85 GDI , 100cmbs	glass	19.5	7					whole clear bottle, round, 2 seams, bubbles

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
361	ST15+45 GDI30, 100cmbs	glass	22	5.5-7					dark green, square, tapered press marks can be seen on the sides, no seams
362	ST15+45 GDI30, ND	glass	23	5.5			Florida Water "Murray & Lanman" "Druggists" "New York"		
363	ST15+45 GDI30, drain, 50cmbs	glass	6	2.6		24			possible Chinese medicine bottle; small, oval, light aqua, broken at neck
364	ST14+72 GDI27, 100cmbs	glass	19.7	5.7	0.3		Hawaii island and lettering; screen print		"Hawaii" "Beverages" silver stars,
365	ST15+45 GDI30, drain, ND	glass	22.5	7.7	0.3		A&D.H.C.		whiskey brown bottle broken at neck
366	ST3+55. GDI27, 100cmbs	glass	19.7	5.8			COKE TRADEMARK 6 1/2 FL. OZ COCACOLA (screen printed)	1957	"Coke" "Coca-Cola" bottle
367	ST3+60 GDI3, 140cmbs	glass	30	7.5					whole clear bottle, 2 seams
368	ST9+90, GDI16, ND	glass	22.5	4.9					whole clear sq tapered bottle
369	ST15+20, electric, 75cmbs	glass	24						
370	ST14+40, electric, 25cmbs	glass	23.5						3 seams, "1425, 134" on base
371	ST14+90, electric, 80cmbs	glass	8.5	3	2				top broken off, Chinese medicine bottle
372	ST14+90, electric, 80cmbs	glass		4.5	1.5	39			stopper
373	ST8+20, drain, 25cmbs	glass	3.5	1.5	1	9			Chinese medicine bottle

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
374	ST9+20, electric,	metal, silver		1.5		2.5		1883	1883 Kalakaua dime
375	ST21+80, root barrier, 30cmbs	shell	8.5	6					conus
376	ST21+75, root barrier, 15cmbs	plastic		4	1mm	>1	NAALEHU MILK		Excelsior Dairy, Hilo Hawaii
377	ST22+00, root barrier. 45cmbs	metal	15	5	1.5	306		pre 1946	rr spike
378	ST22+15, root barrier, ND	clay?		1		4			marble/sphere
379	ST22+25, root barrier, ND	glass		1.5		6			red & white marble
380	ST23.35, root barrier, ND	ceramic	7	6.5	0.5	63	blue tree		rim to base cup fragment
381	ST9+20, electric, 85cmbs	ceramic	8.5	6	0.6	53	blue flowers		rim fragment
382	ST28+75, root barrier, ND	plastic	16.5	7.4	1mm		1946 monthly calendar	1946	1946 monthly calendar
383	ST1+00, electric, 70cmbs	glass	18.5	5			"WORCESTER SAUCE"		whole clear bottle, 2 seams,
384	ST11+80, truss, 180cmbs	metal	15	4	1.2	133		pre 1946	rr spike
385	ST12+10, truss, 200cmbs	metal							horseshoe
386	ST18+75, 80cmbs	metal							horseshoe
387	ST 1+50, ND	metal							horseshoe
388	ST9+20, electric, 90cmbs	metal	17	3.5		249		pre 1946	rr spike

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
389	ST9+20, electric, 90cmbs	metal	10	1.6	0.5	91			handle, door, cabinet?
390	ST9+20, electric, 85cmbs	glass		6.7			W F & S, MIL on base		4 pointed star with circle & dot in center
391	ST9+20, electric, 100cmbs	glass	6	5.5	0.8		...LCH... SCHIEDAM....		square bottle corner fragment, dark green
392	ST8+20, sidewalk, 60cmbs	glass	8	3		41			2 seams, lip broken
393	ST14+72, truss, ND	metal							horseshoe
394	ST0+10, electric, 50cmbs	glass	23.5	6.5					2 seams, lip broken
395	ST27+20, root barrier, 60cmbs	unknown		1.2	0.1	>1			4 hole button, tan
396	ST27+20, root barrier, 60cmbs	glass	4.8	1.5	0.8				Chinese medicine bottle, broken to top of shoulder
397	ST27+20, root barrier, 60cmbs	clay?		1.3					small marble like ball, tan
398	ST8+50, root barrier, 60cmbs	glass		2.8	2.2	10	PYREX U.S.A. 125V BRYANT		stopper like, threaded base
399	ST7+75, root barrier, 60cmbs	ceramic		4	1.8	9	blue landscape		very small bowl fragment, base to rim
400	ST7+50, root barrier, 70cmbs	metal	18	0.6		85		pre 1946	thin, rr spike or large nail
401	ST6+50, root barrier, 65cmbs	glass		7.5		101	...ON BREW		dark green base/body fragment, 5 pointed star on base
402	ST14+50, root barrier, 50cmbs	glass	17	6.3			Duraglas		

Acc. #	Provenience	Material	Length (cm)	Width/ Dia. (cm)	Height/ Thickness (cm)	Weight (g)	Identifying Marks	Date	Notes
403	ST3+50, root barrier, ND	ceramic	3.6	6.8		28	small dark & light brown flowers		base/body fragment
404	ST2+75, root barrier, 60cmbs	metal	8.5	6.4	10	98			wedge shaped, possible hoe or iron fragment
405	ST3+05, root barrier, ND	glass	17.6	6.8					M114A 9 trapezoid with K inside all on base
406	ST3+25, root barrier, 60cmbs	glass	4.5	4.5	0.4	30			hexagon, green & white variegated, base
407	ST14+50, root barrier, ND	glass	17	6.5					8 MTC 2227 on base
408	ST8+65, electric, 110cmbs	metal	22	13.5	1	482			hand drill
409	ST0+50, road, 40cmbs	metal	12.5	3.5	0.4	52		pre 1946	possible small rr spike
410	ST8+25, road, 55cmbs	metal							horseshoe

\* ST indicates station numbers that correspond to the construction plans.





## **APPENDIX B: DATA FOR SELECTED HISTORIC ARTIFACTS**

By: Peter Mills, Phoebe Mills, Margaux Mellott, and Mei Hua Xie



**Data for Horseshoes (from Accession 171 and 175 in Appendix A)**

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
1	443	14.3	13.6			1.1	1.2	nc	has caulkin on heel
2	378.6	12.5	11.3			1.0	1.1	tc	
3	294.1	13.4	10.9			1.0	1.0	tc	
4	353.9						0.0		
5	539.6	13.7	10.4	13.1	13.8	0.9	1.1		pieces of other horseshoe stuck on this one
6	352.3	12.7	11.8			1.3	0.5	tc	
7	225.2	11.0	11.0			1.2	0.5		
8	307.7	12.4	11.1			1.0	0.9	tc	corrosion
9	295.9	13.5				0.8	0.4		
10	285.5	11.5	10.5					apex worn	apex worn flat
11	321.8							tc	
12	338.7	13.0	11.2			1.3	0.6	tc	
13	390.5	12.6				1.1		tc	
14	222.5	12.1	11.2			0.0	0.0		
15	200.1	11.6	11.6			0.9	0.4		
16	382.1	12.8	12.0			1.3	0.5		
17	266.8	12.1	9.5	12.1	11.7	1.3	0.4	tc	
18	418.3	14.1	12.5			0.8	0.9	tc	
19	198.9	12.9	10.0	12	12.9	0.8	0.6		
20	283.3	12.4	11.4			1.0	0.6		
21	326.3	12.1	12.7			0.0	0.0		
22	266.4	12.9	10.7	12.9	12.7	1.0	0.7	tc	
23	260.3	11.9	11.0	11.9	11	0.9	0.6	tc	
24	328.9	12.3	10.9			1.3	0.5		
25	231	11.7	11.4			1.0	0.0	tc	apex worn
26	294.5	12.0	11.5			1.1	0.5	wtc	
27	318.5	11.5							bent, not measureable
28	320.1	12.8	11.0			0.9	0.4	tc	
29	344	13.0	10.9			0.0	0.0		
30	293.8	12.4	10.5			1.2	0.4	tc	
31	399.1	13.8	10.5			1.1	0.7	nc	same kind as #1, caulkin on heel

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
32	362.9	12.5	10.7			0.0	0.0	tc	
33	267.6	11.3	9.8			0.9	0.7	tc	
34	322.2	12.7	11.1	12.7	12.1	1.2	0.4	tc	
35	266.5	12.4	11.9			1.1	0.0	apex worn	
36	348.7	12.7	10.2			1.1	0.6	tc	
37	230.5	10.3	9.0			1.0	0.0	apex worn	
38	361.4	14.0	12.1			0.0	0.0	tc	
39	289.9	10.2				0.0	0.0		bent, not measureable
40	318.4	13.2	11.8			1.0	0.8	tc	
41	251.3	12.5	10.5			0.9	0.0	tc	apex worn
42	294.3	12.9	10.5			0.0	0.0	tc	
43	376.7	11.9	12.2	11.2	11.9	1.0	1.0	tc	
44	462.8					0.0	0.0	wtc	
45	272	12.1	11.2	11.4	12.1	0.9	0.8	tc	
46	255.1	11.9	11.3			0.9	0.7		
47	349.6	13.7	12.5			1.1	0.7	tc	
48	272.2	12.7	10.4	11.6	12.7	1.2	0.5	tc	
49	301.5	12.6	10.9			1.0	0.7	tc	
50	389.9	13.5	10.3	12.3	13.5	1.1	1.0	nc	
51	453.1	13.2	11.8	12.9	13.2	1.2	0.9	tc	
52	369.1	13.4	11.4			1.1	0.8	tc	
53	427.4	13.0	11.1			1.0	0.9	tc	bolt in accretion
54	225.4	11.5	9.4			1.0	0.9	tc	
55	228.7	12.2	10.5			1.1	0.7	tc	
56	413.8	14.0	10.2			1.1	1.1	wtc	
57	538.8	13.9	12.2			0.8	0.7	tc	
58	331.7	12.1	10.6			1.1	0.8	tc	
59	352.5	12.7	12.6			1.1	0.6	tc	
60	224.8	12.6				0.0	0.6	tc	not measureable
61	313.4	13.1	11.4	12	13.6	1.1	0.0	tc	
62	297.1	12.3	8.1	12.3	11.3	1.1	0.4	tc	
63	458.8	14.1	12.7			1.1	0.8	tc	
64	390.5	13.2	12.5			0.9	0.0	tc	apex worn
65	418.4	12.4	11.0			1.0	1.0	tc	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
66	452.7	15.8	11.2	14.7	15.8	1.1	0.6	tc	tapered feet
67	397.4	15.0	12.1	14.7	15	1.1	0.5	tc	
68	364.5	12.6	11.0	12.4	12.6	1.1	0.6	tc	
69	322.8	12.0	11.6	11	12	0.5	0.6	tc	
70	333.3	13.0	11.5	12.9	13.2	1.1	0.8	tc	
71	370.1	14.0	12.0	13.5	14	1.0	0.8	tc	
72	260.8	12.1	11.9	11.8	12.1	1.0	0.6	tc	
73	199.3	12.2	11.2	12.2	11.5	1.1	0.9	tc	
74	319.6	11.9	9.5	11.2	11.9	0.5	0.5	tc	
75	319.7	12.5	9.6	12	12.5	1.0	0.2	tc	
76	275.3	13.0	11.0	12.8	13	1.0	0.7	tc	
77	372.6	12.6	11.0	11.1	12.6	0.7	0.4	tc	
78	428.9	13.8	11.5	13.5	13.8	1.1	0.8	tc	
79	476.1	14.0	13.6	13	14	1.2	1.3	tc	
80	244.2	14.4	12.0	14.2	14.4	1.2	1.1	nc	
81	222.6	12.6	11.0	12.6	11.4	1.2	0.6	tc	
82	264.9	11.0	9.7			0.9	0.6	tc	
83	373.6	13.0	11.1			0.8	1.3	wtc	
84	248.8	11.8	0.0			1.2	0.5	tc	
85	273.2	11.2	12.6			0.9	0.0	apex worn	bent
86	285.5	12.0	10.4			0.0	0.0	tc	
87	401.7	13.0	9.6			0.0	0.0	wtc	
88	216.7	11.4	11.0			0.0	0.0	tc + scr	
89	315.6	10.5	10.8			0.0	0.0	tc	
90	294.3	13.4	11.3	12.7	13.4	1.0	0.7	tc	
91	285.7	14.2	11.5	14.2	13.5	1.2	0.9	tc	
92	183.1	11.0	9.8			0.0	0.0	tc	
93	324.7	11.7	12.2			0.9	1.0	tc	
94	569.9	14.5	13.8			1.3	1.5		
95	321.3	13.8	12.1			0.8	0.8	tc	
96	416.4	13.6	12.5			1.2	1.0	tc	
97	372.9	14.1	12.1			1.0	0.9	tc	
98	349.5	12.1	9.6	11.8	12.1	1.0	0.9	tc	
99	452	13.3	14.5			1.2	1.0	tc	
100	330.8	11.9	10.3			0.0	0.0	tc	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
101	383.8	13.1	11.5			1.0	1.0	tc	
102	368.4	13.0	10.0			1.0	0.3	tc	
103	253.5	11.9	11.1			0.0	0.0	apex worn	
104	250.3	12.0	8.6			1.0	0.0	tc	apex worn
105	319	11.8	12.2			0.0	0.0	tc	
106	315.5	12.0	10.5			1.1	0.6	tc	
107	267.4	11.3	9.5			0.0	0.0	tc	
108	462.6	14.6	11.8			1.2	0.9	tc	different nail pattern
109	364.7	13.0	10.1	12.6	13	1.1	0.6	tc	
110	297.8	12.0	11.7			0.9	0.7	tc	
111	244.8	10.7	11.3			0.8	0.6	tc	beveled
112	325	12.0				1.1	0.8	tc	bent, not measurable
113	263.3	12.5	11.2			0.8	0.0	apex worn	
114	308.5	11.5	12.0	11	11.5	0.9	0.7	tc	beveled
115	351.6	12.0	9.3	12	11.5	0.9	0.4	tc	corroded
116	206.1	11.8	11.0	11.8	11	0.6	0.7	tc	
117	596.7	17.0	15.0			1.1	0.6	tc	
118	393.7	14.4	11.1			1.1	0.7	tc	
119	597.7	15.5	12.4			1.3	0.9	tc	
120	268	13.0	11.0			1.0	0.0	apex worn	
121	443.8	13.5	14.8			0.9	0.8	tc	
122	317.8	12.5	12.0			0.9	0.0	apex worn	
123	250.1	12.6	10.5	11.2	12.6	1.0	0.9	apex worn	tc?; thin left side
124	310.6	11.5	11.1			0.8	0.7	tc	
125	296.9	11.1	11.3			0.9	0.0	apex worn	bent
126	337	12.6	11.3	11.7	12.6	1.1	0.8	tc	
127	258	12.9	11.0	12.9	12.4	1.0	0.5	tc	
128	160.8								not measureable; accretions
129	507.7	15.5	14.2			0.9	0.6	tc	5 holes for nails
130	200	11.5	9.7	11.5	10.9	0.6	0.5	tc	



Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
131	228.7	11.5	11.1			0.7	0.4	tc	
132	383.4	13.1	13.0	13.1	12.8	0.9	0.7	tc	
133	341.3	13.0	10.6	13	12.2	1.2	0.4	tc	caulkin left side
134	203.1	11.5	9.8			0.7	0.0	tc	apex worn
135	367	12.8	11.3			0.9	0.6	tc	
136	307.9	13.3	11.5	13.3	12.8	1.0	0.7	tc	
137	339.4	12.3	11.2			1.0	0.5	tc	
138	124.1	10.8	10.0			0.7	0.6	nc	
139	652.6	16.3	13.4			1.1	0.5	tc + wscr1	
140	279	12.0	10.0	12	11.7	1.0	0.0	tc	apex worn
141	334.3	15.2	12.5	15.2	14.1	1.1	0.3	tc	nail in center below toe clip
142	301.8	13.0	10.5			0.9	0.5	tc	
143	294.4	11.2	11.0	11.2	11	1.0	0.5	tc	
144	310.3	12.2	11.2	12.2	11.8	1.0	0.6	tc	
145	251.2	11.1	10.0			1.1	0.6	tc	clip broken off
146	310.5	12.3	11.9			0.8	0.7	tc	
147	372.4	13.2	12.6			0.9	0.8	tc	
148	292.6	13.0	11.1	13	12.7	0.9	0.5	tc	clip broken off
149	302.7	12.5	10.5			0.9	0.5	apex worn	corroded
150	256.5	11.3	10.6			0.8	0.6	tc	
151	302.2	11.6	11.1			0.9	0.6	tc	
152	453.1	13.8	12.3			1.1	0.9	tc + fer1	
153	330.5	13.1	12.0	12.2	13.1	1.0	0.6	tc	
154	207.1	11.6	9.4	11.6	11	0.9	0.2	tc	
155	352.1	12.5	11.5			1.1	0.6	wtc	
156	352.4	14.0	12.2			0.9	0.5	tc	
157	388.1	13.7	13.6			0.8	1.0		corroded
158	409.6	13.0	9.7	13	11.9	1.1	0.8	tc + fer	
159	242.6	11.7	10.0	11.2	11.7	1.0	0.0	tc	apex worn
160	221.1	11.0	11.2	10.1	11	1.0	0.0	apex worn	left foot broken
161	418.1	13.5	13.0			1.2	0.8	tc	
162	280.8	12.1	10.0			0.8	0.6	tc	
163	269	11.0	10.5			0.8	0.8	tc	
164	341.6	12.5	11.2			0.7	0.6	wtc	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
165	213.7	11.2	11.0			0.9	0.0	apex worn	
166	268.3	13.0	10.6			0.7	0.0	apex worn	
167	324.6	12.5	10.7			1.0	0.8	tc	
168	281	12.0	11.1			1.0	0.6	tc	
169	331.8	12.4	12.0			0.9	0.6	tc	
170	377.6	13.2	10.1	12.6	13.2	1.0	0.8	tc	
171	221.7	11.0	11.1			0.5	0.0	apex worn	
172	276.3	13.3	12.4	13.3	12.2	1.0	0.5	tc	
173	322.9	13.1	12.3			1.0	0.0	apex worn	
174	335.3	12.6	12.0			1.0	0.0	apex worn	
175	375.6	13.2	12.0	13.2	12.8	1.0	0.0	apex worn	
176	366.8	13.3	11.0			1.0	0.5	tc	
177	328.7	13.2	12.0			0.9	0.6	tc	
178	286.4	11.7	10.9			1.0	0.7	tc	
179	435.7	13.5	12.0			1.0	0.9	tc	
180	379.9	13.2	11.3			1.0	0.8	tc	
181	352.3	13.0	10.1			0.8	0.8	tc	
182	300.8	14.4	10.5			1.0	0.0	apex worn	
183	297.9	13.0	11.0	12.4	13	1.0	0.8	tc	
184	307.4	12.4	10.6	11.5	12.4	0.9	0.7	tc	
185	414.3	13.2	12.2			1.0	0.9	tc	
186	208.9	12.7	11.2	12.7	12	1.0	0.5	tc	
187	444.5	13.9	12.6			0.9	0.8	tc	
188	398.7	13.0	9.6	12	13	1.2	0.5	tc + fcr	
189	293.5	12.5	10.0	12.5	12.2	0.8	0.8	tc	broken
190	326.6	12.9	11.3	12.9	12.2	0.9	0.8	tc	
191	247	11.0	9.5			0.9	0.6	tc	rock adhering to accretion
192	398.7	13.6	11.0			0.9	0.7	tc	
193	233.5	12.5	10.8			0.8	0.5	tc	
194	232.2	12.0	10.9			0.7	0.3	tc	
195	326.8	12.4	10.7			0.7	0.3	tc	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
196	338.3	13.0	10.4			0.9	0.6	tc	
197	360.5	12.1	11.7			0.8	0.6	tc	
198	293.7	14.4	11.6	14.4	13.6	1.0	0.4	tc	
199	433.7	13.1	11.6			1.2	1.0	tc	
200	300.5	13.5	12.1			1.0	0.7	tc	
201	426.5	13.8	9.9	12.2	13.8	1.0	0.9	tc	
202	375.3	13.0	9.8	13	12.5	1.1	1.1	wtc	
203	355.6	12.8	12.8			1.1	0.7	tc	
204	357.6	12.7	11.2			1.1	0.8	tc	
205	285.1	12.1	11.5			0.9	0.4	tc	
206	369.7	12.3	10.5			1.0	0.8	tc	
207	291	12.7	11.3			1.0	0.5	tc	
208	347.3	12.9	10.7			1.2	0.8	tc	
209	228.6	12.1	11.0			0.7	0.0	apex worn	
210	309.5	11.0	10.0			0.7	0.7	tc	
211	336.5	12.4	10.6			1.1	0.6	tc	
212	147.5	10.6	9.7			0.6	0.9	tc + scr	
213	256.1	11.8	9.3			0.9	0.6	tc	
214	337	13.5	11.5			1.0	0.8	tc	
215	214.1					0.0	0.0		not measureable
216	280.1	11.2	10.8			1.2	0.6	tc	
217	263.8	12.5	11.2			1.0	0.9	tc	
218	193.8	12.0	10.5			0.8	0.3	tc + scl	
219	504	14.7	12.8			1.1	0.7	tc	
220	264	11.2	9.7			0.9	0.8	tc	
221	377	12.2	11.2			1.0	1.0	tc	
222	309	12.5	11.0	12.5	12	1.3	0.4	tc	
223	392	12.7	12.1	12.7	11.7	1.1	0.7	tc	
224	365	12.8	11.0			0.9	0.6	tc	
225	256	11.2	10.2			0.8	0.7	tc	
226	459	14.0	12.8			1.1	0.7	tc	
227	244	11.8	10.5			0.9	0.7	tc	
228	293	12.5	11.0			1.1	1.0	tc	heavy accretions
229	267	12.1	10.8			1.2	0.7	tc	
230	249	12.0	10.5			1.1	0.6	tc	very clean

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
231	448	13.9	13.2			1.0	0.8	tc	
232	319	12.2	10.8			1.0	0.7	tc	
233	365	13.2	11.0			1.0	0.5	tc	heavy accretions
234	299	12.5	11.1			0.8	0.7	tc	
235	309	12.6	10.0	12.0	12.6	1.1	0.7	tc	
236	501	14.3	13.2			1.1	1.0	tc	
237	288	12.3	11.9			1.0	0.4	tc	clean
238	285	12.9	11.3			1.1	0.5	tc	clean
239	356	13.3	10.6			1.2	0.7	tc	
240	266	12.0	9.9			1.1	0.6	tc	
241	301	12.4	11.2			1.0	0.8	tc	accretion
242	376	12.4	11.0			1.4	0.6	tc	
243	421	13.5	12.1			1.4	0.6	tc	accretion
244	226	11.1	10.3			1.0	0.7	tc	
245	309	11.9	9.7			1.0	0.9	tc	eared left
246	325	12.5	10.4			1.0	0.8	tc	accretions
247	318	12.9	10.2	12.9	12.1	1.2	0.5	tc	
248	356	12.2	10.8			1.1	1.0	tc	
249	319	12.4	10.5			1.0	0.4	tc	heavy accretions
250	658	14.9	14.8			1.1	1.1	tc	
251	346	11.5	12.1			1.0	0.8	tc	clean
252	308	13.1	10.7	13.1	12.3	1.2	0.7	tc	
253	142	9.9	9.5			0.9	0.4	tc	
254	310	11.4	11.4			1.1	0.7	tc	
255	352	12.7	12.1	12.4	12.7	1.0	0.8	tc	
256	347	12.7	11.4			1.0	0.6	tc	accretions
257	276	12.4	11.0			1.0	0.5	tc	
258	379	15.0	11.9			0.9	0.7	tc	one end eroded
259	450	13.4	14.9			1.1	0.8	tc	
260	276	11.6	11.1			0.9	0.8	tc	
261	340	13.1	9.7	13.1	12.0	1.0	1.0	tc	
262	316	12.9	11.2			1.0	0.6	tc	
263	294	12.3	10.5			1.1	0.6	tc	
264	460	14.1	12.7			1.2	1.1	tc	
265	362	12.1	11.3			1.1	1.0	tc	
266	354	13.0	10.7	12.2	13.0	1.2	0.9	tc	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
267	360	13.0	11.5			0.9	0.8	tc	
268	258	12.4	11.0			0.8	0.6	tc	clean
269	266	13.4	10.4	13.4	13.1	1.1	0.7	tc	
270	492	13.9	13.6			1.1	1.0	tc	
271	448	12.5	12.1			1.2	1.2	tc	accretions
272	333	13.5	11.5	11.8	13.5	1.1	0.8	tc	
273	274	12.2	10.1			1.1	0.3	tc	breaking apart
274	393	13.4	12.3			1.1	0.5	tc	
275	340	12.5	11.5			1.0	0.7	tc	
276	324	12.8	11.0			1.0	0.9	tc	
277	478	16.0	13.7			1.2	1.1	tc	clean
278	336	12.6	10.1			1.1	0.4	tc	
279	246	11.8	10.1			0.9	0.7	tc	
280	290	12.0	10.9			1.1	0.6	tc	
281	422	12.9	12.5			1.1	0.8	tc	accretions
282	322	13.8	9.6	12.1	13.8	1.1	0.9	tc	accretions
283	535	14.5	15.1	14.5	13.0	1.1	0.9	tc	
284	287	12.5	11.9			1.0	0.8	tc	
285	324	12.9	11.4			1.1	1.0	tc	accretions
286	290	12.0	10.4			0.9	0.8	tc	clean
287	402	13.9	12.4			1.0	0.7	tc	
288	185	10.8	10.1			0.9	0.3	tc	eared left
289	364	12.8	12.1			1.0	0.8	tc	accretion
290	377	12.4	12.5			1.1	1.0	tc	
291	358	12.6	11.7			1.0	0.8	tc	
292	294	13.0	11.9			0.7	0.7	tc	
293	436	13.9	12.3			1.1	1.1	tc	accretions
294	319	12.5	11.3			1.0	0.7	tc	
295	324	15.0	12.1	13.2	15.0	1.0	0.6	tc	eared left
296	445	13.8	11.9	13.8	12.8	1.1	0.9	tc	accretion
297	235	11.9	11.1			0.9	0.7	tc	narrow bar stock
298	357	12.6	11.8			1.1	1.0	tc	
299	401	12.5	12.7			1.1	1.0	tc	
300	585	15.1	13.1	15.4	15.1	1.1	0.9	tc + bb	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
301	287	12.1	10.8			1.1	0.9	scl + as	6 nails left side, bar width 2.3 on left side, bar width 1.4 on right side
302	491	14.0	12.1			1.1	0.9	tc + fcr	
303	374	12.8	12.0			1.2	0.6	tc	cut framing nail in accretion
304	448	13.0	11.9			1.0	0.9	tc	safety pin and cut nail in accretion
305	284	13.0	9.5	11.4	13.0	1.0	0.6	tc	
306	334	13.0	9.3			1.1	0.8	wtc	
307	283	12.1	11.0			0.9	0.5	tc	very clean
308	342	12.5	11.2			1.0	0.8	nc	clip possibly broken off
309	305	14.9	12.2	14.9	13.9	1.3	0.8	tc	eared right
310	326	13.5	11.6	13.5	12.8	0.9	0.8	tc	
311	205	11.9	11.0			0.9	0.5	tc	
312	317	12.2	11.0			1.0	0.8	tc	
313	347	13.2	11.0	12.2	13.2	1.1	0.6	tc	
314	302	11.5	10.2			1.0	0.8	tc	
315	338	13.2	10.3			1.1	0.9	tc	
316	313	12.0	11.1			1.1	0.7	tc	
317	246	12.1	10.8			1.0	0.8	tc	left side worn (thinner)
318	305	12.0	11.0			1.1	0.3	tc	
319	297	12.1	10.4			1.0	0.9	tc + fcr	right side clip
320	408	13.3	12.2			1.0	0.7	tc	
321	337	12.0	10.7			1.1	1.0	tc	accretion
322	293	11.9	10.3			1.0	0.7	tc	
323	299	11.9	10.9			1.0	0.8	tc	
324	372	13.2	12.2			1.0	0.6	tc	
325	308	12.4	12.2			1.0	0.7	tc	
326	322	12.4	10.9			1.1	0.8	tc	
327	495	15.1	12.0			1.1	1.0	tc	
328	252	11.7	10.2			0.9	0.6	tc	
329	271	12.6	11.2	11.9	12.6	1.0	0.7	tc	eared left
330	350	12.0	10.5			1.0	0.9	tc	
331	224	12.1	11.3			0.8	0.6	tc	
332	306	13.4	12.0			1.1	0.7	tc	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
333	247	13.0	10.5	12.0	13.0	1.0	0.5	tc	eared left
334	314	13.8	10.9	13.8	13.5	1.1	0.8	tc	eared right
335	220	12.3	9.7			0.9	0.4	tc	
336	259	11.9	10.9			0.9	0.8	tc	
337	385	13.2	12.1			1.2	0.5	tc	
338	369	13.7	11.2			1.0	0.9	tc	eared left
339	423	13.1	11.6			1.2	0.9	tc	
340	279	13.3	11.5	13.3	13.0	1.0	0.8	tc	
341	442	13.4	11.5			1.1	1.1	tc	accretions
342	451	13.1	11.9			1.2	1.1	tc	accretions
343	328	13.0	11.1			1.1	0.7	tc	
344	243	12.1	9.5			1.1	0.0	tc	eroded through at top
345	391	12.7	10.8			1.3	1.1	tc	heavy accretions
346	274	12.3	10.4			1.0	0.8	tc	narrow bar stock 1.5 c_
347	367	12.3	11.0			1.1	0.7	tc	heavy accretions
348	379	13.2	10.2	13.2	12.5	1.1	0.6	tc + fer	
349	504	13.5	12.9			1.1	1.0	tc	
350	324	13.7	12.4			1.0	0.6	tc	heavy left side wear
351	381	13.1	11.0			1.0	0.9	tc	
352	640	14.0	12.3			1.1	1.1	tc	heavy accretions
353	239	11.1	10.5			0.8	0.7	tc	accretions
354	266	12.1	11.0			1.1	0.6	tc	
355	296	13.2	9.9	13.2	12.3	1.0	0.7	tc	
356	482	13.1	13.5			1.0	1.0	tc	
357	338	12.6	12.0			1.1	0.9	tc	
358	335	12.2	11.2			1.0	1.0	tc + scr	
359	226	11.5	9.3			1.1	0.7	tc	
360	306	13.0	10.9	12.5	13.0	1.1	0.7	tc	
361	359	13.2	12.1			1.1	0.8	tc	
362	402	12.7	10.5			1.1	1.1	wtc	
363	368	12.1	9.9			1.1	1.1	tc	accretions
364	399	13.0	10.0	13.0	12.5	1.0	1.0	wtc	
365	468	13.9	10.7	13.3	13.9	1.2	1.0	wtc	
366	280	11.8	8.2	11.8	11.2	1.1	0.8	wtc	eared



Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
367	421	13.5	10.4			1.4	1.3	wtc	
368	397	12.3	9.9	11.2	12.3	1.0	1.0	wtc	accretions
369	422	14.5	11.5			1.0	0.7	tc + fcr	eared left
370	370	13.0	9.9	12.0	13.0	1.1	0.0	fcl	apex worn flat
371	406	13.3	9.3			1.1	0.0	fer	left prong broken
372	390	13.2	9.5	12.7	13.2	1.2	0.6	tc + fcl	
373	443	13.1	9.8	13.1	12.6	1.1	0.6	nc + fcr	no toe clip
374	330	12.0	9.3			1.2	0.5	tc + fcrl	
375	670	16.1	13.1			1.3	0.5	tc + fcrl	
376	504	14.7	13.5			1.2	0.8	tc + fcrl	
377	413	13.2	11.3	12.8	13.2	1.1	0.8	tc + fcrl	
378	417	13.2	11.0			1.1	0.9	fcrl	
379	569	14.5	12.5			1.1	1.1	tc + bb	
380	389	13.1	12.1			1.2	0.0	apex worn	
381	305	13.2	12.6			0.9	0.0	apex worn	
382	374	12.1	11.2			1.1	0.0	apex worn	
383	195	10.2	10.0			0.9	0.0	apex worn	
384	360	14.5	12.5			1.0	0.0	apex worn	
385	336	13.3	11.8			1.1	0.0	apex worn	accretion
386	232	11.5	10.5			1.0	0.0	apex worn	
387	293	11.8	11.2			0.9	0.0	apex worn	
388	286	13.0	11.3			1.1	0.0	apex worn	eared left
389	428	14.1	11.6			1.1	0.0	apex worn	
390	276	12.0	11.8			1.1	0.0	apex worn	eared left
391	200	11.7	10.4			0.9	0.0	apex worn	
392	200	10.9	11.1			0.4	0.0	apex worn	
393	353	12.1	12.2			1.1	0.0	apex worn	accretions

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
394	238	11.7	12.0			0.6	0.0	apex worn	eared right
395	249	11.1	11.5			0.8	0.0	apex worn	
396	281	12.5	11.6			0.9	0.0	apex worn	
397	288	12.3	10.4			1.0	0.0	apex worn	
398	334	10.7	11.3			1.0	0.0	apex worn	accretions
399	190	11.4	10.7			0.9	0.0	apex worn	worn thin all over
400	125	10.2	8.2			0.6	0.0	apex worn	
401	405	13.4	13.0			0.8	0.0	apex worn	
402	352	13.0	10.8			1.1	0.0	apex worn	
403	178	11.1	11.2			0.9	0.0	apex worn	
404	292	11.7	10.5			1.1	0.0	apex worn	
405	264	12.5	10.2			1.1	0.0	apex worn	
406	352	12.9	11.6			1.1	0.0	apex worn	
407	286	12.0	10.3			1.1	0.0	apex worn	
408	307	12.3	11.4			1.1	0.0	apex worn	accretions
409	300	12.7	10.1			1.1	0.7	tc	
410	363	12.9	11.6			1.0	0.4	tc	broken off tc
411	287	12.7	11.2			1.1	0.5	tc	apex worn, broken off tc
412	329	12.3	11.1			1.0	1.0	tc	
413	488	14.3	12.3			1.1	1.1	nc	no toe clip
414	325	12.4	11.4			1.1	0.9	tc	
415	383	13.0	12.7			1.1	0.8	apex worn	no vis. Tc
416	280	11.4	10.7			1.0	0.9	apex worn	worn flat at apex width .9 narrow
417	425	13.1	10.3			1.1	0.8	tc	broken possible clip

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
418	290	12.3	11.1			1.1	1.0		worn to .5 on left side, cannot see tc
419	436	13.3	12.2			1.2	1.2		heavy accretions
420	444	12.2	10.0			1.1	0.8	tc	heavy accretions
421	282					1.2	0.6		bent, unmeasurable
422	306					x			heavy accretions, unmeasurable
423	295	12.5	11.0	12.1	13.0	1.0	0.7	tc	
424	266					1.0	x		bent, unmeasurable
425	355					x	x		heavy accretions, unmeasurable
426	256	12.5	11.5			1.2	0.4	tc	
427	305	12.2	11.0			1.0	0.5	tc	
428	373	14.0	12.4			0.8	0.6	tc	broken toe clip
429	369	12.9	11.7			0.9	0.6	tc	
430	380	12.2	10.1	11.5	12.2	1.0	0.3	tc	forged caulkin on left side
431	270	12.1	10.7	10.8	12.2	0.8	0.6	tc	left side eared
432	213	11.8	9.6			0.9	0.4	tc	
433	214	12.2	10.6	12.3	12.0	0.4	0.8		no tc visible
434	460	14.5	12.1			0.9	0.7	tc	
435	525	12.2	12.0			1.0	0.4	tc	
436	300	12.2	10.6	11.9	11.6	1.0	0.6	tc	
437	345	12.2	11.6			0.9	0.7	tc	
438	285	12.2	10.9			1.1	0.3	tc	
439	442	12.7	9.8	12.6	12.8	1.2	0.6	nc	
440	314	13.6	11.3			0.9	0.4	tc	
441	280	13.5	11.7			0.9	0.4	tc	
442	358	13.0	12.7			0.9	0.5		no tc visible
443	295	12.2	11.1			0.7	0.4	tc	
444	268	11.6	11.1			0.7	0.6	tc	
445	319	13.0	11.1			0.8	0.5	tc	
446	256	12.2	11.5			0.5	0.5	tc	
447	451	13.5	11.4			x			heavy accretions
448	406	12.6	10.3	13.2	12.6	1.3	0.4	tc	
449	333	13.0	11.8			0.7	0.6		heavy accretions, apex work flat with slant

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
450	315	11.3	11.3			0.8	0.5	apex worn	
451	248	11.2	10.0			0.5	0.5	tc	
452	303	12.7	10.5			0.8	0.4	tc	
453	468	15.0	14.0			1.0	0.4		heavy accretions, no tc visible
454	287	12.2	10.0			0.8	0.5	tc	
455	424	12.9	9.5			1.0	0.5	tc	
456	332	13.4	11.6			1.0	0.3	tc	
457	221	13.0	9.8			0.8	0.3	tc	
458	353	13.2	12.0			0.8	0.5	tc	tc broken
459	293	12.1	10.7			0.9	0.3		worn apex, no tc visible
460	254	12.4	10.9			0.9	0.3		worn apex, no tc visible
461	240	12.3	10.3			0.9	0.3		worn apex, broken apex
462	267	11.7	9.6			1.1	0.4		left side eared
463	413	14.5	11.3			1.0	1.2	fcr	accretion, forged caulkin right side
464	372	12.8	11.0			0.9	0.7	tc	
465	416		15.5			1.0	0.7		top broken
466	293	13.0	11.8			0.8	0.5	tc	broken toe clip
467	384	13.4	15.0			1.0	0.6	tc	
468	344	12.6	12.2			0.9	0.4	tc	
469	298	12.5	11.6			0.9	0.2	tc	
470	352	11.7	11.8			0.9	0.4	apex worn	heavy accretions, worn apex
471	254	11.0	11.1			1.0	0.2	apex worn	apex worn off
472	232	11.8	10.1			0.4	0.3	tc	
473	340	13.5	10.4			1.0	0.6	wtc	welded tc
474	150	10.7	10.2	11.2	10.0	0.5	0.3	tc	
475	442	13.6	11.6			1.0	0.6	tc	heavy accretions
476	295	12.9	10.6			1.0	0.3	tc	bent
477	392	13.2	13.1			1.2	0.5	tc	broken tc
478	202	12.7	11.0	12.7	11.7	0.7	0.3	tc	
479	383	12.5	10.7			1.1	0.4	apex worn	worn apex, broken apex

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
480	311	12.0	9.6			0.8	0.3	tc	right side eared
481	338	13.0	11.0	12.6	13.0	0.9	0.4	apex worn	worn apex, no visible tc
482	383	13.0	11.6			1.1	1.0	tc	
483	304	13.1	11.5			0.8	0.6	tc	
484	403	13.7	11.1			1.1	0.9	wtc	welded tc, forged caulkin
485	181	11.6	8.1			0.9	0.7	tc	
486	341	12.4	10.2			0.9	0.9	tc	
487	339	12.7	11.0			0.9	0.7	tc	apex worn, remnant tc
488	343	12.9	11.4			1.0	0.7		worn apex
489	287	11.6	11.1			1.0	0.9	tc	
490	160	10.9	7.9			1.3	0.2	apex worn	worn apex, no tc visible
491	278	11.7	9.9			0.9	0.8	tc	
492	267	12.9	11.2			0.9	0.2	tc	
493	200	11.0	9.4			0.6	0.5	tc	
494	830	17.3	15.4			1.2	1.0	tc	forged caulkin right side
495	395	13.6	11.0			1.2	1.1	wtc	welded tc
496	293	12.8	10.0			0.9	0.6	wtc	welded tc
497	308	13.1	11.2			0.9	0.8	tc	
498	332	12.7	11.0			0.9	0.7	tc	
499	248	13.4		13.4	12.8	1.0	0.6		right side badly corroded
500	313	13.2	11.4			0.8	0.8	tc	
501	231	11.7	10.5			0.9	0.5	tc	
502	292	12.7	10.5			0.9	0.5	tc	
503	339	12.2	10.9			1.0	0.6	tc	
504	394	14.1	11.9	13.1	14.1	1.0	0.8	tc + scl	left side clip, eared left side
505	309	12.9	10.8	12.9	11.9	1.1	0.4	tc	
506	370	12.0	9.5			1.4	0.4	tc	Forged caulkin left
507	186	10.4	9.5			0.9	0.3	apex worn	narrower stock, apex worn
508	224	12.5	11.3			0.8	0.4	tc	
509	366	12.8	11.1			1.1	0.4	tc	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
510	184	11.4	10.6			0.8	0.5	apex worn	narrower stock, apex worn
511	275	12.5	11.0			0.8	0.4		wider bar stock (2.3 cm)
512	405	12.5	11.3			0.9	0.7	tc	accretions
513	241	11.5	9.9			0.9	0.4	tc	worn apex
514	216	13.2	10.9	12.0	13.2	0.9	0.2	tc	
515	293	12.0	10.9			0.9	0.4	tc	
516	363	12.7	10.8			0.9	0.7	tc	accretions
517	186	10.4	9.3			0.9	0.3	tc	
518	352	12.9	11.3			1.0	0.6	tc	
519	372	12.5	10.3			1.0	0.6	tc	
520	247	11.3	10.5			0.9	0.4	tc	
521	388	12.5	11.8			1.0	0.9		no visible tc
522	430	14.7	11.2			x	x	wtc	welded toe clip, broken left side, heavy accretions
523	218	11.4	10.3			1.0	0.2	tc	
524	274	11.7	9.9	11.7	11.0	1.0	0.5	tc	
525	227	12.2	10.2			0.8	0.3		
526	285	12.4	11.5			0.7	0.4		broken apex
527	372	13.3	12.2			0.8	0.5	apex worn	eared right side, worn apex
528	364	12.7	10.5			1.2	0.6		worn apex no visible tc
529	338	12.8	11.4			1.2	0.6	tc	
530	326	12.9	11.2			1.2	0.6	tc	
531	329	12.8	9.5	12.8	11.3	1.0	0.4	wtc	forged caulkin right, welded tc
532	326	11.3	9.9			x	0.6		accretions
533	296			x	x	x	0.2		bent, unmeasurable
534	336	13.1	11.5			0.9	1.0	tc	
535	373	13.3	12.7			1.2	0.6	tc	
536	318	11.8	10.9			0.8	0.7	tc	
537	388	12.0	10.9			1.0	0.8	tc	
538	217	11.2	10.0			0.9	0.4	tc	
539	308	13.4	11.5			0.8	0.6	tc	
540	221	11.1	9.2			1.0	0.4	apex worn	worn apex, accretions

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
541	259	11.5	9.9			1.0	0.2		
542	151	10.2				0.1	0.2		bent
543	320	12.9	10.4			0.8	0.6	tc	
544	299	12.1	10.1			0.8	0.5		
545	373	13.3	11.5			1.0	0.7	tc	
546	391	12.2	10.6			1.0	0.8	tc	
547	428	13.3	12.9			0.8	0.7		no visible tc
548	283	11.9	10.1			1.0	0.5	tc	
549	224	13.0	10.3	10.2	13.0	1.1	0.5	tc	all nails on left side, thickness right side 0.5
550	252	12.2	10.8			1.1	0.3	tc	
551	331	13.3	11.0			1.0	0.5	tc + scl	side clip on left side
552	527	14.2	12.1			1.3	0.7	tc	forged caulkins both sides
553	296	13.2	12.0			0.9	0.7	apex worn	worn apex, no visible tc
554	238	11.0	9.5			0.8	0.5	tc	
555	205	12.0	10.1			0.7	0.3	tc	
556	241	11.5	11.5			0.7	0.4	tc	
557	304	12.1	10.8			0.8	0.5	tc	
558	302	13.1	10.1			1.0	0.6	tc	
559	297	12.1	11.4			0.9	0.7	tc	
560	345	12.9	10.9			1.1	0.4	tc	
561	331	13.0	9.5	12.5	13.0	1.1	0.0	tc	forged caulkin left; accretions
562	366	12.8	12.0			1.0	0.8	tc	
563	381	14.1	12.5			1.0	0.7	tc	
564	670	15.5	13.5			1.5	0.8	tc	accretions
565	334	13.0	11.8	13.0	12.4	1.1	0.8	tc	
566	156	11.2	10.5			1.1	0.3	tc	bent
567	331	12.1	10.7			1.1	0.7	tc	
568	285	13.2	11.7			1.3	0.5		hind tc poss worn off
569	422	13.0	10.2			1.4	0.6	tc	accretions
570	381	13.0	11.9			1.3	0.7	tc	fc right
571	378	10.7	9.2			1.1	0.4	tc	fc both sides

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
572	317	12.0	10.5			0.8	0.0	apex worn	worn flat at apex width .8 c
573	383	13.2	12.0			1.0	0.8	tc	
574	279	12.2	11.3			1.0	0.0	apex worn	eared left worn flat .9c
575	283	12.0	11.1			1.1	0.0	apex worn	worn flat 1c
576	234	11.1	10.1			1.0	0.0	apex worn	worn flat 1c
577	282	11.7	12.3			0.9	0.7	tc	front shoe
578	351	12.4	10.4			1.1	0.9	tc	
579	240	12.1	10.0			1.0	0.8	tc	
580	417	12.7	10.9			1.1	1.0	tc	
581	319	13.4	11.3	13.4	12.1	1.1	0.8	tc	
582	292	12.0	11.0			1.1	0.0	apex worn	.8 width at apex
583	283	12.0	10.8			0.9	0.7	tc	
584	324	12.5	10.0			1.2	0.8	tc	
585	299	13.0	9.6	11.2	13.0	1.1	0.3	apex worn	fc left; tc possibly worn off
586	400	13.4	12.5			1.1	1.0	tc	
587	252	11.1	11.0			1.0	0.7	tc	.7 wide bar stock
588	432	13.5	12.1			1.2	1.1	tc	1.4 wide bar stock
589	417	13.3	11.8			1.1	0.8	tc	1.5 wide bar stock
590	345	12.5	11.2			1.1	0.0	apex worn	worn flat 1.1c
591	294	12.2	11.0			1.1	0.7	tc	clean 1.4c wide bar stock
592	251	11.5	10.5			1.0	0.9	tc	1.1 wide bar stock
593	287	12.8	11.4			1.0	0.0	apex worn	worn flat at apex
594	325	12.2	10.3			1.2	0.6	tc	
595	385	13.1	11.1			1.1	0.8	tc	
596	380	13.7	12.4			1.1	1.0	tc	accretions
597	538	14.5	12.0			1.2	0.9	tc + fclrl	forged calkins both sides; eared right
598	305	12.4	10.7			1.3	0.6	tc	
599	301	12.2	10.7			1.0	1.0	tc	nail right behind toe clip
600	337	12.2	9.3			1.0	1.0	tc	



Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
601	256	12.1	10.2			1.1	0.3		toe clip worn off or not there
602	230	12.1	10.7			0.7	0.0	apex worn	worn flat, no tc evident
603	477	15.1	12.8			1.3	1.1		eared left
604	352	13.0	12.5			1.2	0.0	apex worn	worn flat, no tc evident
605	247	11.8	9.9			0.8	0.3	tc	
606	257	11.4	11.1			1.0	0.5	tc	
607	229	12.2	10.7	12.2	11.4	1.1	0.8		eared right, .7 wide bar stock
608	319	14.2	10.5	14.2	13.5	1.1	0.6	wtc	
609	320	13.0	11.4	13.0	12.4	1.1	0.7	tc	eared right
610	356	12.9	10.0	11.6	12.9	1.2	0.0	fcl	toe clip worn off or not there
611	282	12.0	10.6			1.0	0.6	tc	
612	443	12.9	9.0	12.2	11.0	1.0	0.4	tc	huge welded side lip left
613	259	12.2	12.2			1.0	0.5	tc	1.1 wide bar stock
614	594	16.4	14.0	16.0	16.4	1.2	0.7	tc + scl	nails behind tc
615	307	13.0	11.5			1.2	0.8	tc	
616	288	11.2	10.2			1.0	0.0	apex worn	worn flat on apex
617	276	12.5	12.1			1.0	0.0	apex worn	worn flat on apex; eared left
618	386	12.5	12.3					apex worn	worn flat on apex; accretions
619	293	11.5	10.0			1.1	0.0		toe clip worn off or not there
620	254	12.1	9.4	10.5	12.1	1.1	0.9	tc	
621	249	11.6	9.5	11.1	11.6	1.1	0.9	tc	
622	227	12.2	11.4			0.7	0.7	tc	right prong broken
623	265	12.0	9.4			1.0	0.8	tc	
624	236	11.7	10.2			1.1	0.0		toe clip worn off or not there
625	388	13.1	9.4	13.1	12.0	1.2	0.7	tc + fcr	
626	339	11.9	11.0			1.2	1.0	tc	
627	312	13.0	11.5	13.0	12.0	1.1	0.5	tc	
628	265	11.7	10.8			1.0	0.0		toe clip worn off or not there

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
629	327	14.4	10.5	14.4	13.5	1.0	0.7	wtc	probable welded toe clip
630	386	13.1	9.7	13.1	12.4	1.2	0.7	tc + fer	
631	298	13.0	10.7	13.0	12.7	1.4	0.7	tc	
632	508	14.7	12.0			1.1	0.9	tc	
633	237	10.8	10.4			1.0	0.6		possible tc
634	330	12.9	10.6	12.9	12.2	1.0	0.5	tc	
635	334	11.5	10.5			1.0	0.0		broken apex; accretions
636	325	12.3	11.9			0.9	0.7	tc	clean
637	313	12.0	10.8			1.1	0.8	nc	no toe clip
638	353	13.0	11.9	12.2	13.0	1.2	0.9	tc	
639	267	12.4	10.7			1.1	0.6	tc	
640	323	13.0	10.3	13.0	12.5	1.1	0.6	tc	
641	309	11.9	11.0			1.1	0.8	tc	
642	290	13.0	12.4			1.0	0.9	tc	
643	293	12.0	11.8			1.1	0.0		toe clip worn off or not there
644	419	14.5	11.9	13.4	14.5	1.2	0.8	tc	eared left
645	453	13.1	11.0			1.1	1.1	tc	
646	310	11.7	9.6			1.1	0.0		toe clip worn off or not there
647	272	13.0	10.7	12.0	13.0	1.2	0.5	tc	eared left
648	355	13.0	11.0			1.0	0.8	tc	clean
649	240	11.7	10.0	11.0	11.7	1.1	0.6	tc	
650	386	13.3	11.3			0.7	0.9	wtc	greater wear at base than apex
651	528	13.0	11.2			1.1	1.0	ferl	no obvious toe clip
652	290	12.2	10.1			1.0	0.7	tc	
653	327	12.4	11.5			1.0	0.6	tc	
654	384	13.6	12.5			1.0	0.6	tc	
655	344	12.7	11.5	12.7	11.7	1.0	0.7	tc	
656	322	12.0	9.5			1.2	0.9	tc	
657	440	13.1	11.9			1.1	1.0	tc	
658	385	12.3	10.5			1.0	1.0	tc	accretion
659	196	12.1	10.6			1.0	0.5	tc	partially worn through on right side
660	407	12.5	10.7			1.1	0.9	tc	accretion

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
661	233	12.1	10.0			0.9	0.5	tc	
662	379	13.0	10.2			1.1	0.7	tc	
663	286	12.9	10.9			0.9	0.5	tc	eared both sides
664	417	13.0	12.0			1.0	0.9	tc	accretion
665	316	12.6	9.4	12.1	12.6	1.0	1.0	tc	
666	282	12.0	11.1			1.0	0.6	tc	
667	293	12.0	12.0			1.1	0.0		toe clip worn off or not there
668	782	16.3	14.8			1.3	1.1	fcrl	no visible toe clip
669	380	12.9	11.0			1.1	0.7	tc	accretions
670	338	12.9	10.5	11.3	12.9	1.1	0.0		eared left; toe clip worn off or not there
671	295	13.9	11.7			1.0	0.4	tc	eared both sides
672	202	11.0	9.3			1.0	0.0		toe clip worn off or not there
673	308	12.4	10.3			1.1	0.7	tc	bar width varies from 2.5 on right to 1.6 on left
674	301	11.8	11.3	11.4	11.8	1.2	0.0		toe clip worn off or not there
675	450	12.9	11.6			1.1	0.9	tc	accretions
676	240	11.7	10.4	10.8	11.7	1.1	0.4	tc	
677	322	12.4	10.6			1.1	0.6	tc	
678	243	11.5	10.5	10.9	11.5	1.0	0.6	tc	
679	404	13.9	12.5			1.1	0.6	tc	
680	428	14.0	12.1			1.2	1.1	tc	bar width varies from 3.1 to 1.8
681	189	11.1	10.1			1.0	1.0	tc	
682	311	13.0	11.6			1.0	0.5	tc	
683	259	13.1	9.4	11.1	13.1	1.1	0.3	tc + fcl	eared left
684	389	13.1	12.2			1.0	1.0		no obvious toe clip
685	237	10.7	11.5			0.8	0.6	tc	wider than long
686	224	11.9	10.2			0.6	0.5	tc	
687	360	12.9	11.1	12.9	12.5	1.2	0.7	tc	eared right, accretions
688	327	13.0	10.7					tc	broken prong right; accretions
689	309	12.5	10.0	11.4	12.5	1.2	0.7	tc	
690	319	13.2	10.8	12.2	13.2	0.6	0.9	wtc	thicker at apex

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
691	415	13.9	12.5			1.1	0.9	tc	
692	451	13.5	11.3				0.8	tc	accretions; 2.9 cm narrow aperture
693	321	12.6	11.5			1.1	0.5	tc	
694	299	12.0	9.4			1.2	0.9	tc	
695	299	11.7	11.7			0.8	0.7	tc	
696	415	13.5	9.6	13.5	13.0	1.0	1.0	wtc + fcr	accretions
697	333	12.5	11.0			1.1	0.6		no obvious toe clip; accretions
698	530	16.1	14.5			1.5	0.4	tc + scl	side clip on left side
699	325	13.3	10.5	12.1	13.3	1.1	0.6	tc	eared left
700	334	12.9	12.0			1.1	0.7	tc	
701	233	11.7	9.4			0.9	0.6	tc	
702	266	11.7	10.0			0.8	0.8	tc	
703	277	11.2	10.1			1.1	0.5	tc	
704	373	12.2	10.5			1.1	0.7	tc	accretions
705	351	13.0	11.9			1.1	0.8	tc	
706	203	11.9	11.0			0.7	0.0		toe clip worn off or not there
707	352	12.6	10.9			1.0	0.8	tc	slightly eared both sides
708	246	12.8	11.3			0.9	0.5	tc	
709	260	11.4	9.1			1.0	0.7	tc	accretions
710	265	11.6	8.1			1.2	0.9	tc	
711	319	12.3	9.5			1.1	0.0		accretions; toe clip worn off or not there
712	278	13.4	11.0	12.0	13.4	1.0	0.7	tc	eared left
713	379	12.0	12.5			1.1	0.0		accretions; toe clip worn off or not there
714	452	12.0	10.8			1.0	0.8	tc	heavy accretions
715	333	13.9	11.0	12.5	13.9	1.1	0.8	tc	eared left
716	275	13.4	11.5			0.8	0.5	tc	
717	330	13.1	9.9	12.5	13.1	1.1	0.6	tc	
718	311	14.1	11.5			1.0	0.0		toe clip worn off or not there
719	610	14.5	12.6			1.3	1.2	tc + ferl	accretions

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
720	410	13.5	12.0	13.0	13.5	1.1	0.8	tc	
721	368	13.0	10.9			1.1	0.6	tc	accretions
722	308	12.5	11.1			1.1	0.7	tc	
723	373	13.4	10.4			1.1	0.4	tc	slightly eared both sides
724	247	12.5	10.5			1.1	0.6	tc	broken prong left; accretion
725	298	12.0	10.9			1.1	0.8	tc	
726	383	12.1	11.3			1.1	0.8	tc + scl	
727	322	12.5	10.9			1.2	0.7	tc	
728	468	15.3	11.6	15.3	14.5	1.0	0.8	tc	
729	297	12.0	10.8			1.1	0.0		accretions; toe clip worn off or not there
730	260	12.5	10.3			0.7	0.0		accretions; toe clip worn off or not there
731	235	11.4	11.1			1.0	0.0	scl	toe clip worn off or not there
732	295	12.0	10.5			0.9	0.9	tc	accretions
733	339	14.0	12.0			1.1	0.7		accretions; no visible toe clip
734	291	12.6	11.0			1.0	0.7	tc	
735	373	13.2	11.0	13.2	12.4	1.2	0.8	tc	eared right
736	371	14.5	12.3			1.0	0.0		toe clip worn off or not there
737	302	12.8	10.5			1.1	0.5	tc	
738	452	13.0	10.1			1.1	0.8	tc	heavy accretions
739	615	14.8	13.5			1.3	0.5	tc + fcr1	
740	401	12.8	10.6			0.9	0.9	wtc	
741	403	13.3	11.4			1.1	0.8	tc	accretions
742	314	13.1	12.1			1.1	0.5	tc	
743	337	13.3	12.6			1.1	0.7	tc	
744	308	12.9	12.0			1.1	0.8	tc	narrow bar stock 0.9 cm
745	417	13.4	12.7			1.1	1.0	tc	
746	262	12.3	9.7			1.1	0.4	tc	bent; accretions
747		12.7	9.4	11.4	12.7	1.1	0.3	tc	
748		14.4	10.9	14.4	13.4	0.9	0.7	wtc	
749		13.1	11.3	13.1	12.1	1.1	0.7	tc	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
750		11.5	10.1			0.8	0.6	tc	narrow bar stock 0.7 cm
751		11.5	12.0			0.9	0.5	tc	
752		12.5	11.1			1.2	1.0	tc	
753		13.0	10.0			0.8	0.4	apex worn	asymmetrical wear
754		12.1	11.5			1.1	0.5	tc	bent
755		15.5	11.3			1.3	1.2	tc	
756		11.0	10.0			0.7	0.7	tc	
757		14.8	10.1	14.8	13.9	1.0	0.5	wtc	eared right, asymmetrical wear on right
758		14.6	12.3			1.1	1.0	tc	
759		11.2	10.9			1.0	0.0	apex worn	
760		11.6	11.9			1.2	0.0	apex worn	bent
761		12.5	12.0			1.0	0.0	apex worn	
762		11.6	11.5			0.9	0.4	tc	
763		12.1	11.6			1.3	0.0	apex worn	
764		12.2	8.4			1.0	0.9	tc	
765		12.6	11.7	12.6	2.2	1.1	0.9	tc	
766		13.2	10.7	13.2	12.5	1.1	0.0	apex worn	
767		10.9	9.7			1.0	0.7	tc	
768		13.1	10.3			1.2	0.7	tc	
769		11.9	11.1			1.1	0.7	tc	
770		12.2	10.0			1.2	0.6	tc	
771		11.4	9.2			1.1	0.7	tc	
772		12.2	11.1			1.1	0.0	tc	
773		12.5	10.7	12.5	11.7	1.1	0.5	tc	
774		11.6	10.9			0.9	0.8	apex worn	
775		11.4	9.5			0.9	0.5	tc	bent
776		12.9	11.1			1.1	1.1	tc + scl	
777		13.4	10.0			1.1	0.9	tc	
778		13.0	10.9	13.0	12.2	1.1	0.7	tc	
779		13.4	12.0			1.1	0.9	tc	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
780		13.9	10.4	13.2	13.9	1.1	0.8	tc	
781		13.6	12.3	13.6	12.5	1.2	0.0	apex worn	
782		11.0	10.3			0.9	0.0	apex worn	
783		13.0	11.0			1.2	0.8	tc	
784		12.6	10.9			1.1	0.5	tc	eared left
785		12.7	10.0			0.7	0.7	tc	right side almost straight
786		11.5	10.9			1.1	0.7	tc	wood screw adhering to shoe
787		13.1	11.2			0.9	0.5	tc	
788		12.1	10.9	12.1	11.6	1.2	0.0	apex worn	
789		10.9	9.6			1.0	0.6	tc	
790		11.8	10.5			1.0	0.3	tc	
791		12.3	10.3			0.9	0.0	apex worn	
792		14.0	11.5			0.7	0.8	wtc	worn more on back
793		13.9	13.6			1.2	0.8	nc	no toe clip
794		14.0	12.7			1.1	0.9	tc	
795		12.0	11.2			0.8	0.7	tc	
796		13.0	11.7			1.1	1.1	tc	
797		13.0	9.4	13.0	12.0	1.1	0.7	nc	probably no toe clip
798		12.9	12.0			1.1	0.8	tc	
799		11.7	10.5			1.0	0.5	apex worn	
800		12.5	10.9			1.0	0.7	tc	
801		13.6	10.4	13.6	12.5	1.1	0.4	tc + fcr	
802		11.0	10.2			0.7	0.0	apex worn	
803		12.1	10.9			1.0	0.7	tc	
804		12.7	11.8			0.9	0.5	tc	
805		12.2	10.9			1.1	0.6	tc	
806		14.7	11.7			1.1	1.1	wtc + fcr	welded toe clip adds 1.2 cm to length
807		12.6	10.5			1.1	0.6	tc	bent
808		13.0	11.9			1.1	1.0	tc	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
809		13.2	11.4			1.1	0.4	tc	
810		12.8	10.7			1.1	0.8	tc	
811		12.1	11.4			0.9	0.6	tc	
812		11.9	10.7			1.2	0.4	tc	
813		11.9	10.3			1.0	0.7	tc	
814		14.6	11.4			0.9	0.8	tc	
815		13.4	11.6			1.0	0.6	tc	
816		11.8	9.9	11.8	11.0	1.0	0.5	tc	
817		13.0	12.2			1.0	0.0	apex worn	
818		16.0	14.1			1.2	0.8	tc + fcr	
819		12.0	9.5			1.0	0.5	tc	
820		12.1	9.6			1.1	0.9	apex worn	
821		13.0	10.1			1.0	1.0	tc	
822		12.5	10.4	12.5	9.9	1.1	0.0	fcr	can't tell if there was a toeclip
823		13.0	8.4			1.1	0.9	apex worn	bent; narrow due to bending
824		12.2	11.4			1.0	0.8	tc	
825		15.8	11.7			1.1	0.8	tc + fcr	
826		11.8	10.5			1.0	0.7	apex worn	narrow bar stock 0.6 cm
827		13.6	12.8			0.9	0.8	tc	
828		11.9	10.4			0.7	0.6	apex worn	
829		11.2	11.0			0.9	0.8	tc	
830		12.5	10.9			1.1	0.7	tc	
831		12.9	10.9	12.9	11.6	1.1	0.9	tc	eared right
832		13.2	10.6			1.1	1.1	tc	
833		10.9	10.0			1.0	0.0	apex worn	
834		11.8	11.0			1.1	0.0	apex worn	
835		13.4	11.1	13.4	12.7	1.1	0.9	tc	
836		12.4	10.1	12.4	11.8	1.1	1.0	tc	
837		12.2	11.3			0.9	0.9	tc	
838		13.0	11.2			0.8	0.8	apex worn	



Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
839		14.0	12.0	13.0	14.0	1.1	1.0	tc	
840		13.9	11.7			1.2	0.7	tc	
841		12.4	12.1			1.0	0.6	tc	
842		14.1	10.5			1.0	0.9	wtc	welded toe clip adds. 1.3 cm to length
843		12.0	11.0			1.1	0.0	apex worn	
844		10.3	9.0			0.8	0.5	apex worn	narrow bar stock 1.7 cm
845		11.8	12.0			1.1	0.0	apex worn	
846		12.0	11.8			1.1	1.0	tc	
847		13.2	10.8			1.0	0.8	tc	
848		11.5	10.4			0.9	0.0	apex worn	heavy accretions
849		13.5	12.0			0.8	0.4	tc	right side broken, heavily corroded
850		12.0	10.0			1.1	0.5	tc	
851		10.9	10.1			1.0	0.8	tc	
852		12.8	13.2			0.9	0.7	tc	
853		12.5	11.1	12.5	11.2	1.1	0.7	tc	
854		16.0	13.1	16.0	15.5	1.3	0.7	tc + fcr	
855		12.0	9.7			1.1	0.9	tc + scl	
856		13.1	12.2			1.0	0.9	tc	
857		13.1	12.3			1.2	0.9	tc	
858		12.0	10.3			1.1	0.7	tc	
859		11.1	10.4			1.0	0.9	tc	
860		14.7	10.5	14.7	13.0	1.1	1.0	wtc + fcr	welded toe clip adds 1.1 cm
861		13.1	11.1	13.1	12.0	1.0	0.7	tc	
862		14.5	14.8			1.2	1.1	tc	
863		12.3	11.4			1.0	0.7	tc	
864		12.5	10.8			0.9	0.8	tc	
865		13.0	10.8	13.0	11.9	1.0	0.7	tc	eared right
866		11.9	10.3			0.9	0.7	tc	
867		15.1	15.0			1.2	1.1	tc	
868		13.4	11.2	12.5	13.4	1.1	0.8	tc	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
869		14.1	10.4	13.2	14.1	0.9	0.7	wtc	welded clip adds 1.8 cm to length
870		12.0	10.0			1.0	0.8	tc	
871		15.0	12.5			1.1	0.9	tc	
872		13.0	12.5			1.1	0.8	tc	
873		14.9	11.2			1.2	1.2	tc	
874		15.0	12.8	15.0	14.5	1.1	0.8	tc	
875		13.0	12.4			1.0	0.9	tc	
876		12.9	11.2	12.9	12.0	1.1	0.7	tc	
877		13.3	10.9	13.3	12.4	1.1	1.0	tc	eared right
878		12.6	12.1			0.6	0.8	tc	worn more in rear
879		12.7	11.1			0.9	0.8	tc	
880		14.2	12.5			1.1	1.1	tc	
881		12.1	11.7			1.1	0.5	tc	
882		13.9	13.3			1.1	0.7	tc	
883		14.3	12.1			1.1	0.7	tc	
884		13.8	12.4			1.1	1.0	tc	
885		15.1	13.2			1.2	0.8	tc	
886		13.4	12.5			1.0	0.9	tc	
887		12.9	10.6	12.9	11.8	1.0	1.0	tc	
888		13.7	13.0	12.6	13.7	1.1	0.0	apex worn	straightened at curve (front)
889		11.2	10.6			1.0	1.0	tc	
890		13.0	11.2			1.1	1.0	tc	
891		11.5	10.9			1.0	0.7	tc	
892		13.0	11.4	12.0	13.0	1.1	0.7	tc	eared left
893		15.4	12.5	15.4	14.1	1.1	1.1	tc	
894		13.5	9.0	12.2	13.5	1.0	0.3	wtc	very small welded clip; eared left; type collection
895		13.0	10.0			1.0	1.0	tc	heavy accretions
896		11.4	9.4			1.0	0.9	tc	
897		12.4	11.2			0.7	0.9	tc	heavier wear in rear
898		12.8	10.1			1.0	1.0	apex worn	heavy accretions
899		12.1	11.9			1.1	0.5	tc	
900		12.0	11.0			0.8	0.7	tc	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
901		12.1	10.2	12.1	11.8	1.0	0.9	tc	heavy accretions
902		11.7	10.5			1.0	0.8	tc	
903		12.1	11.0			1.0	0.9	tc + scl	left side clip
904		12.1	11.8			0.9	0.9	apex worn	no toe clip visible
905		13.3	13.0			1.1	1.0	tc	heavy accretions
906		12.9	9.9	12.9	11.9	1.1	0.8	tc	eared right
907		17.0	13.5			1.2	1.1	tc	
908		13.3	12.1			1.0	0.9	tc	heavy accretions
909		14.3	12.1			1.2	1.0	tc	
910		12.1	11.0			1.0	0.8	tc	
911		13.2	10.5			1.0	0.6	tc	bent
912		12.1	11.1			0.8	0.7	tc	
913		11.7	10.2			1.0	0.8	tc	
914		13.2	10.0	12.2	13.2	1.1	0.8	tc	eared left
915		13.1	11.9			1.1	1.0	tc	
916		13.5	11.7			1.0	0.8	tc	
917		12.2	12.0			1.0	0.0	apex worn	accretions
918		12.7	11.5			1.1	1.1	tc	
919		12.3	10.6			1.2	0.8	tc	
920		14.1	11.8	14.1	12.4	1.1	1.0	tc	
921		14.0	12.5			1.1	1.1	tc	heavy accretions
922		11.6	10.6			1.0	0.9	tc	
923		12.9	12.0			1.1	1.0	tc	heavy accretions
924		13.0	10.2	11.1	13.0	1.1	1.1	tc	accretions
925		13.3	12.0			0.6	0.8	tc	accretions
926		10.4	9.6			0.9	0.6	tc	
927		13.1	12.1			1.0	0.7	tc	
928		11.7	11.7			1.0	0.9	tc	
929		11.7	9.4			1.0	0.9	tc	
930		12.0	11.9			1.1	1.0	apex worn	
931		12.8	11.5			1.0	0.8	tc	
932		11.3	9.7			0.9	0.4	scr	right side clip, can't see toe clip
933		12.0	9.8			1.1	1.1	tc	accretions
934		11.1	10.6			1.1	0.8	tc	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
935		12.0	10.4			1.1	1.0	tc + fcr	accretions
936		11.4	10.0			0.9	0.7	tc	
937		12.1	10.5			1.1	1.0	tc + fcr	
938		13.7	11.3			1.2	0.8	tc	
939		12.9	10.8			0.9	0.9	tc	welded caulkin on front
940		15.9	13.3			1.0	0.9	tc	eared right
941		11.8	10.2			1.1	0.9	tc	
942		13.6	12.5			1.0	0.8	tc	
943		14.5	12.0	13.1	14.5	1.1	0.6	tc	
944		13.0	12.0			1.1	0.9	apex worn	
945		13.7	12.9			1.1	1.0	tc	
946		13.9	10.9	13.9	13.4	0.7	0.8	wtc	welded toe clip adds 1.1 cm; eared right
947		11.9	12.0			1.1	0.8	tc	
948		14.4	11.5	14.4	13.6	1.0	0.9	tc	eared right
949		11.9	9.9			1.0	0.7	apex worn	
950		12.0	10.4			1.0	0.8	tc	
951		12.3	10.5			1.0	0.9	nc	no toe clip
952		13.0	10.9	12.4	13.0	1.1	0.9	wtc	
953		12.7	11.2			1.1	0.9	apex worn	
954		12.0	10.2			0.9	0.8	tc	
955		13.2	11.4	12.6	13.2	1.1	0.9	apex worn	flattened front, no toe clip visible
956		12.5	10.9			1.0	0.9	tc	accretions
957		12.3	11.2			1.0	0.0	apex worn	bent
958		11.5	9.9			0.7	0.9	tc	
959		12.1	11.4			1.1	1.0	tc	
960		13.8	10.9	13.8	12.6	1.0	1.1	tc	ac
961		11.5	11.1			1.1	0.7	tc	bent, ready to break in half
962		12.0	11.2			1.0	0.8	apex worn	
963		12.9	11.9			1.1	0.8	tc + fcl	

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
964		11.3	10.2			1.0	0.9	apex worn	
965		11.6	10.0			1.2	0.6	tc	
966		12.0	10.8			0.9	0.5	tc	
967		12.0	10.0			1.1	0.7	tc + fcr	
968		12.7	11.4			0.9	0.7	tc	
969		16.0	15.0			1.2	0.7	tc + scr	
970		12.2	9.7			1.1	0.7	tc + fcl	
971		12.7	11.1			1.0	1.0	apex worn	
972		14.0	12.3			1.2	0.7	fcrl	flattened front
973		12.9	10.8			1.0	1.0	tc	accretions
974		12.7	12.2			1.1	0.9	tc	
975		11.5	9.0			1.0	0.7	apex worn	
976		11.5	11.4			1.0	0.6	tc	
977		12.9	11.5			1.0	0.9	tc	
978		12.4	9.8			1.1	1.1	tc	heavy accretions
979		13.0	12.4			1.0	0.8	tc	
980		12.7	10.0			1.0	0.6	tc	
981		11.9	11.2			0.9	0.5	apex worn	
982		11.0	11.0			0.9	0.6	apex worn	
983		10.0	10.3			1.0	0.9	nc	in type collection; truncated ends
984		12.2	10.6			0.7	0.7	tc	
985		12.8	10.0			1.2	0.7	tc + fcrl	
986		12.2	11.9			1.1	0.0	apex worn	flattened front
987		15.1	13.0			1.1	0.8	tc	
988		12.8	11.6			1.1	1.0	tc	accretions
989		14.0	11.9			1.0	1.0	tc	
990		13.4	10.5	11.9	13.4	1.0	0.9	tc	eared left
991		12.8	11.5			1.0	9.0	tc	
992		11.8	10.0			1.0	0.8	apex worn	
993		12.0	10.7			1.1	0.9	tc	
994		14.0	10.9			1.0	1.0	tc	accretions

Horseshoe #	Weight (g)	Center Length (cm)	Width (cm)	Right Length (cm)	Left Length (cm)	Base Thickness (cm)	Apex Thickness (cm)	Style*	Notes
995		12.5	10.6			1.1	0.9	tc	accretions
996		11.9	11.2			1.0	1.0	tc	
997		13.0	12.2			1.1	1.1	tc	
998		15.0	14.8			1.2	1.2	fcr	
999		12.0	12.2			1.0	1.0	tc	
1000		12.3	11.1			1.1	0.0	fcr	

\*nc= no toe clip; tc= toe clip; wtc= welded toe clip; fcr= forged caulkin right and left sides; fcr= forged caulkin right side; fcl= forged caulkin left side; scl= side clip left side; bb= base bar; as= asymmetrical; scr= forged side clip right and left; wscr= welded side clip right and left

A selection of horseshoe photos is presented below.



Example of a horseshoe with apex worn.



Example of a horseshoe with forged caulkin on the left.





**Example of a horseshoe with forged caulkin on the right.**



**Example of a horseshoe with no toe clip.**





**Example of a horseshoe with a toe clip.**



**Example of a horseshoe with a welded toe clip.**

**Data for Glass Items (measurements are in cm)**

Acc. No.	Provenience	Description	Identifying Marks	Height	Neck Diam.	Mouth Diam.	Base Diam.	Base Shape	Base Markings	Mold Type	Top Type	Date	Contents
5	Pole hole 12 100-150 cmbs	Clear Pacific Soda Works frag 7 fl oz	Pacific Sodaworks Hilo Hawaii/Benzonate Soda Citric Acid Added/ 7Net Contents FL Oz Registered	14.5	N/A	N/A	5.7	Round, flat	"P"	Fully auto		1940s or later	Soda
11	ST 3+100	Multiple frags clear square medicine bottle	None		2.5	3.2		Square	None	Semi auto	Flared finish with tool	Late 1800s early 1900s	Medicine
26	ST 10+25 80 cmbs	Brown bottle, broken top	None	26	4		8	Round	SB & G Co 5			1881-1905	Beer
33	ST 10+50 125 cmbs	Whole brown bottle, thick seams, pulled neck	McFarlane & Co Honolulu	29.3	3.7	3.1	7.8	Round	None			Late 1890s-1910	Whiskey
34	ST 13+00 80 cmbs	Whole brown bottle, thick seams, pulled neck, with cork	None	28.7	4	2.8	7.8	Round	SB & G Co 4			1881-1905	Beer
39	ST 4+50	Whole light green bottle, no pontil marks, flat bottom	None	24		2.6	6.5	Round	None	Fully auto post mold	Crown top	After 1910	Beer
40	ST 13+00 60 cmbs	Whole brown beer bottle	None	23.4	2.5	2.4	6.6	Round, flat	SB & G Co	tooled finish	Crown top	1881-1905	Beer
43	ST 4+80	Aqua cylindrical bottle body frag, no markings	None					N/A	N/A		Crown top		

Acc. No.	Provenience	Description	Identifying Marks	Height	Neck Diam.	Mouth Diam.	Base Diam.	Base Shape	Base Markings	Mold Type	Top Type	Date	Contents
44	ST 13+00 80 cmbs	Whole bottle with wood fragments	"FEHRS" in fancy deco emblem on shoulder, "12" at bottom of body	24	3.9	2.8	6.7	Round, flat	NO, OWENS SUCTION	Fully auto	Crown top	After 1910	Beer
45	ST 14+35	Whole aqua cylindrical bottle fully automatic, crown top	embossed "P" on side edge of base	23.5	3.7	2.6	6.5	Round, flat	None	Fully auto	Crown top	After 1910	
46	213 cmbs	Whole green bottle, no seams, bubbles	None	24.2	3.2	2.9	6.6	Round, flat	NO	Turn paste mold	Glob top	Late 1800s to early 1900s	
65	ST 11+35 213 cmbs	Whole clear bottle with shiny, flaking finish	None	22.8	2.5	2.5	5.2 X 5.1	Square	None	Semi auto or dip mold	Hand tooled finish	Early 1900s?	
66a	No provenience	Green beer bottle base and neck	None	23.3	2.9	N/A	6.5	Round, shallow kickup	None	Fully auto?		Early 1900s	Beer
66b	No provenience	Aqua bottle neck and finish	None	18.5	3.1	2.8	N/A	N/A	N/A	Semi-auto	Tooled top no collar	Early 1900s	
67	ST 11+00 under sidewalk?	Whole Pacific Soda Works light green bottle	Pacific Soda Works	20.4	2.6	3.1	6	Round, flat	X		Hutchinson tooled	1900-1909	Soda
70	ST 11+05 100 cmbs	Whole Union Soda Works bottle, aqua	UNION SODA WORKS HILO, H.I.	19.6	3.8	3.4	6	Round, flat	None	Semi auto	Hutchinson tooled	1900	Soda
71a	ST 10+60 35 cmbs S wall	Whole light aqua bottle	None	25.3	2.6	2.4	6.7	Round, flat	None	Fully auto	Crown top	After 1910	

Acc. No.	Provenience	Description	Identifying Marks	Height	Neck Diam.	Mouth Diam.	Base Diam.	Base Shape	Base Markings	Mold Type	Top Type	Date	Contents
71b	ST 10+60 35 cmbs S wall	Light aqua bottle neck and finish	None	11.9	2.6	2.5		N/A	N/A	Fully auto	Crown top	After 1910	
76	ST 3+50 45 cmbs	brown prescription medicine bottle base	None					Oval	P... Illegible	Fully auto		1900s	Medicine
77	ST 3+30 100 cmbs	Whole dark aqua bottle, many bubbles irregular glass distribution	None	23.3	2.6	2.5	6.5	Round, flat	Vacuum imprint	Turn-paste? No seams	Crown top	Early 1900s	
80a	No provenience	Light green Coca Cola base and midsection	COCA-COLA TRADE-MARK REGISTERED BOTTLE PAT. D-105529, COCA-COLA TRADE-MARK REGISTERED MIN. CONTENTS 6- FL. OZS	12.8	N/A	N/A	5.9	Round, flat	None	Fully auto		1942	Soda
80b	No provenience	Aqua bottle neck and finish	None	8	1.9	2.4	N/A	N/A	N/A	Semi auto	Tooled top low collar	Late 1800s early 1900s	Medicine?
81a	ST 3+50 60 cmbs	Clear cylindrical bottle (relatively small) missing neck and finish	None	13.5			5.2	Round, flat	AH combined TM 0-7402	Fully auto		Mid 1900s	
81b	ST 3+50 60 cmbs	Display glass/plate glass fragment	None					N/A	N/A				N/A

Acc. No.	Provenience	Description	Identifying Marks	Height	Neck Diam.	Mouth Diam.	Base Diam.	Base Shape	Base Markings	Mold Type	Top Type	Date	Contents
91a	No provenience	Amber bottle base	None	N/A	N/A	N/A	broken	Round, shallow kickup	Sand Pontil	Semi auto		Late 1800s	Beer?
84	ST 2+00	Aqua bottle neck and finish	None	8	3.4	2.6	N/A	N/A	N/A	Fully auto	Collared top	1900s	
92	ST 6+35 Elec Trench 30 cmbs KP 36	Whole olive green bottle with wire for holding stopper	None	25.4	2.9	2.7	7.2	Round, heavy kickup	PONTIL MARK	turn paste mold	Applied ring finish on collar	1800s	Wine?
93	ST 6+35 Elec Trench 30-50 cmbs	Whole olive green beer bottle	None	25.9	2.9	2.7	7.2	Round, heavy kickup	PONTIL MARK	turn paste mold	Applied ring finish slightly different from 92	1800s	Wine?
94	ST 6+50 Elec Trench	Aqua case bottle base to shoulder fragment	On base only	17.7	N/A	N/A	7.8	Square	Embossed on base 35/ pitchfork	Fully auto?		Early 1900s	Liquor
99	ST 10+35 40 cmbs Elec Trench	Brown bottle and neck, finish broken	None	26.9	3.9		7.6	Round, flat	R G & B Co. 4	Full or semi auto		1901-1919	
100	ST 2+00 Elec Trench	Aqua cylindrical shoulder frag, no markings	None					N/A	N/A				
110	ST 9+40 special drain box S Wall 150 cmbs	Whole jar with white powder and metal screwtop lid	None	11.2	N/A	N/A	6.1	Round, flat	None	Fully auto		1900s	

Acc. No.	Provenience	Description	Identifying Marks	Height	Neck Diam.	Mouth Diam.	Base Diam.	Base Shape	Base Markings	Mold Type	Top Type	Date	Contents
113	ST 14+60 special box 30 cmbs above telephone jacket	Clear square Jar	HUMPHREYS MEDICINE [with horse head motif] all on one panel with words in arc over motif	11.9	5.3	5.5	7	Square, flat	vacuum imprint	Fully auto		After 1940	Horse Medicine
116a	ST 10+5 Elec Trench	Aqua bottle base and neck	None	16.5	3.6	N/A	6.5	Round, flat	None	Fully auto			
116b	ST 10+75 Elec Trench	Green bottle base with large kickup	None	10.4	N/A	N/A	6.4	Round, heavy kickup	None	Semi auto?		Early 1900s	
131	ST 9+60 Elec Trench N wall 20 cmbs	Thin clear glass medicine bottle frag	None					N/A	N/A				Medicine
136	ST 14+30 Main Trench	Whole aqua beer bottle with remnant of label on neck	None	30	2.6	2.5	7.8	Round, flat	ABGM Co V1	Semi-auto (seam gone on finish)	Regular finish with collar for holding cork	1908-1920	Beer
137	No provenience	Aqua beer bottle base and midsection	None	18.8	N/A	N/A	6.4	Round, flat	None	Full or semi-auto			Beer
138	ST 14+30 approx 100 cmbs	Whole aqua bottle	None	23.6	2.6	2.6	6.4	Round, flat	None	Fully auto	Crown top	After 1910	
139	ST 15+40 Drain 100 cmbs	Aqua bottle base and neck, finish broken	None	23.7	2.7	N/A	6.7	Round, flat	AB logo with "C 11" underneath	Semi auto		1905-1917	
143	ST 11+90 lateral trench	Whole High Test Soda Works bottle, aqua	HIGH TEST SODA WORKS HILO	20	2.7	3.2	6	Round, flat	322 H (DOUBLE STAMPE D)		Hutchinson tooled funnel	1908	Soda

Acc. No.	Provenience	Description	Identifying Marks	Height	Neck Diam.	Mouth Diam.	Base Diam.	Base Shape	Base Markings	Mold Type	Top Type	Date	Contents
144	ST 10+50 25 cmbs	Dark olive green/black bottle base with pontil mark	None	7.7	N/A	N/A	6.7	Round, heavy kickup	None	Turn paste mold		Mid to late 1800s early 1900s	Wine
149	ST 15+00 60 cmbs	Whole aqua beer bottle	None	23.7	2.6	2.5	6.4	Round, flat	AB logo with "P 19" underneath	Semi auto	Crown top, tooled finish	1905-1917	Beer
153	ST 26+60 6 PI 80	Whole aqua bottle	None	30	2.5	2.5	7.8	Round, flat	AB logo with "H-10"	Semi auto	Crown top, tooled finish	1905-1917	Beer
160	ST 24+ 70 Elec Trench 76 cmbs	Brown beer bottle, eroded tin/paper label (Primo?) broken off top	No deposit no return. Not to be refilled...	17.2	2.6		6.6	Round, flat	"20" "I" 6 7Q Duraglas 1-Way 7 GB	Fully auto		1950s	
161	ST 26+10 Elec Trench 60 cmbs	Aqua Pacific Soda Works bottle, broken neck and finish	Pacific Soda Works	18.6			6	Round, flat	X logo on bottom	Semi auto	Hutchinson stopper	1900-1908	Soda
168a	ST 28+40 Elec Trench 28 cmbs	Whole aqua beer bottle	None	28.8	2.6	2.6	8.8	Round, flat	None	Fully auto	Crown top	Mid 1900s	Beer
168b	ST 28+40 Elec Trench 28 cmbs	Aqua beer bottle broken top	None	21.6	2.6		6.5	Round, flat	None	Full or semi auto		1900s	Beer
168c	ST 28+40 Elec Trench 28 cmbs	Olive green beer bottle base	None	8.9			6.6	Round, flat	None	Full or semi auto		1900s	Beer
170	ST 14+60 lateral	Brown beer bottle	None	24.5	2.6	2.5	6.6	Round, flat	None	Fully auto	Crown top, tooled finish	After 1910	Beer

Acc. No.	Provenience	Description	Identifying Marks	Height	Neck Diam.	Mouth Diam.	Base Diam.	Base Shape	Base Markings	Mold Type	Top Type	Date	Contents
176	ST 19+03 180-240 cmbs	Whole dark green bottle with crinkles	None	28.9	4	2.7	7.9	Round, shallow kickup	Small dot?	Turn paste mold	Applied finish	Late 1800s early 1900s	Beer
180	ST 21+60 Elec Trench	Brown cylindrical bottle base	None	5.9	N/A	N/A	7.7	Round, shallow kickup	None	Fully auto		1900s	
182	ST 20+25 30 cmbs N Wall Elec Trench	Clear Eastman Kodak embossed chemical bottle	Circular embossed motif: Eastman Kodak Co Roc[hester] NY/ TESTED CHEMICALS					N/A	N/A				Chemical
189	ST 20+60 25 cmbs, above Hi Tel lines	Whole aqua Coke	COCA-COLA TRADE-MARK REGISTEREDBOTTLE PAT. D-105529, COCA-COLA TRADE-MARK REGISTERED MIN. CONTENTS 6-FL. OZS	19.7	3.1	2.7	6	Round, flat	OAKLAND CALIF. SINGLE DOT			1944	Soda
191	ST 20+05	Whole Excelsior Dairy milk bottle	One Pint Liquid/EXSELSIOR DAIRY/TEL 5A4/HILO HAWAII/ BBC Co 48 [on rim of base]	18	4.7	5.6	7.9	Round, flat	Owens logo but no code	Semi auto	Tooled finish	1948	Milk
195	ST90+20 50 cmbs	Whole aqua bottle, seams to the top with crinkles	TRADE C MARK, REGISTERED OCT. 1923/ SODA WORKS LTD; PROPERTY OF CITY HONOLULU TH	19.9	3.5	2.5	5.6	Round, flat	"C" in diamond	Fully auto	Crown top	After 1923	Soda
197	ST 21+60	Aqua bottle neck and finish	None	7.1		2.7	2.7	N/A	N/A	Tooled finish		Late 1800s early 1900s	



Acc. No.	Provenience	Description	Identifying Marks	Height	Neck Diam.	Mouth Diam.	Base Diam.	Base Shape	Base Markings	Mold Type	Top Type	Date	Contents
198	ST 7+40	Whole clear nail polish bottle, screw top	None	4.7	1.2	1.2	4 x 2.7	Rectangular, flat	None	Fully auto		Mid 1900s	Nail polish
203	ST 4+80 (kai) 61 cmbs root barrier trench	Clear glass ink jar	None	5.8	2.6	2.7	4.3	Round, flat	CARTER' S USA	Fully auto		1900s	Ink
206	ST 5+40 root barrier trench	Whole Coke bottle	COCA-COLA TRADE-MARK REGISTERED IN US PATENT OFFICE/MIN CONTENTS 6 FL OZS/ 56-18	19.7	2.5	2.5	5.9	Round, flat	MG logo at center		Crown top	1956	Soda
207	ST 5+50 roof barrier 15 cmbs	Whole clear Hilo Soda Works bottle	PROPERTY OF/HILO SODA WORKS/HILO, HAWAII/Net Contents 6 1/2 Fluid Oz/ 1A [stippled texture]	21.4	2.5	2.5	5.5	Round, flat	HS/ Owens I without diamond 59 to right side/ 4287-c	Fully auto	Crown top	1959	Soda
209	ST 5+90 root barrier trench 25 cmbs	Dark olive green case gin bottle base	None	4.3			4.9	Square, slightly concave	No pontil	Probably semi auto with snap case		Late 1800s early 1900s	Gin
213	ST 20+25 30-50 cmbs wall fall by Hi Tel box	Jergens lotion bottle with screwtop lid	None	9.8	1.9	1.8	4.4 x 2.1	Rectangular, flat	JERGENS	Fully auto		1900s	Lotion
215	ST 2 00	Clear soda bottle frag with orange and white color design	"e..."					Round	None			Mid 1900s	Soda

Acc. No.	Provenience	Description	Identifying Marks	Height	Neck Diam.	Mouth Diam.	Base Diam.	Base Shape	Base Markings	Mold Type	Top Type	Date	Contents
219	ST 25+00 Root Bar 70-80 cmbs	Olive green bottle base	None	8.2			7.8	Round, flat	raised dot at center automatic mold			1900s	
222	ST 21+73 (kai) 65cmbs root barrier	Clear long-necked bottle (cologne/perfume?)	None	13.3	2	2.2	4.1	Round, flat	None	Dip mold, tooled finish		Late 1800s early 1900s	Cologne/perfume?
223	ST 21+75 65 cmbs	Clear long-necked bottle (cologne/perfume?)	None	11.7	2	2.4	6.6	Round, flat	None	Dip mold, tooled finish		Late 1800s early 1900s	Cologne/perfume?
228	ST 21+30 gas line 61 cmbs	Aqua bottle neck and finish	None	11.9	2.6	2.8		Round, flat	None	Tooled finish		Late 1800s early 1900s	
230	LP 29 60 cmbs	Clear glass flask base	[Wilsen ? illegible to me] cursive writing of names around base in embossing	3.1			8.2	Oval, flat	Owens TM with 1940 date code			1940	Liquor?
231	ST 20+25 Hi Tel wall fall 35-45 cmbs	Whole coke bottle	COCA-COLA TRADE-MARK REGISTEREDBOTTLE PATD DEC 25, 1923/ MIN. CONTENTS 6-FL. OZS	19.6	2.5	2.5	6	Round, flat	HONOLULU T.H.	Fully auto	Crown top	1940-1950s?	Soda
232	ST 20+25 Hi Tel Wall Fall	aqua soda bottle, missing top	Net Contents 6 1/2 Fluid Ozs/ 5 / IPG Co	16.4			5.9	Round, flat	None	Full or semi auto		1902-1925	Soda
233	ST 20+25 Hi Tel wall fall	Light green floral motif vase in 5 fragments	Floral motif below rim pieces and on base				5.2	Round, flat	None			1900s	N/A- vase

Acc. No.	Provenience	Description	Identifying Marks	Height	Neck Diam.	Mouth Diam.	Base Diam.	Base Shape	Base Markings	Mold Type	Top Type	Date	Contents
234	ST 20+25 Hi Tel wall fall 45 cmbs	Clear Whistle Soda bottle, chipped but nearly whole	WHISTLE/ Registered 6 1/2 fl OZ/ Whistle Bottling Co. [stippled texture]	19.1	2.5	2.5	5.8	Round, flat	WHISTLE REGISTE RED	Fully auto	Crown top	After 1919	Soda
235	ST 20+25 Hi Tel wall fall 45 cmbs	Whole clear T Ikeda soda bottle	T Ikeda [script]/ Property of/T Ikeda Soda Works/Net Contents 7 Fl. Oz. [stippled texture design]	21.7	2.5	2.5	5.4	Round, flat	T I, Owens TM with oval and diamond	Fully auto	Crown top	1929-1940s	Soda
239	ST 19+50 60 cmbs	Whole brown cylindrical bottle	On base only	31.6	2.6	2.5	7	Round, flat	Owens trade mark code	Fully auto		1938	
240	ST 79+45 Hi Tel Line 70 cmbs	Whole aqua medicine bottle	DR H F PEERY'S/ DEAD SHOT/ VERMIFUGE	10.2	1.6	1.9	2.8 x 1.7	Oval	None	Semi auto hand tooled finish		Late 1800s early 1900s	Medicine
242	ST 19+20 40 cmbs	Fragmented clear solid cylinder with faceted sides (probably not a stopper)	None					N/A	N/A				
244	ST 15 SL 24	Aqua near complete cylindrical bottle	On base only	22.5	2.8	3.3	9.3	Round, flat	"CCW"	Semi auto	Hutchinson-like	Late 1800s early 1900s	
245	ST 15 SL 24	Olive green beer bottle, cracked but whole	None	26	2.9	2.8	6.2	Round, heavy kickup	PONTIL MARK	turn paste mold	Hand applied ring finish for collar	1800s	Wine?
246	ST 15 SL 24	Whole aqua long narrow cylindrical bottle	None	24.7	2.3	2.4	5	Round, shallow kickup	None	Fully auto		1900s	

Acc. No.	Provenience	Description	Identifying Marks	Height	Neck Diam.	Mouth Diam.	Base Diam.	Base Shape	Base Markings	Mold Type	Top Type	Date	Contents
247	ST 15SL 24	Whole brown cylindrical bottle	None	27.7	3.6	3	8	Round, flat	Concentric circles from turn paste	Turn paste mold	Turn paste with blob like top	Late 1800s early 1900s	
248	ST 15 SL 24	Whole clear glass bottle	on base only	19.8	2.4	2.2	5.7	Round, flat	M inside circle	Semi auto	Hand applied twist top design with collar below	Late 1800s early 1900s	
249	ST 15 7	Clear small case gin bottle	None	20	2.4	2.5	5.5	Square	None	Semi-auto	Hand tooled	Late 1800s to 1917	Gin
250	ST 15 6	Aqua glass bottle base and neck	STEPHENS/ GLOUCESTER	14.7	2.4	N/A	5.3	Round, flat	8396 embossed on base	Semi auto?		Late 1800s early 1900s	Pickle vinegar
253	ST 19+30 root barrier	Clear glass solid rectangle, broken	None					N/A	N/A				
300	ST 33+36 80 cmbs	Aqua ink jar	None	5.2	2.5	2.6	3.9	Round, flat	No pontil	Fully auto		Early 1900s	Ink
301	ST 21+80 50 cmbs	Clear cylindrical bottle with decorative embossing and stipples	Decorative fluted lines and stipples	19.8	2.6	2.5	5.8	Round, flat	Prop FCC Bottle Co Ltd/ Made in Japan TM 3/65	Fully auto	Crown top	After 1910; 1965?	
302	No provenience	Dark green bottle base in 2 fragments	None				6.2	Round, flat	Numbers and letter code	Full or semi auto		Early 1900s	

Acc. No.	Provenience	Description	Identifying Marks	Height	Neck Diam.	Mouth Diam.	Base Diam.	Base Shape	Base Markings	Mold Type	Top Type	Date	Contents
307	ST 33+10 Elec Trench 35 cmbs	Whole small brown cylindrical bottle	None	8.3	1.5	1.8	2.6	Round, flat	None	Fully auto		1900s	
308	ST 32+25	Clear small vial with screw top	Stipple decoration	6.4	2	1.9	3 x 1.8	Oval, flat	None	Fully auto		Mid to late 1900s	
309	ST 32+20 40 cmbs Elec trench	Blue ointment jar (Vick's vapor rub) with partial lid and ointment inside	None	5.9			4.2	Round, flat	Vicks Vaporrub with TM	Fully auto	Screw top	Ca. 1940s?	Medicine
310	ST 32+00	Brown beer bottle crown top	No deposit no return. Not to be refilled Anchorglass	16.7	2.5	2.6	6.6	Round, flat	8565A anchor glass trademark 5/48/83	Fully auto	Crown top	1960s-1977	Beer
314	ST 24+60	Red molded glass with design	None					N/A	N/A				
315	ST 25+45 25cmbs	Clear embossed soda bottle broken off top	Property of Excelsior Soda Works, Hilo Hawaii/ Contains 6 1/2 fluid ounces decorative motif; EX on base with Owens TM	21.2	2.6	N/A	5.5	Round, flat	EX 2155/ Owens diamond 40/6	Fully auto		1936 based on Owens TM	Soda
318	ST 22+20 drain trench 40 cmbs	Whole brown Primo bottle paper label partially intact	No deposit no return. Not to be refilled...	14.7	2.4	2.6	6.5	Round, flat	C6	Fully auto	Crown top	1960s	Beer
326	ST 22+70 Elec Trench	Aqua beer bottle with broken top	On base only	23	3.7	N/A	4.5	Round, flat	AB M9	Full or semi auto		1905-1917	Beer

A selection of bottle photos is presented below.



McFarlane & Co. whiskey, late 1800s–1910 (Acc. 33).



Unidentified square tapered bottle with hand tooled finish, possibly early 1900s (Acc. 65).



**Union Soda Works, Hilo, HI, 1900 (Acc. 70).**



**Humphreys Medicine (for horses); post 1940 (Acc. 113).**



**Excelsior Dairy milk bottle, Hilo, HI, 1948 (Acc. 191).**



**Unidentified cylindrical bottle, late 1800s–early 1900s (Acc. 244).**





**Unidentified bottle, late 1800s–early 1900s (Acc. 248).**



**Case gin bottle, late 1800s–1917 (Acc. 249).**