

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1051
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

Puako (Hawaii Island, Hawaiian Government Survey, 1873; K. T. Adams, 1928).—On the northwestern coast of Hawaii, in South Kohala District, a short distance north of the village of Puako, on the highest point of a slight rise, 370 meters, N. 18° W. from the stack of an abandoned sugar mill at Puako (in 1928 no longer standing), 100 meters from the shore and 30 meters east of the trail between Puako and Kawaihae. It was marked by a concrete post set in the ground, over which was built a small cairn. A telephone pole a little way down the slope bears N. 87° E. In 1928 when the station was visited the cairn over the mark was removed and the mark found to be about 3 feet north of the center of the cairn. At that time two reference marks were established. No. 1, almost on line of telephone poles, is a standard disk reference mark cemented in the top of an outcropping rock on the edge of the slope leading to the gulley, about 8 inches above the surface of the ground and 23.330 meters (76.54 feet) from the station in azimuth 10° 04'. No. 2 is a standard disk reference mark cemented into the top of an outcropping rock 1 foot above the surface of the ground on the edge of the knoll, 4.652 meters (15.26 feet) from the station, in azimuth 160° 36'.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: Puako STATE: Hawaii COUNTY: Hawaii
 ESTABLISHED BY: H.G.S. YEAR: 1873 LOCALITY: Puako, S. Kohala, Hawaii
 RECOVERED BY: Chas. L. Murray YEAR: 1938

Detailed statement as to the fitness of the original description:

Location of Station: On northwestern coast of Hawaii, 1/4 mile north of Puako and about 300 feet inshore on the highest point of a small rise.

Old Mark Found: U.S.G.S. bronze tablet set in concrete presumably over the original H.T.S. mark. Small pile of stones and 25 feet tower over mark.

New Station Mark: H.T.S. Type E monument (Tripod built of 2" pipe 10 feet long for legs which is set firmly in the ground with concrete. A removable signal of 1 1/2" pipe 27 feet long is set over the station mark and thru the top of the tripod.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 538
 RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUAKO
 ESTABLISHED BY: Haw. Govt. Survey YEAR: 1873 STATE: HAWAII
 RECOVERED BY: L. C. Wilder YEAR: 1948 COUNTY: HAWAII

Detailed statement as to the fitness of the original description:

Station is located on a small rise now surrounded with kiawe trees, about 150 yards east of the east shore of Puako Bay, which is 5 miles south of Kawaihae. About 200 yards south of the northerly of the only two known gates into property skirting the bay. The two gates are perhaps 500 yards apart in a south or southeasterly direction. A line of telephone poles passes close to the station, which serves a good means of finding the station which is hidden by trees.

Station is marked by a USGS bronze disk, presumably over the old station, altho in 1928 the old cairn over the station was removed and the station found about 3 feet north of the center of the cairn. A pipe tripod and 22 foot pipe pole has been established over the station (in 1938 by Hawaii Territory Survey). There are two USC&GS reference marks cemented in ledge.

To reach the station proceed by truck from Kawaihae, if the road is in repair, to the second or southerly gate above mentioned. Turn back about 500 yards and find the telephone line to the westward of the road.

OBJECT	DIRECTION	DISTANCE
PUU AIEA	00 00 00	
PUU LOA (metal target)	27 00 44.9	
R. M. No. 1, 1928	179 26 52	23.325m 76.52ft
R. M. No. 2, 1928	330 02 07	4.648m 15.275ft

U. S. GOVERNMENT PRINTING OFFICE

NOTE.—One of these forms must be used for every station recovered.

H-2318-3

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUAKO
 STATE: HAWAII YEAR: 1873 SECOND ORDER

SOURCE G- 9279

GEODETIC LATITUDE	19 58 45.509	ELEVATION	16.5 METERS
GEODETIC LONGITUDE	155 49 59.231		55 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLT
HI 1	5101	385,016.76	416,271.55	- 0 06 50

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE β OR Δ OR FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From station)	PLANE AZIMUTH (From station)	CODE
PUAKO NEW	290 09 16.6	290 16 07	5101

QE 032

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1052
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1,5 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 525
 Rev. Aug. 1958

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **PUAKO NEW** STATE: **HAWAII** COUNTY: **HAWAII**

CHIEF OF PARTY: **L. G. WILDER** YEAR: **1948** Described by: **L. G. WILDER**

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK Surface-station mark, Underground-station mark	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	HEIGHT OF LIGHT ABOVE STATION MARK		METERS.
			feet	meters	
2	1.49 METERS.				
		OBJECT	BEARING	DISTANCE	DIRECTION
		PUU PA (metal target)	E		00 00 00
		PUU LOA (metal target)	NE		312 31 35.1
		NOHONAOHAE (metal target)	SE		30 31 56.0
12a	R. M. No. 1, 1948		S	27.755	86 34 49
12a	R. M. No. 2, 1948		NW	75.01	243 45 08
12a	R. M. No. 3, 1948		NE	17.71	314 34 53
12a	R. M. No. 4, 1948			41.20	12.56
					4 30 23

Station is located on the highest ground in the general locality, 0.6 miles east of the eastern shore of Puako Bay which is 5 miles south of Kawaihae, west coast of Hawaii Island. There are numerous flat topped hills adjacent to the station and of about the same height, all overgrown with scattered kiawe brush. Station is $\frac{1}{2}$ mile, a little south of east of Station Puako, which has a 22 foot pipe pole over same.

Station is reached by a road from Kawaihae which is maintained to the extent that trucks can pass over it. However, at times, there are wash-outs. There is a locked gate across the road (end of truck travel on this road) at the locality of the station. From the gate turn to the eastward to the highest ground. Station can be reached by truck by carefully picking the way. At present one family lives on the bay.

Four reference marks were established. A rock cairn was built at the station to assist in locating same.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 525
 (Rev. Feb. 1958)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **PUAKO NEW**
 ESTABLISHED BY: **L.C. Wilder** YEAR: **1948** STATE: **Hawaii**
 RECOVERED BY: **C.T. Husemeyer** YEAR: **1950** COUNTY: **Hawaii**

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:

Station recovered in good condition.

To reach from Kawaihae Park; go southerly along bladed road for about 4 miles to a point about $\frac{1}{2}$ mile northeast of Puako Village. Here turn left and follow dim tracks up hill to first prominent flat and station.

A small cairn is built around the station.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **PUAKO NEW**
 ESTABLISHED BY: **L.C.W.** YEAR: **1948** STATE: **Hawaii**
 RECOVERED BY: **R.E.A.** YEAR: **1961** COUNTY: **Hawaii**

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:

The station and four reference marks were found in good condition. A new "to reach" follows--

To reach the station from the intersection of Hawaii highway 26 and the Puako Road just east of Kawaihae, go south on the Puako Road for 4.1 miles to the Puako Public Dump on left. Pass through dump on a rough track road and continue for 0.4 mile to high ground and station.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **PUAKO NEW**

STATE: **HAWAII**

YEAR: **1948**

SECOND

ORDER

SOURCE: G- 9279

GEODETIC LATITUDE:	19 58 36.320	ELEVATION	201 METERS
GEODETIC LONGITUDE:	155 49 32.753		201 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE
HI 1	5101	388,140.46	415,339.58	- 0 06 41

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE β OR Δ OR FORMULA NEGLECTING THE SECOND TERM

TO STATION OR OBJECT	GEODETIC AZIMUTH (from watch)	PLANE AZIMUTH (from watch)	CODE
PUAKO	110 09 25.7	110 16 07	5101

QE 033

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1052

LATITUDE ° ' TO ° '
 LONGITUDE ° ' TO ° '
 DIAGRAM

PUAKO NEW (continued)

FORM 526e
 (10-18-66)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PUAKO NEW
 ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii
 RECOVERED BY: D.M. Whipp YEAR: 1967 COUNTY: Hawaii
 Island: Hawaii

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
PUAKO (HGS) 1873				00 00 00.0
R.M. No. 2	NW	74.981	22.855	35 23 10
Kawaihae Light 1928	NNW			62 00 47.6
R.M. No. 3	NE	58.504	17.833	106 11 30
R.M. No. 4	E	41.254	12.575	156 06 07
R.M. No. 1	SSE	90.998	27.737	238 12 54

Station was recovered and all marks found in good condition. A complete description follows:

Station is located about 11 miles west-southwest of Kamuela and 4-1/2 miles south of Kawaihae, on a low, flat ridge, 1/2-mile east of the east end of Puako Bay and 700 feet south of a group of 3 water tanks located about 500 yards east-southeast of the Puako road.

To reach station from the post office in Kawaihae, go southerly on main road for 1.55 miles to fork and sign "PUAKO". Take right fork and go 2.6 miles to side road to Hapuna Beach Park on right. Continue ahead

for 1.25 miles to crossroad, where macadam road goes right, and the road left goes to garbage dump. Continue ahead, on a rough track road, for 0.1 mile to wire gate. Pass through gate and continue for 0.2 mile to second wire gate. Pass through gate, turn left, and follow bulldozed strip along fence for 0.15 mile to top of grade and station on left of fence.

Station mark is a standard disk stamped "PUAKO NEW 1948", cemented in a drill hole in a 12-inch-square bedrock outcrop that projects 6 inches above ground. It is 99.7 feet west of the fence-line.

Reference mark number one is a standard disk stamped "PUAKO NEW NO 1 1948", cemented in a drill hole in black lava outcrop that projects 2 feet above ground. It is 2 feet north of a large chiseled cross in the same rock, 13 feet northwest of the fence-line and 1.7 feet lower than station mark.

Reference mark number two is a standard disk stamped "PUAKO NEW NO 2 1948", cemented in a drill hole in bedrock that projects 1 foot above ground. It is on a rocky point and about 3 feet lower than station mark.

Reference mark number three is a standard disk stamped "PUAKO NEW NO 3 1948", cemented in a drill hole in a 10 x 24-inch rock outcrop that projects about 7 inches above ground and is about 1 foot higher than station mark.

Reference mark number four is a standard disk stamped "PUAKO NEW NO 4 1948", cemented in a drill hole in the top of a small rock outcrop that projects 10 inches above ground and is 1-1/2 feet higher than station mark.

Form 526
 (11-8-65)

U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
 RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PUAKO NEW
 ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii
 RECOVERED BY: R.L. McWson YEAR: 1968 COUNTY: Hawaii

Detailed statement as to the fitness of the original description, including marks found, stampings, changes made, and other pertinent facts:

Station and all four reference marks recovered in good condition as described by D.M. Whipp, 1967. Wooden Hydrographic Survey Signal (Tripod) built over station November, 1968.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PUAKO NEW
 ESTABLISHED BY: L. C. Wilder YEAR: 1948 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: R. H. Houlder YEAR: 1971 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 4.5 miles south of Kawaihae

Detailed statement as to the fitness of the original description, including marks found, stampings, changes made, and other pertinent facts:

The station and reference marks were recovered in good condition as described in 1967.

The following are the 1971 observations:

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
PUAKO 1873				00°00'00.0"
RM 2	NW	74.98	22.855	35 23 28
RM 3	NE	58.50	17.830	106 11 33
RM 4	E	41.25	12.575	156 05 42
RM 1	SSE	91.00	27.737	238 12 48

FORM CG-526 (9-66)
 USCOMM-DC 36496-P66

U.S. DEPARTMENT OF COMMERCE
 ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
 COAST AND GEODETIC SURVEY

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191554 STATION 1054
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 536

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: Puu Hinai STATE: Hawaii COUNTY: Hawaii
 ESTABLISHED BY: H.T.S. LOCALITY: Waikoloa, S. Kohala, Hawaii
 YEAR: 1938

Detailed statement as to the fitness of the original description:

Location of Station: On the southwest crater rim of a conspicuous hill named Puu Hinai situated about 4 1/2 miles below the Waimea Kona road at a point on the road about 10 miles distant from Kamuela.
 Old Station mark found: The buried copper Δ and cow's horn marking the station could not be found. However, the station was remarked from the original tie marks (Δ 's on stone) 11.6 and 38 feet away from the station. These appear not to have been disturbed. All other original tie marks (+'s on stones) were found removed. As no surface mark identified the station the tie mark 38-feet distant from the station appears to have been used as the station as a pile of stones and flag rod was found over this tie mark.
 New Station mark: H.T.S. Type C triangular monument (2 1/2" pipe 4-foot long set in triangular concrete monument 7 1/2 feet on each side, with standard metal target).

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 536

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUU HINAI YEAR: 1938 STATE: HAWAII
 ESTABLISHED BY: H.T.S. RECOVERED BY: L. G. Wilder YEAR: 1948 COUNTY: HAWAII

Detailed statement as to the fitness of the original description: Unable to locate the original description. A new description follows--

The station is located on the western rim and the highest point of a prominent volcanic knoll named Puu Hinai which lies about 11 miles southwest of Waimea, about 8 miles east of Anaeohomaluu Bay, about 7 miles southeast of Puako Bay and about 4 miles west of the road which leads between Waimea and the Kona District.

To reach from the post office in Waimea; go south, on the road which leads toward the Kona District, for 6.4 miles; continue straight ahead on the road which leads toward the Kona District for 4.2 miles; turn right, pass through a board gate and go westerly, on a track road, for 4.6 miles to the base of the hill and the end of truck travel. From this point pack westerly, up the steep slope, for about 0.3 mile to the summit and the station.

The station is the center of a 2 1/2 inch iron pipe which projects about 2 1/2 inches from the top of a concrete frustum of a pyramid, which in turn projects about 2 1/2 feet from the top of a triangular slab of concrete which is about 7 feet on each side.

Reference mark number 1 is a standard disk, stamped 1 1948, set in the top of a 2 1/2 inch iron pipe which is flush with the ground.

Reference mark number 2 is a cross cut in a flat rock, surrounded by a triangle which is about 6 inches on each side. The rock is flush with the ground and is at about the same elevation as the station.

Object	Distance	Direction
AHUMOA (metal target)		00 00 00
R. M. No. 2 S	11.612 m 38.096 ft	70 54 58
PUU PA target NE	8 miles	277 57 30.94
R. M. No. 1 NNE	6.547 m 21.480 ft	283 36 00

(continued on next page)

R

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU HINAI
 STATE: HAWAII YEAR: 1938 SECOND ORDER

SOURCE: G- 9279

GEODETIC LATITUDE: 19° 54' 17.598	ELEVATION: 438.7 METERS
GEODETIC LONGITUDE: 155° 46' 50.432	1439 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β θ Δ θ ANGLE
HI 1	5101	403,579.46	389,211.38	- 0 05 44

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE β θ Δ θ FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (from south)	PLANE AZIMUTH (from south)	CODE
NOHONA OAHAE	258 42 34.3	258 48 18	5101

QE 035

JUN 1978
 U.S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1054

LATITUDE ° ' TO ° '
 LONGITUDE ° ' TO ° '
 DIAGRAM

PUU HINAI (continued)

FORM 526a
 (9-19-63)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

R

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **PUU HINAI**
 ESTABLISHED BY: **HTS** YEAR: **1938** STATE: **Hawaii**
 RECOVERED BY: **D.M. Whipp** YEAR: **1967** COUNTY: **Hawaii**
 Island: **Hawaii**

HEIGHT OF TELESCOPE ABOVE STATION MARK **0.8** METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
NOHONAOHAE (HGS) 1873-----1948	DISTANCE	and DIRECTION-----		00 00 00.0
R.M. No. 2	S	38.096	11.612	112 37 42
R.M. No. 1	NNE	21.480	6.547	325 18 44
NOHONAOHAE (HGS) 1873-----1967	DISTANCE	and DIRECTION-----		00 00 00.0
Green Water Tank	E	About 2 miles		14 13 54.3
R.M. No. 2	S	38.022	11.590	112 37 18
R.M. No. 1	NE	21.456	6.540	325 19 12

Station mark was recovered in good condition. Reference mark number one and the chiseled cross and triangle marking RM 2 were also recovered. A new reference mark disk was established at the chiseled cross. A complete description follows:

Station is located about 11 miles southwest of Kamuela, 6-1/2 miles west-southwest of the junction of State Highways 19 and 20, and 6 miles southwest of Puako, at about 1439 feet elevation, on the west rim of Puu Hina'i, a prominent, grassy hill.

To reach station from the post office in Kamuela, go south on State Highway 19 for 6.6 miles to junction with State Highway 20. Continue on State Highway 19 for 4.2 miles to board gate on right, at power pole 96. Pass through gate and follow track road west-northwest for 0.8 mile; take right fork and go 1.6 miles to green wooden water tank. Continue on track road for 2.2 miles to end of truck travel at base of hill. Pack west to highest point of hill and station. About a 15-minute pack.

Station is marked with a Type C signal constructed by the Hawaii Territorial Survey. This consists of a 2-1/2-inch iron pipe projecting 2 feet from the center of a triangular, concrete platform about 7 feet on each side and projecting 4 inches above ground. Station is center of the 2-1/2-inch pipe, which holds a removeable, red and white metal target.

Reference mark number one is a standard disk stamped "1 1948", set in the top of a 2-inch iron pipe flush with ground and 4.9 feet lower than top of station pipe.

Reference mark number two is a standard disk stamped "PUU HINAI HGS 1938 NO 2 1967", cemented in a drill hole in a 14-inch, triangular rock projecting 3 inches above ground, at the point marked by the chiseled cross in chiseled triangle, described as RM 2 in 1948.

Green Water Tank is a green, wooden, flat-topped, water tank 18 feet in diameter and 14 feet high.

NOTE: There is no "concrete frustum of a pyramid" on the platform as described in 1948.

____ of chief of party should be inserted here. The officer who actually visited the station should sign his name at the end of the recovery note.

NOTE - One of these forms must be used for every station recovered.

USCOMM-DC 27173-P89

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151554 STATION 1055
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

Puu Io (Hawaii Island, Hawaiian Government Survey, 1876).—In northern part of Hawaii, on Puu Io, at the foot of Mauna Kea, on the brow of the hill to the northeast (not on the summit). Marked by a mamane post and a cairn of stones. A rock marked with two crosses is N. 40° E. from the station, distant 8 feet.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 508
RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: Puu Io STATE: Hawaii COUNTY: Hawaii
 ESTABLISHED BY: Hawaiian Govt. YEAR: 1876 LOCALITY: South Kohala, Hawaii
 RECOVERED BY: S. L. Murray YEAR: 1938

Detailed statement as to the fitness of the original description:

Location of Station: On the westerly crater rim of the hill called Puu Io which is about 12 miles easterly from Waimea via the Mana road and about 1 1/2 miles south of the Mana Dairy. Follow the road to the pump station on the side of Puu Io Hill.

Old Station mark found: U.S.G.S. bronze tablet in a 6" cylindrical concrete monument stamped 3983 feet Elevation and covered with a small stonepile. The H.T.S. mark of 1876, a mamane post, no longer exists. A large boulder with two large +s bears S 40° E 9 feet from the bronze tablet. The bearing to this immovable rock from the H.T.S. station of 1876 was N40°E 8 feet. The U.S.G.S. tablet has been adopted as the station since it apparently has been assumed to be the station by surveyors using it. However it should be retriangulated on.

New Type of station mark: H.T.S. Type D monument set over the U.S.G.S. bronze tablet.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 508
RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUU IO STATE: HAWAII
 ESTABLISHED BY: Hawaiian Govt. YEAR: 1876 LOCALITY: HAWAII
 RECOVERED BY: L. G. Wilder YEAR: 1948 COUNTY: HAWAII

Detailed statement as to the fitness of the original description: The 1876 station was not recovered (A mamane post and cairn). The present station is the center of a U.S.G.S. bronze disk, stamped 3983, set in the top of a 6 inch cylindrical concrete post which is flush with the surface of the ground. This station was established about 1926 and it is not known if the original station was recovered at this time. In 1938 the Hawaiian Territorial Survey surrounded this station by a triangular concrete platform which is 7 feet on each side and projects about 1 foot. A new description follows--

The station is located on the summit of a low volcanic knoll known as Puu Io, about 12 miles northwest of the summit of Mauna Kea, about 9 miles southwest of Honokaa, about 8 miles east southeast of Waimea and 25 meters north of two wooden water tanks.

To reach from the post office in Waimea; go east on the road which leads toward Honokaa for 2.1; turn right, onto a graded road, and go south and east for 4.6 miles; cross over a cattle guard, pass to the right hand side of a dairy farm and continue south and west for 3.1 miles; turn right, onto a track road, and go westerly for 0.5 mile; pass to the right hand side of a concrete water trough and continue westerly for 0.1 mile; pass through a board gate and follow the track road west and north for 0.7 mile to a ranch house at the western foot of the hill.

* Name of chief of party should be inserted here. The officer who actually visited the station should sign his name at the end of the recovery note.
 U. S. GOVERNMENT PRINTING OFFICE NOTE.—One of these forms must be used for every station recovered. H-2810-2

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU IO
 STATE: HAWAII YEAR: 1876 SECOND ORDER

SOURCE: G- 9275

GEODETIC LATITUDE	19 59 05.405	ELEVATION	1238.3 METERS
GEODETIC LONGITUDE	155 34 03.630		4063 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ ON Δ θ ANGLE
Hi 1	5101	476,763.36	418,169.75	- 0 01 23

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ ON Δ θ FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
HOLOHOLOKU	85 51 05.0	85 52 28	5101

KE 135

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1055
 LATITUDE ° ' TO ° '
 LONGITUDE ° ' TO ° '
 DIAGRAM

PUU IO (continued)

From this point pack easterly, up the steep slope, for about 0.2 mile to the summit and the station. This is about a 20 minute pack.

Reference mark number 1 is a standard disk, stamped PUU IO NO 1 1948, set into a drill hole in a boulder which is flush with the ground on the west and projects about 2 feet on the east. It is about 3 feet lower than the station and is 43 feet north of the north edge of the most easterly of two water tanks.

The two water tanks are constructed of wood and are 18 feet in diameter and their base is 1.43 meters lower than the station.

Object	Distance	Direction
PAPALEKOKI 1948		00 00 00
R. M. No. 1 SSE	11.583 m 37.999 ft	12 34 21
East Tank S (center)	27.16 m	22 01 55.4
West tank S (center)	28.62 m	35 13 16.7
NOHONAOMAE (metal target)		97 02 40.3
HOKUULA 2 (metal target)		150 37 48.0

An early recovery note reports; Original station recovered by "H. Barrington in January 1911. Remarkd by bronze tablet set in concrete, centered under old post, stamped 4958.

FORM 526a
 (2-18-65)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUU IO
 ESTABLISHED BY: HGS YEAR: 1876 STATE: Hawaii
 RECOVERED BY: D.M. Whipp YEAR: 1967 COUNTY: Hawaii
 Island: Hawaii

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
		DISTANCE		
HOLOHOLOKU (HGS) 1873-----1948	SSE	37.999	11.583	-00 00 00.0
R.M. No. 1	S	27.16	260	44 32
East Tank (center)	S	28.62	273	23 27.4
West Tank (center)	S	28.62	273	23 27.4
HOLOHOLOKU (HGS) 1873-----1967	ENE	5.771	1.760	-00 00 00.0
R.M. No. 2	SE	37.998	11.584	250 41 15
R.M. No. 1	SSE	88.834	27.077	259 44 45.4
East Tank 1948	SSE	93.641	28.542	272 44 09.7
West Tank 1948	SSE	93.641	28.542	272 44 09.7

Station mark and reference mark number one were recovered in good condition. A new reference mark was established. A complete description follows:

Station is located about 7 miles east-southeast of Kamuela and 9-1/2 miles southwest of Honokaa, on the summit of Puu Io, a bare hill of about 4063 feet elevation that has two green, wooden, water tanks on top.

To reach station from the post office in Kamuela, go easterly on State

Highway 19 for 2.1 miles; turn right on graded road at power pole IX and follow main road southeasterly for 0.5 miles to old ranch on left; continue for 1.5 miles to track road right, at telephone pole 106. Take side road and go 0.75 mile to board gate. Pass through gate and go right for 0.1 mile to board gate on left side of lane. Pass through this gate and go cross-country 0.4 mile to end of truck travel at steep grade. Pack about 300 yards to top and station.

Station mark is a USGS disk set in the bottom of a hole 8 inches deep in the center of a triangular, concrete platform 7 feet on each side and flush with ground. NOTE: No stamping is discernible on the disk.

Reference mark number one is a standard disk stamped "PUU IO NO 1 1948", cemented in a drill hole in a red rock ledge, 0.1 foot lower than station.

Reference mark number two is a standard disk stamped "PUU IO 1876 NO 2 1967", cemented in a drill hole in a 3-foot, red rock that projects 2 feet on the east side, and is at same elevation as station.

East Tank 1948 is a green, wooden, water tank, 17.8 feet in diameter and 13-1/2 feet high.

West Tank 1948 is a green, wooden, water tank, 17.8 feet in diameter and 13-1/2 feet high.

NOTE: The 1967 distance and direction to the tanks is considered the most accurate because the exact centers were determined by shooting both sides of the tanks.

*Name of chief of party should be inserted here. The officer who actually visited the station should sign his name at the end of the recovery note.

NOTE - One of these forms must be used for every station recovered.

USCOMM-DC 27173-PSS

JUN 1978
 U. S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151554 STATION 1056
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

Form 526
 (11-8-65)

U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
 RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PUU KA PELE
 ESTABLISHED BY: HGS YEAR: 1882 STATE: Hawaii
 RECOVERED BY: Y Yamamoto YEAR: 1955 COUNTY: Hawaii
 USGS

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:
 The old mark, drill-hole and triangle cut in lava rock was found in place but could not be made certain whether it was in its original position. The rock was removed and the new station was placed directly over the old mark. New description as follows:

Located about 7.3 mi. W Pōhakuākea Hunting Lodge and 5.4 mi. S of Waikīī, at the highest point on the W rim of a cinder hill known as Puu Ka Pele. To reach from Hilo Post Office, drive W for 37.1 mi. along the Saddle Rd to gravel rd. leading S toward Puu Ka Pele; turn S 2.0 mi. to foot of cinder hill. Leave truck and climb to top of W rim of hill and station.
 Station mark: Standard USGS tablet stamped "PUU KA PELE 1955" cemented on top of a 2 1/2 in. pipe driven into ground directly over old mark.
 Reference mark No. 1: Standard reference mark tablet stamped "1 1955" cemented in lava rock, 29.2 ft. from station mark and 0.3 ft. lower in azimuth 231° 33'.
 Reference mark No. 2: Standard reference mark tablet stamped "2 1955" cemented in lava rock, 41.50 ft from station mark and 2.2 ft lower in azimuth 355° 51'.

* Name of chief of party should be inserted here. The officer who actually visited the station should sign his name at the end of the recovery note.
 Note.—One of these forms must be used for every station recovered.

Coast-DC 34314

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU KA PELE
 STATE: HAWAII YEAR: 1882 THIRD ORDER

SOURCE: G-SP156

GEODETIC LATITUDE:	19° 46' 15.350	ELEVATION:	METERS
GEODETIC LONGITUDE:	155° 38' 18.893		FEET

STATE COORDINATES (FZ-1)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE*
HI 1	5101	452,353.12	340,299.92	- 0 02' 49"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE β OR Δ OR FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE

QD 245

JUN 1978
 U. S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1057
 HAWAII
 LATITUDE 19 ° 30' TO 20 ° 00'
 LONGITUDE 155 ° 30' TO 156 ° 00'
 DIAGRAM NE 5-1.5 HAWAII

NO TEXT

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION PUU KEA
 STATE HAWAII YEAR 1882 THIRD ORDER

SOURCE G-SP156

GEODETIC LATITUDE:	19 45 48.826	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 37 37.516		FEET

STATE COORDINATES (Fvt)				
STATE & ZONE	CODE	X	Y	μ OR Δ OR ANGLE *
HI 1	5101	456,302.99	337,822.88	- 0 02 35

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE μ OR Δ OR α FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE

00 246

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1058
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

DESCRIPTION OF TRIANGULATION STATION

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 Form 535
 Rev. Aug. 1969

NAME OF STATION: **PUU KUAINIHO** STATE: **HAWAII** COUNTY: **WAIMEA**

CHIEF OF PARTY: **L. G. WILDER** YEAR: **1948** Described by: **G. J. HOEPEL**
 NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK **1.8** METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.

NOTE*	Surface-station mark, Underground-station mark	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	DISTANCE		DIRECTION†		
			feet	meters	°	'	"
	WEST PUU WAAWAA				00	00	00
12c	R. M. No. 1	NW	13.294	4.053	97	21	56
12c	R. M. No. 2	SE	12.188	3.715	273	46	44

The station is located on the summit of a low volcanic knoll, named Kuainiho, which is about 15 miles southwest of Waimea, about 8 miles west of Waikii, about 6 miles northeast of the Puu Waawaa Ranch, and about 0.2 mile south of the road which runs between Waimea and Kona District.

To reach from the post office in Waimea; go south, on the road which leads toward the Kona district, for 6.4 miles; continue straight ahead, on the road which leads toward the Kona District, for 9.5 miles to the end of truck travel at the northern slope of the low knoll. From this point pack southerly for about 0.2 mile to the summit and the station.

The station is a standard disk, stamped PUU KUAINIHO 1948, set into a drill hole in a boulder which projects about 2 inches.

Reference mark number 1 is a standard disk, stamped PUU KUAINIHO NO 1 1948, set into a drill hole in a boulder which projects about 2 feet and is about 2 feet higher than the station.

Reference mark number 2 is a standard disk, stamped PUU KUAINIHO NO 2 1948, set into a drill hole in a boulder which is flush with the ground and is about 1 foot higher than the station.

Detailed description:

* Refer to notes in manuals of triangulation and state publications of triangulation. † Direction—angle measured clockwise, referred to initial station.
 (To nearest meter only, when no trigonometric leveling is being done.)

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **PUU KUAINIHO**
 STATE: **HAWAII** YEAR: **1948** SECOND ORDER

SOURCE **G- 9279**

GEODETIC LATITUDE	19° 50' 22.722	ELEVATION	827.8 METERS
GEODETIC LONGITUDE	155° 46' 18.656		2716 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	PLANE AZIMUTH ANGLE*
HI 1	5101	406,573.45	365,512.00	- 0 05 32

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE PLANE AZIMUTH FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
KEAMUKU	284 33 32.9	284 39 05	5101

QE 041

JUN 1978
 U. S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1059
 HAWAII
 LATITUDE 19 ° 30' TO 20 ° 00'
 LONGITUDE 155 ° 30' TO 156 ° 00'
 DIAGRAM NE 5-1.5 HAWAII

NO TEXT

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU LOA 2

STATE: HAWAII

YEAR: 1883

THIRD

ORDER

SOURCE: G-SP156

GEODETIC LATITUDE:	19 33 27.667	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 56 44.661		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	# OR Δ or ANGLE *
HI 1	5101	346,543.22	263,240.29	- 0 08 57 "

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE # OR Δ or FORMULA NEGLECTING THE SECOND TERM

TO STATION OR OBJECT	GEODETIC AZIMUTH (from south)	PLANE AZIMUTH* (from south)	CODE

QQ 255

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1060
 HAWAII
 LATITUDE 19 ° 33' TO 20 ° 00'
 LONGITUDE 155 ° 30' TO 156 ° 00'
 DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

Puu Ohau (Hawaii Island, Hawaiian Government Survey, 1883; T. J. Maher, 1928).—On west coast of Hawaii, Kona District, on Puu Ohau, a conspicuous hill about 1½ miles north of Kealekekua Bay, 305 meters from the sea. There is an ancient stone platform about 5 meters west of the station, and across a deep volcanic pit, on opposite side of rim but much lower, is a tomb of white mortar. It bears S. 30° W. from station, distant 150 meters. Care must be taken not to mistake tomb for cairn, painted white, which was left over station (1913). Station marked by earthenware bottle 2 feet below surface of ground. Surface mark is stone marked with triangle, while three stones marked with crosses are each 0.76 meter (2.5 feet) from station. In 1928 surface and witness marks found as described; subsurface mark not investigated. Additional witness marks established as follows: Cross cut in large boulder, distant 3.9 meters (13 feet), on bearing N. 30° W. (mag.); triangle blazed on tree, distant 11.2 meters, (37 feet), on bearing S. 41° E. (mag.). Station may be reached over lava trail from Cooks Monument. In smooth weather landing may be made at base of Puu Ohau in small bight, on shore of which is a shack.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 5308

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **PUU OHAU**
 ESTABLISHED BY **Hawaiian Govt.** YEAR: **1883** STATE: **HAWAII**
 RECOVERED BY: **L. C. Wilder** YEAR: **1948** COUNTY: **HAWAII**

Detailed statement as to the fitness of the original description: A 2 1/2 inch pipe was found projecting from the top of a square concrete platform and was used as the station. One reference mark was established for this station. A new description follows—
 The station is located on the boundary line of the North and South Kona Districts and on the summit of a prominent volcanic knoll, about 200 feet high, which lies about 4 miles south of Keauhou Bay, about 3 miles north of Kealakekua Bay, about 2.5 miles west of Kealakekua, about 0.4 mile north of a small beach shack, about 300 meters east of the beach and 20 feet east of an old stone platform.

To reach from the post office in Kealakekua; go south, on the road which leads toward Captain Cook, for 0.4 mile; turn right, pass through a board gate, and follow a track road, westerly, for 0.5 mile; pass to the south of a house; pass through the most westerly of two gates and follow a dim track road westerly for 0.7 mile; pass through a board gate, cross over the old railroad grade and continue westerly for 0.6 mile; pass through a gate in a rock wall and continue westerly for 0.2 mile; pass through a gate, which lies just east of a cactus patch, turn right and follow a track road north and west for 0.7 mile; take the right hand fork and go northerly, on a narrow, brush covered, road for 0.3 mile to the end of truck travel. From this point pack west and north, up the gentle slope, for about 0.2 mile to

*Name of chief of party should be inserted here. The officer who actually visited the station should sign his name at the end of the recovery note.
 U. S. GOVERNMENT PRINTING OFFICE Note.—One of these forms must be used for every station recovered.

H-2518-2

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **PUU OHAU**
 STATE: **HAWAII** YEAR: **1883** SECOND ORDER
 SOURCE: **G- 9279**

GEODETIC LATITUDE	19 30 52.527	ELEVATION	70.1 METERS
GEODETIC LONGITUDE	155 57 20.844		230 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	# OR Δ " ANGLE "
Hi 1	5101	343,041.28	247,599.16	- 0 09 08

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE # OR Δ " FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
KEAUHOU COAST	162 46 19.5	162 55 28	5101

QE 054

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1060
 LATITUDE ° ' TO ° '
 LONGITUDE ° ' TO ° '
 DIAGRAM

PUU OHAU (continued)

the highest ground and the station.

The station is the center of a 2 1/2 inch iron pipe which projects 2 1/2 feet from the top of a square concrete platform which is about 6 feet on each side. The concrete platform projects about 1 foot above the ground.

Reference mark number 1 is a standard disk, stamped PUU OHAU 1 1948, set into a mound of concrete on the top of a boulder which is about 4 feet in diameter and projects about 3 feet. It is located 12 feet north of the crest of the craters rim and is about the same elevation as the station.

Object	Distance	Direction
		00 00 00
KEAUHOU COAST		51 10 10.7
Kainaliu Spire (St. Pauls Church)	3 miles NE	118 29 27
R. M. No. 1 E	44.085 ft 13.438 m	

The following reported by Chas. L. Murray, Sr. Cadastral Engineer, Hawaii Territory Survey: The old mark a drill hole in a triangle cut in a set-stone was recovered by the H. T. S. in 1928. A 2 1/2 inch pipe was set in concrete and centered over the old mark.

FORM 526a
 10-18-59

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY
RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUU OHAU STATE: Hawaii
 ESTABLISHED BY: HGS YEAR: 1883 COUNTY: Hawaii
 RECOVERED BY: R. C. Munson YEAR: 1968 Island: Hawaii

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KEAUHOU COAST	1948 DISTANCE			00 00 00.0
R.M. No. 1	E	44.083	13.438	118 29 27
KEAUHOU COAST 1948	1968 DISTANCE			00 00 00.0
R.M. No. 2	N	9.596	2.925	11 59 38
Kainaliu, Lanakila Church, spire	ENE			62 02 30.9
Kealakekua, Radio KONA, mast	ENE			98 13 35.2
R.M. No. 1	ESE	44.100	13.441	118 30 26

Station mark and reference mark number one were recovered in good condition. A new reference mark, No. 2, was established. A complete description follows:

Station is located about 9 miles south-southeast of Kailua, 2 miles west of Kealakekua, on the North Kona-South Kona Boundary, and on the north rim of Puu Ohau, a timbered hill of about 230 feet elevation.

To reach station from the post office in Kealakekua, go south on State Highway 11 for 0.75 mile to power pole 135. Turn sharp right and go down

grade on macadam track road for 0.3 mile to board gate on left. Pass through gate and go 0.15 mile to locked board gate. Pass through gate and continue on field road for 0.65 mile to gate. Pass through gate, take left fork, and go 0.25 mile to fork. Take left fork for 30 yards to gate; pass through gate and go 0.55 mile to gate; pass through gate and go 0.3 mile to gate in stone wall. Pass through gate then turn right and go along wall for 0.25 mile to locked gate; pass through gate, then through gate in opposite stone wall, and go left, downgrade, for 0.5 mile to crossroad. Continue ahead for 0.35 mile to 3-way fork; take extreme left fork and go 0.15 mile to end of truck travel. Pack southeast up hill about 200 yards to station. (Key for locked gates was obtained at Greenwell Ranch office in Kealakekua).

Station is marked by a 1-inch-drill hole in a stone at the bottom of a 6 x 30-inch recess 7 inches deep, in the center of a 6-foot-square, concrete platform. At center of platform is a square concrete pier, 2 feet high, which supports a red and white target 8 feet tall.

Reference mark number one is a standard disk stamped "PUU OHAU 1 1948", cemented in a drill hole in the top of a bedrock ledge projecting 2 feet above ground, and is about 6 inches higher than station mark.

Reference mark number two is a standard disk stamped "PUU OHAU HGS 1883 NO 2 1968", cemented in a drill hole in bedrock projecting 6 inches from ground. It is about 6 inches lower than station mark.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUU OHAU STATE: Hawaii BENCH MARK(S) ALSO
 ESTABLISHED BY: HGS YEAR: 1883 COUNTY: Hawaii
 RECOVERED BY: GE YEAR: 1972
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

Detailed statement as to the fitness of the original description, including marks found, stampings, changes made, and other pertinent facts:

Station mark and Reference marks 1 and 2 were recovered as described by R. C. Munson (1968) in good condition.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1061
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1,5 HAWAII

Puu Pa (Hawaii Island, Hawaiian Government Survey, 1873).—In the northern part of Hawaii, on hill of same name, 3 miles southwest of Waimea village. Station is on west summit of hill and is marked by a granite post.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM NO. 508

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PUU PA
 ESTABLISHED BY: Haw. Govt. Survey YEAR: 1873 STATE: HAWAII
 RECOVERED BY: L. C. Wilder YEAR: 1948 COUNTY: HAWAII

Detailed statement as to the fitness of the original description: The station was recovered in good condition. The station mark is a U. S. Geological Survey bronze disk and not a granite post as described in the 1873 description. A new description follows—

The station is the center of a U. S. Geological Survey bronze disk set into concrete and surrounded by a 5 x 5 foot slab of concrete which projects 1 foot. A frustum of a pyramid, constructed of concrete, having a base of 18 inches and a top of 12 inches and having a 2.5 inch pipe running through its length is centered over the station mark.

The station is located on the west summit of a volcanic knoll known as Pu Pa and is about 4 miles southwest of Waimea.

To reach from the post office in Waimea; go south on the road which leads toward Kona for 2.2 miles to telephone pole number 862; turn right, onto a track road, and go westerly for 1.5 miles; take the right hand fork and follow the main traveled road west for 0.6 mile to the high ground and the station.

Reference mark number 1 is a standard disk, stamped 1 1948, set into a drill hole in a boulder which projects about 2 inches and is about 4 feet lower than the station.

OBJECT	DISTANCE	DIRECTION
HOLOHOLOKU R. M. No. 1 N	19.409 m 63.675 ft	00 00 00 297 28 33

An early recovery note reports; Original station recovered by C.H. Birdseye in September 1911. Remarkd by bronze tablet stamped 2677, centered over old mark.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU PA
 STATE: HAWAII YEAR: 1873 SECOND ORDER

SOURCE G- 9279

GEODETIC LATITUDE: 19 59 34.521	ELEVATION: 612.8 METERS
GEODETIC LONGITUDE: 155 42 24.877	2667 FEET

STATE COORDINATES (FTH)				
STATE & ZONE	CODE	X	Y	B OR Δ ANGL *
HI 1	5101	428,959.56	421,146.16	- 0 04 15 *

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE B OR Δ FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
HOKUULA 2 USGS	207 45 02.2	207 49 17	5101

QE 034

JUN 1978
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 191554

STATION 1061

LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

PUU PA (continued)

FORM 526a
(6-10-59)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY
RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PUU PA
ESTABLISHED BY: HGS YEAR: 1873 STATE: Hawaii
RECOVERED BY: D.M. Whipp YEAR: 1967 COUNTY: Hawaii
Island: Hawaii

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.72 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN
FROM THE GROUND AT THE STATION

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
HOKUULA 2 (USGS)-----1948	DISTANCE			00 00 00.0
R.M. No. 1	N	63.675	19.409	12 47 49
HOKUULA 2 (USGS) 1948----1967	DISTANCE			00 00 00.0
R.M. No. 1	NE	63.628	19.394	12 46 52
Kamuela Airport, VOR	ENE			48 04 29.3
R.M. No. 2	SSW	51.477	15.690	165 07 30

Station mark and reference mark number one were recovered in good condition. A new reference mark was established. A complete description follows:

Station is located about 3 miles southwest of Kamuela and 2 miles west-southwest of the Kamuela Airport, on the highest point of a prominent grassy hill of about 2667 feet elevation.

To reach station from the post office in Kamuela, go south on State Highway 19 for 2.1 miles to track side road right, at telephone pole 862. Go right for 0.05 mile; take left fork and go 0.1 mile to board gate.

Pass through gate and continue for 1.6 miles; leave track road and go right, up along gradual ridge, for 0.6 mile to highest point and station.

Station mark is a USGS disk, unstamped, set in concrete 6 inches below the top of a 6 x 6-foot, concrete platform that projects 16 inches above ground. A truncated, concrete pyramid, 2 feet high, is at center of platform and supports a red and white metal target. Station mark is in the bottom of an 8 x 30-inch recess in center of platform.

Reference mark number one is a standard disk stamped "1 1948", cemented in a drill hole in a 20-inch, triangular, red boulder projecting 4 inches above ground, and is 5.1 feet lower than station mark.

Reference mark number two is a standard disk stamped "PUU PA HGS 1873 NO 2 1967", cemented in a drill hole in a small bedrock outcrop that projects 3 inches above ground, and is 4.5 feet lower than station mark.

*Name of chief of party should be inserted here. The officer who actually visited the station should sign his name at the end of the recovery note.

NOTE - One of these forms must be used for every station recovered.

USC&GSMC-DC 37179-P89

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191554 STATION 1062
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 532
 REV. AUG. 1948

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: PUU PANINI (HTS) State: HAWAII County: NORTH KONA DISTRICT HAWAII

CHIEF OF PARTY: L. G. WILDER	Year: 1948	Described by: G. J. HOEPEL		
NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK 1.6 METERS.†	HEIGHT OF LIGHT ABOVE STATION MARK	METERS.		
Surface-station mark, Underground-station mark	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
OBJECT	BEARING	DISTANCE		DIRECTION: ° ' "
		feet	meters	
PUU WAAWAA WEST KAUPULEHU FLOW (cabin & pole) ANAHULU				00 00 00 75 01 39.3 188 23 29.7

The station is located on the crest of a long, grassy, north-west-southeast ridge which lies about 10 miles north of Hualalai Volcano, about 10 miles east of Kakapa Bay, about 5 miles southeast of Kihole Bay, about 1 mile west of Anahulu Homesteads, about 0.4 mile southeast of a grove of trees and 14.5 feet west of a wire fence. Land to the east is under cultivation. Land to the west drops off sharply and is mostly barren lava beds.

The station is the center of a 2 1/2 inch iron pipe which projects about 2 feet from the top of a triangular slab of concrete which is about 6 feet on each side and is flush with the surface of the ground.

To reach from the post office in Waimea; go south on the road which leads toward Kailua for 6.4 miles; continue straight ahead, toward Kailua for 14.8 miles to the village of Puu Anahulu Homesteads; turn right, off the highway, pass through a basketball court and go westerly for about 100 yards; pass through a board gate and follow a field road, northwesterly, for 0.2 mile, pass through a board gate and continue northwesterly for 0.35 mile; turn left, pass through a board gate, and go across country, southwesterly, for 0.15 mile; pass through a board gate and go southwesterly, up a steep grade for about 100 yards to the crest of the ridge and the station.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU PANINI HTS
 STATE: HAWAII YEAR: 1948 SECOND ORDER

SOURCE G- 9279

GEODETIC LATITUDE	19 45 15.583	ELEVATION	690.6 METERS
GEODETIC LONGITUDE	155 51 11.300		2266 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	PLANE AZIMUTH ANGLE*
HI 1	5101	378,622.10	358,790.69	- 0 07 11

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE $\theta = \theta_0 + \Delta \theta$ FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PUU WAAWAA WEST	343 00 39.1	343 07 50	5101

* Refer to notes in manuals of triangulation and state publications of triangulation. † Direction-angle measured clockwise, referred to initial station.
 ‡ To nearest meter only, when no trigonometric leveling is being done. 16-50870-1 U. S. GOVERNMENT PRINTING OFFICE

JUN 1978
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 191554

STATION 1062

LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

PUU PANINI (HTS)(continued)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUU PANINI (HTS)
ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii BENCH MARK(S) ALSO
RECOVERED BY: D.M. Whipp YEAR: 1967 COUNTY: Hawaii
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Island: Hawaii

R

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:

Station is recovered in good condition. A complete description follows:

Station is located about 15-1/2 miles northeast of Kailua, 5 miles southeast of Kiholo Bay, and 1/2-mile northwest of State Highway 19, at about 2265 feet elevation, on the crest of a narrow, grassy ridge running northwest-southeast, on the west boundary of the Puu Anahulu Homestead land. The ridge has scattered silk oak trees along the west side.

To reach station from the post office in Kamuela, go south and southwest on State Highway 19 for 20.8 miles to side road right, just before long left curve of highway, at power pole 195X. Turn right, then take left fork and go 0.05 mile to a board gate. Pass through gate and go 0.2 mile to 2 gates 40 yards apart. Pass through both gates and continue for 0.3 mile to board gate on left, by trees. Pass through gate and follow westerly along left side of fence for 0.1 mile to base of steep ridge and end of truck travel. Pack uphill about 100 yards to a narrow gate in fence, and station just beyond.

Station is the center of a 2-1/2-inch, iron pipe projecting 2 feet from the center of a triangular, concrete platform about 7 feet on each side and projecting 3 inches from ground. It is 15.4 feet west-southwest of the fence line and 18.7 feet west-northwest of a T-junction of fence lines. A red and white metal target, 9 feet tall, is mounted in the station pipe.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151554 STATION 1063
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1,5 HAWAII

U. S. DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 535
 Rev. Aug. 1949

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: PUU WAAWAA WEST STATE: HAWAII COUNTY: HAWAII

CHIEF OF PARTY: L. C. Wilder YEAR: 1948 Described by: C. L. Murray

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK METERS.†	HEIGHT OF LIGHT ABOVE STATION MARK METERS.	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
			BEARING	DISTANCE		DIRECTION‡
	Surface-station mark, Underground-station mark		feet	meters		
	ANAHULU				0 00 00	
	R. M. No. 1 N		17.30	5.270	19 41 26.6	
	R. M. No. 2 NE		17.79	5.422	73 49 12.7	

A new station established by the U.S.C. & G.S. in 1948. It is located on the western side of the Island of Hawaii in Puu Waawaa and about ten miles inland from the sea. The station is situated on the highest part of the fairly flat western rim of Puu Waawaa, an old extinct crescent shaped crater. The hill is very prominent and is about a mile in diameter at its base. The west slope of the hill is quite heavily wooded and the many gullies give the hill a corrugated appearance.

The station mark is a standard disk set on the top of a 2 1/2 inch pipe three feet long filled with cement and driven firmly in the ground. The disk is flush with the surface of the ground.

The two reference marks are similarly set as the station mark and are at about the same elevation.

To reach the station from Kamuela proceed along the road to Kona a distance of about 22 miles to the side road leading up to Puu Waawaa Ranch House which is located about two miles above the main government road. The ranch house is situated at the westerly foot of Puu Waawaa hill. From the ranch house the station is best reached by following a track road near the foot of the northerly slopes of the hill to the foot of the easterly rim of the crater. Follow up the east rim to the station. A jeep or high powered truck can make the ascent along the crater rim.

* Refer to notes in manuals of triangulation and state publications of triangulation. † Direction-angle measured clockwise, referred to initial station.
 ‡ To nearest meter only, when no trigonometric leveling is being done. 16-56882-1 U. S. GOVERNMENT PRINTING OFFICE

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU WAAWAA WEST

STATE: HAWAII

YEAR: 1948

SECOND

ORDER

SOURCE: G- 9275

GEODETIC LATITUDE: 19° 46' 20.915	ELEVATION: 1209.0 METERS
GEODETIC LONGITUDE: 155° 50' 14.933	3566 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ or ANGL [†]
HI 1	5101	583,968.66	341,156.18	- 0 06 51

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ OR Δ or ANGL[†] FORMULA NEGLECTING THE SECOND TERM

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PUU HINAI	202 05 11.6	202 12 03	5101

QE 039

HORIZONTAL CONTROL DATA

QUAD 191554 STATION 1063

PUU WAAWAA WEST (continued)

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

LATITUDE ° ' TO ° '
 LONGITUDE ° ' TO ° '
 DIAGRAM

FORM 526a
 (9-19-69)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PUU WAAWAA WEST
 ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii
 RECOVERED BY: D.M. Whipp YEAR: 1967 COUNTY: Hawaii
 Island: Hawaii

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.5 METERS, HEIGHT OF LIGHT ABOVE STATION MARK METERS.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
PUU HINAI (HTS) 1938	-----1948	DISTANCE and DIRECTION-----		00 00 00.0
R.M. No. 2		17.79	5.422	38 09 29
R.M. No. 1		17.30	5.270	344 01 43
PUU HINAI (HTS) 1938	-----1967	DISTANCE and DIRECTION-----		00 00 00.0
R.M. No. 2		17.791	5.423	38 08 20
ANAHULU (HGS) 1882				324 20 15.4
R.M. No. 1	N	17.275	5.266	344 01 48

Station was recovered and all marks found in good condition. A complete description follows:

Station is located about 21 miles southwest of Kamuela, 11 miles north-east of Honokahau, and 2-1/2 miles south-southeast of State Highway 19, at about 3967 feet elevation, on the southwest side, and highest point, of Puu Waawaa, a prominent, timbered, extinct crater. Station WAAWAA (HGS) 1882 is on the northeast point of the rim and has a red and white metal target on it.

To reach station from the post office in Kamuela, go southerly on State Highway 19 for 21.5 miles to the Puu Waawaa Ranch gate on left. Go left for 2.0 miles to ranch headquarters buildings on right. (Permission to be on the ranch property was obtained here). Pass through board gate with sign "SMALL PALOA" and follow track road 0.15 mile; pass through gate and go upgrade 0.15 mile; take left fork, go 30 yards, then take right fork, and go 0.25 mile; pass through gate and continue for 0.25 mile; take right fork and go 0.2 mile; pass through gate and go 0.4 mile to gate on left. Pass through gate and go along fence for 0.1 mile; pass through board gate at orchard corner and go right, along base of hill, for 0.8 mile to gate on left in lane, at east side of hill. Go left, through gate and up lane for 0.45 mile to top of grade. Go left for 60 yards; pass through gate and go uphill through trees for 0.2 mile to top and station.

Station mark is a standard disk stamped "PUU WAAWAA WEST 1948", set in the top of an iron pipe flush with ground. It is at west end of hilltop, in the middle of a 12-foot-square, board fence and 2.6 feet northwest of a white witness post.

Reference mark number one is a standard disk stamped "PUU WAAWAA WEST 1 1948", set in the top of an iron pipe flush with ground, at about same elevation as station.

Reference mark number two is a standard disk stamped "PUU WAAWAA WEST 2 1948", set in the top of an iron pipe flush with ground and at about same elevation as station mark.

Distance between reference marks is 15.85 feet.

NOTE: All marks become hidden by the tall, heavy grass.

*Name of chief of party should be inserted here. The officer who actually visited the station should sign his name at the end of the recovery note.

NOTE - One of these forms must be used for every station recovered.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1065
 HAWAII
 LATITUDE 19 °30' TO 20 °30'
 LONGITUDE 155 °30' TO 156 °00'
 DIAGRAM NE 5-1.5 HAWAII

Square (Hawaii Island, T. J. Maher, 1928).—On west coast of Hawaii Island, in Kona District, west of Kailua Bay. Situated close to the main government road, station is gable at south end of shed or covering for water tanks, which appears as a long wooden barnlike structure.

RECOVERY NOTE, TRIANGULATION STATION
 INTERSECTION

NAME OF STATION: **Square**
 ESTABLISHED BY: **T.J. Maher** YEAR: **1928** STATE: **Hawaii** BENCHMARK(S) ALSO
 RECOVERED BY: **D.M. Whipp** YEAR: **1967** COUNTY: **Hawaii**
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: **Island: Hawaii**

R

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:

Station was recovered. Located 3 miles east of Kailua and 1 mile north of Holualoa, on hillside on east side of State Highway 18, at east side of two large, green, water tanks, and across highway from triangulation station WAIAHA 1948.

Station is the gable at south end of a very large, weathered wooden building with a rusted, corrugated iron roof, that houses some water tanks (no longer used).

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **SQUARE**
 STATE: **HAWAII** YEAR: **1928** ORDER: **THIRD**
 SOURCE: **G- 556**

GEODETIC LATITUDE	19 38 10.623	ELEVATION	METERS
GEODETIC LONGITUDE	155 57 03.014		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	σ (R.A.) ANGLE °
HI 1	5101	344,863.39	291,789.18	- 0 09 05

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE σ (R.A.) ° FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 151554 STATION 1066
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 30'
 DIAGRAM NE 5-1,5 HAWAII

Target (Hawaii Island, T. J. Maher, 1928).—On western coast of Hawaii Island, on south side of entrance to Keauhou Bay and to the southward of station *Point* on low lava point. Marked by the Territorial Survey with cement base with piece of 1/2-inch galvanized iron pipe projecting above its top. Further description may be obtained from Territorial Survey.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **TARGET**
 ESTABLISHED BY: **T.J. Maher** YEAR: **1928** STATE: **Hawaii** BENCH MARK(S) ALSO
 RECOVERED BY: **R.C. Munson** YEAR: **1968** COUNTY: **Hawaii**
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: **Island: Hawaii**

R

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **TARGET**
 STATE: **HAWAII** YEAR: **1928** **THIRD** ORDER

SOURCE: **G- 55c**

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:

Station was recovered by inverse from station KEAUHOU COAST 1948 and found to be marked by a 1-inch-square chiseled hole 1 inch deep, in bed-rock, with a 3-foot cairn over it, instead of being marked by a 1/2-inch pipe in concrete, as previously described.

Located about 6 miles south of Kailua, 3 miles northwest of Kainaliu and 591.35 feet northeast of station KEAUHOU COAST 1948, on the southwest end of a low, bare, black lava hogback ridge setting between two fairways of a golf course, 290 feet northeast of the 3rd hole.

Listed below is a comparison of the inverse angle and distance from KEAUHOU COAST.

Instrument set over KEAUHOU COAST:			
PUU OHAU (HGS) 1883	00	00	00.0
Computed angle -- TARGET	230	59	32.8
Observed angle -- TARGET	230	59	30.0
Computed distance - 591.2 ft.	Taped distance 591.35 ft.		

GEODETIC LATITUDE:	19 33 28.265	ELEVATION:	5	METERS
GEODETIC LONGITUDE:	155 58 06.752	SCALED		FEET

STATE COORDINATES (FWS)				
STATE & ZONE	CODE	X	Y	θ OR Δ ANGLE*
HI 1	5101	338,652.75	263,321.59	- 0° 05' 25"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ OR Δ FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

151554 STATION 1067
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

RECOVERY NOTE, TRIANGULATION STATION

R

U. S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY
 FORM 536

NAME OF STATION: **Waawaa** STATE: **Hawaii** COUNTY: **Hawaii**
 ESTABLISHED BY: **H.G.S.** YEAR: **1882** LOCALITY: **Puuwaawaa Ranch, N. Kona, Hawaii**
 RECOVERED BY: **Chas.L.Murray** YEAR: **1938**

Detailed statement as to the fitness of the original description:

Location of station: In the westerly portion of Hawaii on the northerly crater rim (a little below the highest point) of Puuwaawaa Hill.

Old station mark found: Δ cut in large stone buried 3 feet in ground. Only one old tie mark could be found but same appeared to have been disturbed.

New station mark: H.T.S. Type D-1 monument (Triangular concrete monument 7 1/2 feet on each side with 1 7/8 steel bar 2 feet long set on steel legs over the station mark which is left exposed to view. A standard metal target is set over the steel bar).

U. S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY
 FORM 536

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: **WAAWAA**
 ESTABLISHED BY: **Haw. Govt. Survey** YEAR: **1882** STATE: **HAWAII**
 RECOVERED BY: **L. C. Wilder** YEAR: **1948** COUNTY: **HAWAII**

Detailed statement as to the fitness of the original description:

The Hawaii Territory Survey monumented this station in 1938 with a concrete platform, metal pole and target, plumbed over the mark that was then found.

Their recovery note states "Old mark found, a triangle cut in large stone buried 3' in ground. The only one old tie mark could be found but same appeared to have been disturbed".

Located on the northerly crater rim (somewhat below the highest point) of Puu Waawaa hill. A jeep can be driven to the top by going around to the south side. Inquire at Puu Waawaa Ranch as permission must be obtained to enter property.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: **WAAWAA**
 ESTABLISHED BY: **HGS** YEAR: **1882** STATE: **Hawaii** BENCH MARK(S) ALSO
 RECOVERED BY: **D.M. Whipp** YEAR: **1967** COUNTY: **Hawaii**
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: **Island: Hawaii**

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:

Station was recovered in good condition. Located about 21 miles southwest of Kamuela, 11 miles northeast of Honokahau and 2-1/2 miles south-southeast of State Highway 19, at about 3820 feet elevation on the northeast rim of Puu Waawaa, a prominent, timbered, extinct crater.

To reach station from the post office in Kamuela, go southerly on State Highway 19 for 21.5 miles to the Puu Waawaa Ranch gate on left. Turn left and go 2.0 miles to ranch headquarters buildings on right. From here follow track roads around west and south side of hill for 2.1 miles; go left through gate and up lane for 0.45 mile to top of grade. Turn right, through 2 metal gates in T-fence corner, and go upgrade along right side of fence for about 200 yards to top and station.

Station is marked by the center of a 1-1/8-inch steel bar 2 feet long mounted on 3 iron legs, at the center of a triangular, concrete platform 7 feet on each side and flush with ground. A red and white metal target, 8 feet high, is mounted on the steel bar.

FORM C&GS-526 (11-65)
 USCOMM-DC 18509-P63

U. S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **WAAWAA**
 STATE: **HAWAII** YEAR: **1882** THIRD ORDER

SOURCE: **G-SP156**

GEODETIC LATITUDE	19 46 31.796	ELEVATION	METERS
GEODETIC LONGITUDE	155 50 01.459		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ FOR Δ OR ANGLE
HI 1	5101	385,257.66	342,254.30	- 0 06 47

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE $\theta = \Delta$ FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE

00 247

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151554 STATION 1068
 HAWAII
 LATITUDE 15° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1,5 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 538
 Rev. Aug. 1965

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **WAIAHA** STATE: **HAWAII** COUNTY: **NORTH KONA DISTRICT HAWAII**

CHIEF OF PARTY: **L. C. WILDER** YEAR: **1948** Described by: **G. J. HOEPEL**

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK METERS.†	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	HEIGHT OF LIGHT ABOVE STATION MARK METERS.	
			feet	meters
4	Surface-station mark, Underground-station mark			
12c	KAHELO (metal target)			00 00 00
		R. M. 1	NE 18.159	5.535 130 25 05
		R. M. 2	E 14.871	4.534 178 26 26

Detailed description:
 The station is located on open grassy ground about 4 miles south of Honokohau, about 3 miles east southeast of Kailua, about 1 mile north of Holualoa, about 0.1 mile south of Waiaha Stream, 150 feet north of a house having a pyramid shaped roof, 125 feet west of the centerline of the highway which runs between Holualoa and Honokohau, 47.2 feet northeast of the closest edge of a wooden water tank, 32 feet south of a rock wall and 24 feet south of the center of a track road.

To reach from the road intersection in Holualoa; go north on the road which leads toward Honokohau for 1.65 miles; turn left, onto a track road and go westerly for 125 feet to the station on the left hand side of the road.

The station is a standard disk, stamped WAIAHA 1948, set into a drill hole in a boulder which projects about 8 inches.

Reference mark number 1 is a standard disk, stamped WAIAHA 1948, set into a mound of concrete on the top of a boulder which projects about 1 foot and is about 1 foot lower than the station.

Reference mark number 2 is a standard disk, stamped WAIAHA 2 1948, set into a mound of concrete on the top of a boulder which projects about 1 foot and is about 1 foot higher than the station.

No azimuth mark was established for this station.

Form 538
 (11-8-65)

U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
 RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: **WAIAHA**
 ESTABLISHED BY: **L.C.W.** YEAR: **1948** STATE: **Hawaii**
 RECOVERED BY: **E.P.C.** YEAR: **1964** COUNTY: **Hawaii**

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:

Station was recovered as described with the exception of direction of wooden water tank. Station is located 47.2 feet NW of the closest edge of the wooden water tank.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **WAIAHA**
 STATE: **HAWAII** YEAR: **1948** SECOND ORDER

SOURCE: **G- 9279**

GEODETIC LATITUDE: 15° 38' 10.275	ELEVATION: 455.3 METERS
GEODETIC LONGITUDE: 155° 57' 07.910	1494 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	8 OR Δ 41
HI 1	5101	344,395.31	291,755.31	- 0 09 07

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE 8 OR Δ 41 FORMULA NEGLECTING THE SECOND TERM

TO STATION OR OBJECT	GEODETIC AZIMUTH (From north)	PLANE AZIMUTH (From north)	CODE
KAHELO	69 03 25.8	69 12 33	5101

QE 154

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1068

LATITUDE ° ' TO ° '
 LONGITUDE ° ' TO ° '
 DIAGRAM

WAIAHA (continued)

FORM 526a
 (8-18-69)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: **WAIAHA**
 ESTABLISHED BY: **L.C. Wilder** YEAR: **1948** STATE: **Hawaii**
 RECOVERED BY: **D.M. Whipp** YEAR: **1967** COUNTY: **Hawaii**
 Island: **Hawaii**

HEIGHT OF TELESCOPE ABOVE STATION MARK **1.5** METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.
 DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KAHELO -----1948 DISTANCE and DIRECTION-----				00 00 00.0
R.M. 1	NE	18.159	5.535	130 25 05
R.M. 2	E	14.871	4.534	178 26 26
KAHELO (HGS) 1882-----1967 DISTANCE and DIRECTION-----				00 00 00.0
Kailua Light, 1957	W			26 24 21.2
R.M. No. 1	NNE	18.159	5.535	130 26 08
R.M. No. 2	ENE	14.832	4.521	178 26 49

All marks were recovered, although the cement around the station disk and RM No. 1 was found to be coming loose from the rock, so they were re-cemented. The wooden tank mentioned in the 1948 description is gone. A witness post was set at station. A complete description follows:

Station is located about 3 miles east of Kailua and 1 mile north of Holualoa, in a brush-covered lot on west side of State Highway 18, just across the highway from 2 very large, green water tanks.

To reach station from the post office in Holualoa, go north on State

Highway 18 for 1.0 mile to track road left, at telephone pole 27, just below the water tanks. Turn left and go along left side of old stone fence for 125 feet to station on left.

Station mark is a standard disk stamped "WAIAHA 1948", cemented in a drill hole in lava bedrock projecting 6 inches above ground. It is 125 feet west of center line of highway, 26 feet south of center line of track road, 33 feet south of the stone fence, 100 feet north of a red-roofed house, 44 feet north of a small, red-roofed out-building by the house, 31 feet north fence-line of yard of the house, and 5 feet south-west of a white witness post.

Reference mark number one is a standard disk stamped "WAIAHA 1 1948", cemented in a drill hole in a bedrock outcrop projecting 2 inches above ground. It is 8-1/2 feet south of center line of track road and at same elevation as station.

Reference mark number two is a standard disk stamped "WAIAHA 2 1948", cemented in a drill hole in a bedrock ledge projecting 1 foot on the west side, and is 1 foot higher than station mark.

NOTE: All marks become covered by the heavy grass and other growth.

*Name of chief of party should be inserted here. The officer who actually visited the station should sign his name at the end of the recovery note.

NOTE - One of these forms must be used for every station recovered.

USCGM-DC 37173-P39

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: **WAIAHA**
 ESTABLISHED BY: **L.C. WILDER** YEAR: **1948** STATE: **Hawaii** BENCH MARK ALSO
 RECOVERED BY: **GEH** YEAR: **1972** COUNTY: **Hawaii**
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: **2.2 NM ESE of Kailua, Kona**
 HEIGHT OF TELESCOPE ABOVE STATION MARK **Tripod** FEET. HEIGHT OF LIGHT ABOVE STATION MARK FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
Kailua, Mokuaikaua Church, Spire, 1913				00 00 00.00
Kailua Light, 1957, 1972	WNW			356 35 51.00
RM 1	ENE	18.20	5.548	100 38 25.4
RM 2	E	14.90	4.54	148 40 08.5

Station mark and Reference marks No. 1 and 2 were recovered in good condition as described by D.M. Whipp (1967).

*Name of chief of party should be inserted here. The person who actually visited the station should sign his name at the end of the recovery note.

FORM C&G-526a (12-68)

U.S. DEPARTMENT OF COMMERCE
 NOAA
 COAST AND GEODETIC SURVEY

JUN 1978
 U. S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191554 STATION 1069
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

SEE STATION PUU IO

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WEST TANK

STATE: HAWAII

YEAR: 1948

THIRD

ORDER

SOURCE: G- 9279

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	19° 59' 04.47	ELEVATION:	1236.9 METERS
GEODETIC LONGITUDE:	155° 34' 03.62		4058 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ FOR Δ θ ANGLE*
HI 1	5101	476,764.27	418,075.42	- 0 01 23

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ FOR Δ θ FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
POSITION DETERMINED BY TRAVERSE FROM STATION PUU IO			
QE 282			