

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1001
 HAWAII
 LATITUDE 15 °30' TO 20 °00'
 LONGITUDE 155 °30' TO 156 °00'
 DIAGRAM NE 51.5 HAWAII

ADJUSTED HORIZONTAL CONTROL DATA

Ahumoa (Hawaii Island, Hawaiian Government Survey, 1882).—In central part of Hawaii, on prominent hill of same name, west of Mauna Kea. Marked by a triangle cut in a large rock *in situ*, with a drill hole 4 1/2 inches deep in its center, in which are a pair of spectacle rims. Three reference crosses were cut in the rock at distances of 4, 5, and 11.2 feet, and a stone cairn was erected over the station, 8 feet in diameter and 6 feet high.

RECOVERY NOTE, TRIANGULATION STATION

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

NAME OF STATION: Ahumoa STATE: Hawaii COUNTY: Hawaii
 ESTABLISHED BY: H.G.S. YEAR: 1882 LOCALITY: Hamakua, Hawaii
 RECOVERED BY: Chas.L.Murray YEAR: 1938

Detailed statement as to the fitness of the original description:

Location of station: On the northerly crater rim of a hill named Ahumoa on the southwesterly slope of Mauna Kea. This hill is about 1 1/2 miles above the Waiki-Hummula road and about 4 miles southwest of Waiki station.

Old station mark found: The original drill hole in center of Δ cut in large rock was found to agree with the old tie marks. A large cairn of rocks was found set over the mark.

New station mark: 2 1/2" pipe 6 feet long set solidly in concrete over the mark. The cairn was rebuilt around this pipe about 6 feet high and 10-feet in diameter and the top of the cairn cemented. Standard H.T.S. metal target used.

RECOVERY NOTE, TRIANGULATION STATION

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

NAME OF STATION: AHUMOA STATE: HAWAII COUNTY: HAWAII
 ESTABLISHED BY: Hawaiian Govt. YEAR: 1882
 RECOVERED BY: L. C. Wilder YEAR: 1948

Detailed statement as to the fitness of the original description:

In 1882 the station was "a triangle cut into a large rock *in situ*, with a drill hole 4 1/2 inches deep in its center, in which are a pair of spectacle rims". In 1938 the original station was reported recovered by the Hawaiian Territory Survey and was reported to agree with the original measurements to the three reference marks established in 1882. Also in 1938 a new station mark, consisting of a 2 1/2 inch pipe set into concrete, was reported to have been centered over the original mark. However, in 1948, the one original reference mark which was recovered failed to check the original measured distance by 0.7 of a foot. A new description follows--

The station is located on the crest of the northwestern rim of a prominent volcanic knoll named Ahumoa which lies about 10 miles west of the summit of Mauna Kea, about 4 miles south southeast of Waiki, about 1.7 miles east of the road which runs between Waimea and Hilo and about 0.2 mile northwest of the highest ground on the hill.

The station is the center of a 2 1/2 inch iron pipe which projects about 2 feet and is set in the top of a triangular slab of concrete which is 7 feet on each side. This slab of concrete is set on the top of a cairn which is about 6 feet in height and is about 10 feet in diameter.

Reference mark number 1 is a standard disk, stamped 1 1948, set in concrete in the top of a 2 1/2 inch iron pipe which projects 6 inches and is about 6 feet lower than the station.

Reference mark number 2 is a cross in a flat rock which is flush with the surface of the ground and is about 6 feet lower than the station.

Object	1948 Distance	1882 Distance	Direction
KEAMUKU			00 00 00
R. M. No. 1 NE	7.012 m (23.005 ft)		133 09 16
R. M. No. 2 SE	3.637 m (11.932 ft)	11.2 ft	233 05 54
PUU HINAI (metal target)			21 19 09.1
NOHONAOHAE (metal target)			49 00 36.6

(continued on next page)

NAME OF STATION: AHUMOA

STATE: HAWAII

YEAR: 1882

SECOND

SOURCE: G- 9279

GEODETIC LATITUDE:	19 °48' 43.996	ELEVATION	2146.4 METERS
GEODETIC LONGITUDE:	155 36 50.702		7042 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE
HI 1	5101	460,786.07	355,490.93	- 0 02 19

* 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
KEAMUKU	99 09 33.9	99 11 53	5101

QE 058

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1001

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

AHUMOA (continued)

FORM 526a
 (8-18-59)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

R

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: AHUMOA
 ESTABLISHED BY: HGS YEAR: 1882 STATE: Hawaii
 RECOVERED BY: D.M. Whipp YEAR: 1967 COUNTY: Hawaii
 Island: Hawaii

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.16 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	
KEAMUKU -----1948	DISTANCE and	DIRECTION-----		00 00 00.0
RM 2 Cross	SE	11.932	3.637	233 05 54
PUU HINAI (metal target)				21 19 09.1
KEAMUKU (HGS) 1882 -----1967	DISTANCE and	DIRECTION-----		00 00 00.0
R.M. No. 3	WNW	8.975	2.736	15 09 22
PUU HINAI (HGS) 1938				21 19 10
R.M. No. 2	E	15.730	4.795	174 17 10
R.M. Cross	SE	11.962	3.646	233 09 43

Station and reference cross were recovered in good condition, although the present distance to the cross does not check the 1948 distance. Reference mark number one has been destroyed. Two new reference marks, number two and three, were established. A complete description follows:

Station is located about 15-1/2 miles south-southeast of Kamuela, 10 miles southeast of the Junction of State Highways 19 and 20, and 2 miles east of the Kilohana Girl Scout Camp, at about 7042 feet elevation, on the north rim of an old crater named Ahumoa, a prominent hill covered with

dense brush. An old quonset building, hidden by high brush, is on the southeast rim and highest point of the hill, at end of track road.

To reach station from the post office in Kamuela, go south on State Highway 19 for 6.5 miles; take left fork and go south on State Highway 20 for 9.9 miles to green board gate on left, 50 yards past Girl Scout Camp. Pass through gate and follow red cinder road for 1.65 miles to fork. Take right fork and go 1.35 miles to end of truck travel at top of grade (0.1 mile before end of road). Pack northeast along rim for about 175 yards to station.

Station is the center of a 2-1/2-inch iron pipe projecting 2 feet from the center of a 4-foot-diameter concrete platform on the top of a very large, prominent, flat-topped cairn 8 feet in diameter and 6 feet high. A red and white metal target sets in the iron pipe and extends 7 feet above platform.

Reference mark number two is a standard disk stamped "AHUMOA HGS 1882 NO 2 1967", cemented in a drill hole in a 16-inch, triangular boulder that projects 6 inches above ground. It is 6.4 feet lower than top of station.

Reference mark number three is a standard disk stamped "AHUMOA HGS 1882 NO 3 1967", cemented in a drill hole in a 20-inch boulder that projects 6 inches above ground. It is 7.7 feet lower than top of station pipe.

Reference Cross is a 4-inch cross, chiseled in the top of a black bedrock outcrop that projects 4 inches above ground. It is 8 inches north of a square iron pin that projects 4 inches above ground, and is 7.4 feet lower than top of station pipe.

*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.

USCOMMA-DC 27178-P89

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

0 191554 STATION 1002
HAWAII
LATITUDE 19 ° 30' TO 20 ° 00'
LONGITUDE 155 ° 30' TO 156 ° 00'
DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

AKAHIPUU (HGS)

(Hawaii Island, Hawaiian Government Survey, T. J. Maher, 1928).—On west coast of Hawaii, in North Kona, northwest of Mount Hualalai, on the sharp, steep hill which rises abruptly, and immediately behind or east of the house of John Maguire (or McGuire), which is on the main Government road about 8 miles from Kailua toward Waimea. This hill is above the main road, and inside the bend where it turns from northeast and southwest to north and south. Station originally marked by a copper triangle, buried, over which was placed a stone marked with a triangle. Three witness stones marked with crosses were placed 10, 19, and 20 feet from the center; the last being the corner of a house foundation. In 1913 the center and first two witness marks were recovered, nothing remaining of the foundation stone. Reference mark No. 1, cross on stone, is 2.94 meters (9.6 feet) from station on bearing N. 65° E. Reference mark No. 2, cross on stone, is 5.83 meters (19.1 feet) from center on bearing S. 65° W. In 1928 station was recovered as described. Subsurface mark not investigated. A standard triangulation disk was cemented in center stone. A standard reference disk was cemented in outcropping rock, 6.1 meters (20 feet) from station in direction of Keahole Point Light. A triangle was blazed on a tree, about 20 feet from ground; tree is inshore from and at lower elevation than station. A large cairn was built over the station. Trees now (1928) cut off lines of sight in all directions except to southward. Mr. Stillman at Maguire's ranch can give full information as to locality.

RECOVERY NOTE, TRIANGULATION STATION

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

NAME OF STATION: AKAHIPUU (HGS)
ESTABLISHED BY T. J. Maher YEAR: 1928 STATE: HAWAII
RECOVERED BY: L. C. Wilder YEAR: 1948 COUNTY: HAWAII

Detailed statement as to the fitness of the original description:

This station has been monumented, in 1938, by the Hawaii Territory Survey, with concrete instrument platform, metal pole and target.

The center mark was recovered in 1938, and the metal pole centered over same.

In 1948 no attempt was made to recover reference marks as the station was not used. No lines see out from this station as 20 to 30 foot timber has grown.

The old description is sufficient.

* 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. 4-75119-3

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION AKAHIPUU HGS
STATE HAWAII YEAR 1928 THIRD ORDER

SOURCE G- 556

GEODETIC LATITUDE	19 45 17.827	ELEVATION	660	METERS
GEODETIC LONGITUDE	155 58 21.327	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE *
HI 1	5101	337,457.48	224,905.89	- 0 05 35

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

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

(continued on next page)

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 1002

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

AKAHIPUU (HGS) (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: AKAHIPUU (HGS)
ESTABLISHED BY: T. J. Maher YEAR: 1928 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 mark and reference disk were recovered in good condition. The reference crosses were not recovered. The hill is covered with a dense growth of silk oak trees up to 40 feet tall and the view is blocked in all directions. A complete description follows:

Station is located about 8 miles north-northeast of Kailua and 1/4 mile southeast of State Highway 19, on a sharp, heavily-timbered hill of about 2232 feet elevation running up to the southeast from the Huehue Ranch buildings.

To reach station from the post office in Kamuela, go south and southwest on State Highway 19 for 30.8 miles to paved side road left, at sign "HUEHUE RANCH". Turn left and go 0.1 mile to locked gate. (Key was obtained at house to right of gate). Pass through gate and go 0.1 mile to second gate. Pass through gate and continue for 0.05 mile to fork. Take left fork around base of hill for 0.15 mile to end of truck travel at southeast base of hill. Pack northeast up through trees for about 200 yards to station.

Station mark is a standard disk, unstamped, cemented in a drill hole in rock in the bottom of a 6 x 30-inch recess in the center of a 6-foot square, concrete platform flush with ground. A concrete pier 2 feet high is at center of platform, centered over the station mark, and a 2-1/2-inch iron pipe through it's center supports a red and white metal target 9 feet tall.

The reference mark is a standard disk, unstamped, cemented in a drill hole in a rock outcrop, 6.1 meters (20.01 ft.) from station, in azimuth 85°.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1003
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

Anaehoomalu (Hawaii Island, Hawaiian Government Survey;
K. T. Adams, 1928).—In western part of Hawaii, South Kohala District,
 on extreme northwest part of the rounded point on the south side of Honokaope
 Bay, 4 miles southwest from Puako village and bay. Station is on rough "aa"
 lava, between 20 and 30 meters inshore, and 535 meters N. 77° W. from a promi-
 nent lava tit, 75 feet high, which is seen across the sand from the station. From
 offshore the station is identified not only by this tit, but also by a large area of
 yellow sand forming a beach and extending inshore over 300 meters in a south-
 westerly direction. Marked underground by a smooth stone in the top of which
 is a drill hole surrounded by a triangle. Around it were placed 11 tin cans, the
 very traces of which had almost wholly disappeared in 1928. Two reference
 crosses cut in stones, each 3 feet from the station and 5 feet apart, had become
 very indistinct in 1928, due to disintegration. In 1928 a surface mark was placed,
 consisting of a standard disk station mark set in a mass of concrete about 2 feet
 in diameter, and having a top thickness of about 3 inches. The space over the
 underground mark was nearly filled with stones and the concrete poured over
 them to unite them with the more solid rock. Two reference marks were also
 placed at the same time, standard bronze disks at the following distances and
 azimuths from the station: No. 1, 12.1 meters (40 feet), 264° 41'; No. 2, 11.6
 meters (38 feet), 22° 15'.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 5386

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: Anaehoomalu STATE: Hawaii COUNTY: Hawaii
 ESTABLISHED BY: K.T. Adams YEAR: 1928 LOCALITY: Anaehoomalu, S.Kohala, Hawaii
 RECOVERED BY: Chas.L.Murray YEAR: 1938

Detailed statement as to the fitness of the original description:

Location of station: On the west coast of Hawaii about 4 miles southwest
 of Puako on the south side of Honokaope Bay on the top of a high Aa bank
 just offshore.

Old mark found: U.S.G.S. bronze tablet set in concrete which agreed with
 old H.T.S. and U.S.G.S. tie marks which still exist.

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.)

*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.

11-7903

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: ANAEHOOMALU
 STATE: HAWAII YEAR: 1928 THIRD ORDER
 SOURCE: G-SP156

GEODETIC LATITUDE:	19° 36' 11.690	ELEVATION:	10.0 METERS
GEODETIC LONGITUDE:	155° 53' 13.522		52 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	φ OR Δ ANGLE*
HI 1	5101	367,045.20	400,793.72	- 0 07 55

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
HAND	293 27 09.6	293 35 05	5101

00 244

(continued on next page)

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1003

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

ANAEOHOMALU (continued)

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

NAME OF STATION: ANAEOHOMALU
 ESTABLISHED BY: K.T. Adams YEAR: 1928 STATE: Hawaii
 RECOVERED BY: D.M. Whipp YEAR: 1967 COUNTY: Hawaii
 Island: Hawaii

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.61 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	
PUU HINAI (HTS) -----1928	DISTANCE	and DIRECTION-----		00 00 00.0
R.M. No. 2		38	11.6	94 52
R.M. No. 1		40	12.1	337 18
PUU HINAI (HTS) 1938 -----1967	DISTANCE	and DIRECTION-----		00 00 00.0
R.M. No. 2	SSW	37.847	11.536	94 59 14
Kawaihae Light, 1928	NNE			276 53 14.8
R.M. No. 1	ENE	39.803	12.132	337 17 34

Station was recovered and all marks found in good condition. The concrete platform is beginning to deteriorate a bit on top, but is still solid. A complete description follows:

Station is located along the coast, about 8 miles southwest of Kawaihae, 1/4-mile west of Honokaope Bay, 1/4-mile west of the end of a bulldozed road and 200 yards west of the west end of a large kiawe grove, on a black lava knoll, at about 52 feet elevation.

To reach station from the post office at Kawaihae, go southeast for 1.5 miles; turn right on road to Puako and go 4.2 miles to end of macadam

road at Puako. Turn right and follow track road along beach for 0.1 mile to locked gate. Pass through gate and continue southerly along beach road for 0.4 mile to locked chain gate. Pass through gate and continue for 1.05 miles to side road left, 0.1 mile before reaching buildings. Turn left and follow rough, bulldozed road across lava field for 0.45 mile to locked chain gate. Pass through gate and continue for 0.35 mile to fork. Take right fork and go 0.6 mile to end of road at kiawe grove. Pack westerly about 1/4-mile to station on point. (Note: Key for locked gates was obtained at the Parker Ranch Office in Kamuela).

Station mark is a standard disk, unstamped, set in the center of a triangular, concrete platform, 7 feet on each side and projecting 8 inches above rocks. It is about 1800 feet west-northwest of station HAND 1913 and 75 yards southeast of tip of rock point.

Reference mark number one is a standard disk, unstamped, cemented in a drill hole in a bedrock ledge, 2.9 feet lower than station mark.

Reference mark number two is a standard disk, unstamped, cemented in a drill hole in a 4-foot-square, flat lava chunk, flush with surrounding rocks, 20 feet southeast of bluff edge and 5 feet lower than station mark.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: ANAEOHOMALU
 ESTABLISHED BY: K.T. Adams YEAR: 1928 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: R.L. Newsom YEAR: 1968 COUNTY: Hawaii

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 was recovered and all marks found in good condition. The concrete platform is beginning to deteriorate on top but is still solid.
 Location is along the northwest coast of the island of Hawaii about eight miles southwest of Kawaihae, 5/8 mile northwest of the Kiholo-Puako trail and 1/4-mile west of Honokaope Bay. On rough "aa" lava about 75 yards west of the southern tip of an inland area of sand; about 5 yards from the edge of the bluff along shoreline.

To reach station from the harbor in Kawaihae go southeast on State Route 26 for 1.8 mile; turn right as going to the village of Puako. Follow this road south 4.2 miles to end of pavement and turn right to follow track road along beach. Continue for 0.1 to locked board gate. Pass through gate and proceed south another 0.4 mile to locked chain gate. Pass through gate onto crushed white rock road; 1.05 mile further turn left just past green water tank onto rough bulldozed road through lava field. One-half mile further there is another locked chain gate; pass through and continue 0.35 mile to fork in road. Take the right fork and go 0.6 mile to large leveled-off area just south of Honokaope Bay. From this flat area of very loose gravel, a road leads to a lower leveled-off area which should only be entered with 4-wheel drive vehicles. Walk through grove of kiawe trees around sand beach and come out onto the inland sand area. Continue south through sand for 150 yards and walk over lava toward shore. Station mark is set in the middle of a concrete triangle 7 feet on each side and projecting 8 inches above rocks. There is a steel pipe with sheet metal cross-banners rising nine feet above concrete over the mark.

Station mark is a standard disk, unstamped, set in the concrete. Reference mark number one is a standard disk, unstamped, cemented in a drill hole in a bedrock ledge, 2.9 feet lower than station mark.

Reference mark number two is a standard disk, unstamped, cemented in a drill hole in a 4 foot square flat lava chunk flush with the surrounding rocks 20 feet southeast of bluff edge and 5 feet lower than station mark.

NOTE: Key for all these gates obtained at Parker Ranch Office, Kamuela.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: ANAEOHOMALU
 ESTABLISHED BY: K.T. Adams YEAR: 1928 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: R. H. Houlder YEAR: 1971 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 8 miles southwest 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 all marks were recovered in good condition as described in 1967. The following are the 1971 observations.

OBJECT	BEARING	DISTANCES		DIRECTION
		FEET	METERS	
HAND 1928				0° 00' 00.0"
RM 2	SSW	37.97	11.58	88 53 19
RM 1	E	39.77	12.13	331 13 28

(USGS, 1978)--Station was recovered as described in recovery note by R.L. Newsom in 1968. Description adequate.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151554 STATION 1004
 HAWAII
 LATITUDE 19 030' TO 20 000'
 LONGITUDE 155 030' TO 156 000'
 DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

Anahulu (Hawaii Island, Hawaiian Government Survey, 1882; K. T. Adams, 1928).—Near west coast of Hawaii, in North Kona District, on the northernmost shoulder of the Puu Anahulu range of hills, about 11.5 miles north of Mount Hualalai, and immediately south of the great lava flow of 1859. This north end is of even contour, steep, and has a noticeably scalloped appearance, and shows up a bright yellow as compared with the surrounding lava flats. Marked by a copper triangle about 26 inches below surface of ground, with four reference marks cut in rocks, 11.5 feet from it. Over station an immense stone cairn was erected, 7 feet high, and painted white. It can be seen with naked eye from all parts of Kawaihae Bay. In 1928 cairn reported as being only 2½ feet high.

U. S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL GEODETIC SURVEY
 FORM 530

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: ANAHULU
 ESTABLISHED BY: Haw. Govt. Survey YEAR: 1882 STATE: HAWAII
 RECOVERED BY: L. O. Wilder YEAR: 1948 COUNTY: HAWAII

Detailed statement as to the fitness of the original description:

Station mark is a 2" wooden stake over which a concrete platform and metal pole and target were erected by the Hawaii Territory Survey. No information is available regarding the recovery of the original mark, a copper triangle.

The station is situated on the westerly and northerly end of a bluff-like prominence known as Puu Anahulu and which runs for distance of about 2 miles below the government road running from Waimea to Kona. The station is located on a dome shaped hill at the end of this prominence.

To reach the station leave the main road at Puu Anahulu Homesteads, at a point near the southern edge of Puu Anahulu bluff and follow track roads through open pasture areas.

OBJECT	DIRECTION	DISTANCE
PUU PANINI (metal target)	00 00 00	
PUU HINAI (metal target)	244 40 40.1	
KAUPULEHU FLOW 1948	48 14 22.7	

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: ANAHULU
 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. A complete description follows: Station is located about 17 miles northeast of Kailua, 17 miles southwest of Kamuela, and 2-1/2 miles northwest of State Highway 19, on a bare, dome-shaped hill of about 1519 feet elevation, on the northwest end of the long ridge running out to northwest from the Puu Anahulu Homesteads. To reach station from the post office in Kamuela, go south and southwest on State Highway 19 for 20.2 miles to graveled side road right, between power poles 188 and 189. Turn right and follow the main road northwest through pasture land, passing through several gates, for 3.2 miles to end of ridge and station.

Station is marked by a 2 x 2-inch wooden stake, with small nail in center. A Type B signal is centered over the mark and the stake can be seen down in a 6 x 30-inch recess 6 inches deep, in center of the 6-foot square concrete platform of the signal. At center of platform, centered over the stake, is a concrete pier 2 feet high. A 2-1/2-inch iron pipe through center of pier supports a target.

11-881
 28-P85

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION ANAHULU
 STATE HAWAII YEAR 1882 SECOND ORDER
 SOURCE G- 9279

GEODETIC LATITUDE	19 51 19.152	ELEVATION	404.5 METERS
GEODETIC LONGITUDE	155 51 31.044		1524 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	Ø OR Δ OR ANGLE*
HI 1	5101	376,763.49	371,260.35	- 0 07 15

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PUU PANINI	351 24 03.8	351 31 23	5101

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

191554 STATION 1005
 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: **AUHAUKEAE**
 STATE: **HAWAII** YEAR: **1928** ORDER: **THIRD**

SOURCE: **G-SP156**

GEODETIC LATITUDE: 19° 38' 19.174	ELEVATION: METERS
GEODETIC LONGITUDE: 155° 59' 02.398	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE
HI 1	5101	333,454.26	292,683.08	- 0° 09' 46"

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

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

QO 253

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 1006
 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: CHURCH SPIRE

STATE: HAWAII

YEAR: 1928

THIRD

-ORDER

SOURCE: G-SP156

GEODETIC LATITUDE:	19 °32' 41.205	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 56 03.647		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ FOR Δ θ' ANGLE °
HI-1	5101	350,453.63	258,543.21	- 0 °08' 43"

* 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

QD 259

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 1007
 HAWAII
 LATITUDE 15° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1,5 HAWAII

SEE STATION MOANUIAHEA

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: DRILL HOLE NR MOANUIAHEA
 STATE: HAWAII YEAR: 1948 SECOND -ORDER

SOURCE: G- 9275
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	19 44 30.608	ELEVATION:	982	METERS
GEODETIC LONGITUDE:	155 57 22.216	SCALED		FEET

STATE COORDINATES (FHM)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE*
HI 1	5101	343,130.76	330,126.94	- 0 05 15

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
POSITION DETERMINED BY TRAVERSE FROM STATION MOANUIAHEA			
QE 258			

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 1008
 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: EAST TANK

STATE: HAWAII

YEAR 1948

THIRD

ORDER

SOURCE: G- 9279

NO OBSERVATION CHECK ON THIS POSITION

GEODEIC LATITUDE:	19 59 04.55	ELEVATION:	1236.9 METERS
GEODEIC LONGITUDE:	155 34 03.40		4058 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	Bearing Δ or ANGLE*
HI 1	5101	476,785.26	418,083.45	- 0 01 23

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

TO STATION OR OBJECT	GEODEIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
POSITION DETERMINED BY TRAVERSE FROM STATION PUU IO			
QE 261			

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 1009
 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: FENCE TANK
 STATE: HAWAII YEAR: 1948 THIRD ORDER

SOURCE G- 5275
 NO OBSERVATION CHECK ON THIS POSITION

GEODETTIC LATITUDE:	19 59 11.34	ELEVATION:	METERS
GEODETTIC LONGITUDE:	155 37 37.70		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ IOR Δ θ ANGLE *
HI 1	5101	456,346.45	418,780.34	- 0° 02' 36"

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

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

QE 24c

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 1010
HAWAII
LATITUDE 19 ° 30' TO 20 ° 30'
LONGITUDE 155 ° 30' TO 156 ° 00'
DIAGRAM NE 5-1.5 HAWAII

Hand (Hawaii Island, K. T. Adams, 1928).—On the northwest coast of Hawaii, about 8.1 miles south by west of Kawaihae Light, on Anaeoomalu Point, south side of Honokaope Bay, and about 200 meters back from high water line. An old lava flow surrounds the station and extends several miles inland. Station is on a knoll about 15 meters above the main lava flow. Two rock cairns, 1 meter high, stand 3 meters north of the station. There are a few trees along the shore line 0.5 mile to the south, 0.3 mile to the north, and also on a sand beach about 200 meters northwest of the station. Station marked by a standard hydrographic disk station mark set in a small white rock cemented together with Portland cement and sand.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **HAND**
ESTABLISHED BY: **K.T. Adams** YEAR: **1928** 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 mark was recovered in good condition. Located about 8 miles southwest of Kawaihae, 1/2-mile northwest of the Kiholo-Puako Trail and 300 yards south of the south side of Honokaope Bay, on a prominent brown lava knoll that is the highest in the area.

To reach station from the post office in Kawaihae, go southeast for 1.5 miles; turn right on road to Puako and go 4.2 miles to end of macadam road at Puako. Turn right and follow track road along beach for 0.1 mile to locked board gate. Pass through gate and continue southerly for 0.4 mile to locked chain gate. Pass through gate and continue for 1.05 miles to side road left, 0.1 mile before reaching group of buildings. Turn left and follow rough bull-dozed road across lava fields for 0.45 mile to locked chain gate. Pass through gate and continue for 0.35 mile to fork. Take right fork and go 0.6 mile to end of road at Honokaope Bay. Pack south about 200 yards to station.

Station mark is an unstamped Hydrographic Survey disk, cemented in the top of a pile of boulders cemented together. There is a large hydrographic signal centered over the mark. NOTE: Key for locked gates was obtained at Parker Ranch Office.

FORM CG65-526 (11-65)
USCOMM-DOC 18369-P25

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

ADJUSTED HORIZONTAL CONTROL DATA

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

SOURCE: **G-SP156**

GEODETIC LATITUDE:	19 50 04.578	ELEVATION:	27.0 METERS
GEODETIC LONGITUDE:	155 52 56.188		89 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	B OR Δ OR ANGLE*
HI 1	5101	368,701.36	430,372.47	- 0 37 49

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

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

QQ 243

(continued on next page)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 191554 STATION 1010

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

HAND (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: HAND
ESTABLISHED BY: K.T. Adams YEAR: 1928 STATE: Hawaii BENCH MARK(S) ALSO
RECOVERED BY: R.L. Newsom YEAR: 1968 COUNTY: Hawaii
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 was recovered in good condition (1 mark only). Station was not occupied at this time.

Location is on the northwest coast of the Island of Hawaii about eight miles southwest of the town of Kawaihae on Lulahala Point, one-half mile northwest of the Kiholo-Puako trail on a prominent brown lava knoll that is the highest in the area.

To reach station from the harbor in Kawaihae go southeast on State Route 26 for 1.8 mile; turn right as going to the village of Puako. Follow this road south for 4.2 miles to end of pavement and turn right to follow track road along beach. Continue for 0.1 mile to locked board gate. Pass through gate and proceed south another 0.4 mile to locked chain gate. Pass through gate onto crushed white rock road; 1.05 mile further turn left just past green water tank onto rough bulldozed road through lava field. One-half mile further there is another locked chain gate; pass through and continue 0.35 mile to fork in road. Take the right fork and go 0.6 mile to large leveled-off area just south of Honokaope Bay. From here walk 200 yards south to the lava hill mentioned above. Three meters north of the station are two rock cairns each about one meter high.

Station mark is an unstamped Hydrographic Survey disk cemented in the top of pile of rocks (one foot high) which are all cemented together with white cement still very intact.

Obtain key for all three gates at the Parker Ranch office in Kamuela.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: HAND
ESTABLISHED BY: K. T. Adams YEAR: 1928 STATE: Hawaii BENCH MARK(S) ALSO
RECOVERED BY: R. H. Houlder YEAR: 1971 COUNTY: Hawaii
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 8.1 miles southwest of Kawaihae.

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

The station was recovered in good condition as described in 1928.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1011
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-15 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 535
 Rev. Aug. 1968

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: HAWAII (USGS) STATE: HAWAII COUNTY: WAIMEA
HAWAII

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

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‡
			feet	meters		
USGS	1.7					
	Surface-station mark, Underground-station mark					
	NOHONAOHAE (metal target)			2 miles	00 00 00	
	PUU PA	WNW		94	07 00.01	
12a	R. M. 1	NE	18.749	5.715	244 36 56	
12a	R. M. 2	SE	28.061	8.554	326 07 06	
	Hokuula (metal target)				169 54 15.3	

The station is located in flat pasture land about 3 miles south of Waima, about 120 feet west of a wire fence, 75.5 feet southeast of a lone tree, 65 feet southeast of telephone pole number 840 and 18.6 feet east of the centerline of the highway which runs between Waima and the Kona District.

To reach from the post office in Waima; go south on the road which leads toward the Kona District for 2.7 miles to the station on the left hand side of the road.

The station is a standard U. S. Geological Survey disk, stamped HAWAII 2604, set into a drill hole in a boulder which is about 6 feet in diameter and projects about 2 feet.

Reference mark number 1 is a standard disk, stamped U S G S 1 1948, set into a drill hole in bedrock which projects about 3 inches and is about 1 foot lower than the station. It is located 33 feet east of the centerline of the highway which runs between Waima and the Kona District.

Reference mark number 2 is a standard disk, stamped U S G S 2 1948, set into a drill hole in bedrock which projects about 8 inches and is about the same elevation as the station. It is located 36 feet east of the centerline of the highway which runs between Waima and the Kona District.

* 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: HAWAII USGS

STATE: HAWAII

YEAR: 1948

SECOND

ORDER

SOURCE: G- 9275

GEODETIC LATITUDE:	19 59 18.539	ELEVATION:	793.7 METERS
GEODETIC LONGITUDE:	155 40 46.763		2604 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	B FOR Δ B ANGLE *
HI 1	5101	438,315.15	419,523.05	- 0 03 41

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
NOHONAOHAE	5 39 48.1	5 43 29	5101

QE 18c

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 1011

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

HAWAII USGS (continued)

FORM 526a
(9-18-69)

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

R

NAME OF STATION: HAWAII (USGS)
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 1.55 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	
NOHONAOHAE (HGS) 1873-----1948	DISTANCE			00 00 00.0
R.M. 1	NE	18.749	5.715	244 36 56
R.M. 2	SE	28.061	8.554	326 07 06
NOHONAOHAE (HGS) 1873-----1967	DISTANCE			00 00 00.0
Parker Ranch, tank "A" 1948	NE			228 38 28.3
R.M. No. 1	ENE	18.750	5.716	244 36 27
R.M. No. 2	SSE	28.060	8.553	326 05 44

Station was recovered and all marks found in good condition. A complete description follows:
Station is located about 2-1/2 miles south of Kamuela, along the east side of State Highway 19, where it passes over a low rise.
To reach station from the post office in Kamuela, go south on State Highway 19 for 2.7 miles to station on left.
Station mark is a U.S. Geological Survey disk, stamped "2604", cemented in a drill hole in a bedrock outcrop projecting 8 inches from ground. It is 18.1 feet east of center line of highway, 64.5 feet southeast of telephone pole 840, and at about same level as highway.
Reference mark number one is a standard disk stamped "USGS 1 1948", cemented in a drill hole in outcropping bedrock that projects 4 inches from ground. It is at edge of dirt area, 35.6 feet east of center line of highway and about 1-1/2 feet lower than station mark.
Reference mark number two is a standard disk stamped "USGS 2 1948", cemented in a drill hole in a bedrock ledge that projects 1 foot above ground. It is 31.7 feet east of center line of highway and about 6 inches 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.

USCOMMA-DC 37173-P88

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151554 STATION 1012
 HAWAII
 LATITUDE 19 ° 30' TO 20 ° 00'
 LONGITUDE 155 ° 30' TO 156 ° 00'
 DIAGRAM NE 5-1.5 HAWAII

Holoholoku (Hawaii Island, Hawaiian Government Survey, 1873).—In the northern part of Hawaii, about 4 miles south-southeast from Waimea village, on the summit of a conspicuous conical hill in the plain. Marked by an iron stake driven in the "scoria," with four redwood posts set up around it to support signal.

U. S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY
 FORM 539

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **Holoholoku** STATE: **Hawaii** COUNTY: **Hawaii**
 ESTABLISHED BY: **Hawaiian Gov.** YEAR: **1873** LOCALITY: **Waimea, S. Kohala, Hawaii**
 RECOVERED BY: **Chas. L. Murray** YEAR: **1935**

Detailed statement as to the fitness of the original description:

Location of Station: On the summit of a conspicuous conical hill reddish in color, and called Holoholoku. This hill is about 4 miles southeast from Waimea and about 2 1/4 miles east of the Waimea-Kona Government main road.

Old Station Mark Found: 6" cylindrical concrete monument marked with a U.S.G. S. bronze tablet stamped 3265 feet. Elevation and covered with a mound of stones. The original mark, an iron pipe could not be found.

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 539

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **HOLOHOLOKU** STATE: **HAWAII**
 ESTABLISHED BY: **Hawaiian Gov.** YEAR: **1873** LOCALITY: **HAWAII**
 RECOVERED BY: **L. C. Wilder** YEAR: **1948** COUNTY: **HAWAII**

Detailed statement as to the fitness of the original description: The original station was not recovered. In 1873 the Hawaiian Government established the station which was marked by an iron stake. Around 1926 the U. S. Geological Survey surveyed this area and established a triangulation station which they marked with a bronze disk, stamped 3265, set in the top of a mass of concrete. In 1938 the Hawaiian Territorial Survey recovered the Geological Survey disk and surrounded the station disk with a triangular slab of concrete which is 7.5 feet on each side and projects about 8 inches. In 1948 the U.S.G. & G.S. established one reference mark. A new description follows—

The station is located on the summit of a conspicuous conical hill, known as Holoholoku, about 4 miles south southeast of Waimea, about 3 miles east of the road which runs between Waimea and Kailua and about 0.1 mile east of a cinder pit.

To reach from the post office in Waimea; go west and south, on the road which leads toward Kailua, for 1.8 miles; turn left, pass through a board gate and follow the cinder road, southeast, for 3.0 miles to the base of the hill and the end of truck travel. From this point pack, easterly, up the steep slope for about 0.2 mile to the summit and the station.

The station is a U. S. Geological Survey bronze disk, stamped 3265, set into a mass of concrete which is flush with the ground.

Reference mark number 1 is a standard disk, stamped NO 1 1948, set in the top of a 2 inch iron pipe which projects about 4 inches and is about 2 feet lower than the station.

Object	Distance	Direction
NOHONAOHAE (metal target)		00 00 00
Tank, 4 miles north		141 26 51.9
R. M. 1 E	8.566 m 28.103 ft	237 08 26
PUU IO (metal target)		231 35 22.3

An early recovery note reports; Original station recovered by N.H. Barringer in January 1911. Remarked by bronze tablet stamped 3265, set in concrete and centered over old pipe.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **HOLGHOLOKU**

STATE: **HAWAII**

YEAR: **1873**

SECOND

ORDER

SOURCE: **G- 9279**

GEODETIC LATITUDE:	19 58 46.087	ELEVATION:	955.2 METERS
GEODETIC LONGITUDE:	155 38 44.423		3265 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE °
HI 1	5101	449,980.50	416,237.97	- 0 02 55

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (from south)	PLANE AZIMUTH* (from south)	CODE
PUU PA	103 05 33.6	103 08 33	5101

QE 137

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1012
 LATITUDE 0 / TO 0 /
 LONGITUDE 0 / TO 0 /
 DIAGRAM

HOLOHOLOKU (continued)

Form 526
 (11-9-55)

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

R

NAME OF STATION: HOLOHOLOKU
 ESTABLISHED BY: HGS YEAR: 1873 STATE: Hawaii
 RECOVERED BY: J.M. Collom YEAR: 1966 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 in good condition. Original description is adequate, except that it is now possible to drive to top of hill on a bulldozed road, with a 4-wheel drive vehicle, up west side of hill.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: HOLOHOLOKU
 ESTABLISHED BY: HGS YEAR: 1873 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: PDC YEAR: 1978 COUNTY: HAWAII
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3.5 mis. southeast of Kamuela

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:
 Station and all marks recovered as described and in good condition.

Form 526a
 (10-18-55)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

R

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

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.56 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
PUU PA (HGS) 1873-----1948 DISTANCE and DIRECTION	E	28.103	8.566	00 00 00.0
R.M. 1				168 16 59
PUU PA (HGS) 1873-----1967 DISTANCE and DIRECTION	NW			00 00 00.0
Kamuela Airport, VOR				27 12 27.8
R.M. No. 2	NW	17.523	5.341	68 05 46
R.M. No. 1	E	28.083	8.561	168 17 37
Airway Obstruction Light	SSE	42.321	12.900	237 32 17.6

NOAA FORM 76-165
 (12-72)

U.S. G.P.O. 1973-769-566/563 REG.#6

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

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 3-1/2 miles southeast of Kamuela, on the summit of Holoholoku, a prominent round-topped hill of about 3265 feet elevation, which has a small, yellow hut with a red obstruction light on it, near the station.

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

Highway 19 for 1.8 miles to junction with the airport road on left. Continue ahead about 100 yards to track side road left. Go left for 0.2 mile to locked board gate. Pass through gate and follow good track road southeast across pasture for 2.8 miles to fork. Take left fork and go 0.15 mile to fork. Take left fork and follow steep road up side of hill for 0.5 mile to top and station. NOTE: Key for locked gate was obtained at the Parker Ranch Office in Kamuela.

Station mark is a USGS disk set in the center of a triangular, concrete platform 7 feet on each side, flush with ground. It is 42.3 feet northwest of the yellow hut. NOTE: The mark was described as being stamped "3265" but no stamping is now discernible.

Reference mark number one is a standard disk stamped "NO 1 1948", set in the top of a 2-inch, iron pipe flush with ground, 2.4 feet lower than station mark.

Reference mark number two is a standard disk stamped "HOLOHOLOKU HGS 1873 NO 2 1967", cemented in a drill hole in a small bedrock outcrop projecting 3 inches from ground, and is at about same elevation as station mark.

Airway Obstruction Light is a red light mounted on top of the gable roof of a 5 x 6-foot, yellow hut which is 7 feet high.

*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.

USCOMMA-DC 37173-P59

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1014
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1,5 HAWAII

Holualoa store (Hawaii Island, E. R. Hand, 1913).—On west side of Hawaii, Kona District, 3¼ miles, S. 67° E. from Kailua wharf, on west side of government road, at junction of the middle road of the three which run down to Kailua. Station is sea gable of the very large unpainted building known as the Kimura Store, owned by Y. Kimura, Japanese. Store sets on a shoulder, and is visible over a wide water area. It is two stories high, but the back is built down a slope and appears as a 3-story building.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: HOLUALOA STORE
 STATE: HAWAII YEAR: 1915 THIRD ORDER

SOURCE: G-SP150

GEODETIC LATITUDE	19° 36' 45.331	ELEVATION:	METERS
GEODETIC LONGITUDE	155° 57' 08.625		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ 10R Δ θ 1 ANGLE*
HI 1	5101	344,304.24	283,186.41	- 0° 09' 07"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ 10R Δ θ 1 FORMULA NEGLECTING THE SECOND TERM.

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

QC 256

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1015
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 50' TO 156° 00'
 DIAGRAM NE 5-1,5 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 535
 107, AUG. 1963

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: HONALO STATE: Hawaii COUNTY: Hawaii
 Island: Hawaii
 CHIEF OF PARTY: R.C. Munson YEAR: 1968 Described by: R.F. Hanson
 HEIGHT OF TELESCOPE ABOVE STATION MARK 1.56 METERS.1 HEIGHT OF LIGHT ABOVE STATION MARK METERS.

NOTE*	HEIGHT OF TELESCOPE ABOVE 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	
1a	Surface-station mark				
7a	Underground-station mark				
		OBJECT	BEARING		
12a		PUU OHAU (HGS) 1883			00 00 00.0
17a		R.M. No. 1	NE	6.769	220 55 49
		Azimuth Mark	SE	(0.35 mile)	305 45 59.2
12a		R.M. No. 2	SE	12.033	311 23 04
		Kainaliu, St. Paul's Catholic Church, spire, 1928	SSE	3.668	314 57 06.4

Detailed description:

Station is located about 2-1/2 miles north-northwest of Kealakekua, 7-1/2 miles southeast of Kailua, and 3/4-mile northwest of Honalo, along the west side of new Highway 11, up on the west cutbank, where the highway goes through a deep cut; on State Highway property, between the highway and a macadam access road that ends at the station, across the highway from power poles 41 and 42 and about midway between them. To reach station from the post office in Kealakekua, go north on State Highway 11 for 2.0 miles to highway junction at Honalo; take left fork and go downgrade on new highway for 0.35 mile to the azimuth mark on left. Continue ahead on the highway for 0.4 mile to macadam intersection on left. Turn left and go parallel with highway, up-grade on macadam

road, for 0.05 mile to end of access road and station on left. Station mark is a standard disk stamped "HONALO 1968", set in the top of a 10-inch-square, concrete monument that projects 2 inches above ground. It is about 50 feet west of center-line of highway, 17 feet west of edge of cutbank, 4-1/2 feet east of edge of access road, 3 feet northeast of a white witness post, and 10 feet north of end of access road. Underground mark is a standard disk stamped "HONALO 1968", set in concrete about 3 feet below ground level. Reference mark number one is a standard disk stamped "HONALO NO 1 1968" cemented in a drill hole in bedrock that projects 2 inches; located between edge of cutbank and access road, at same elevation as station mark. Reference mark number two is a standard disk stamped "HONALO NO 2 1968" cemented in a drill hole in bedrock projecting 2 inches; located 6 feet southeast of southeast corner of access road end and about 4 inches higher than station mark. Azimuth mark is a standard disk stamped "HONALO 1968", cemented in a drill hole in a 16-inch-square, bedrock outcrop that projects 4 inches above ground. It is located on a 6-foot-high cutbank, between highway and a coffee-field road, 32 feet west of center-line of highway, 10 feet south of the higher part of the cutbank, which has coffee trees on it, about 25 yards south from a point even with power pole 50, and 125 yards north of a macadam access road entrance.

NOTE: This station was established to replace LUN 1948.

* 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 the trigonometric leveling is being done. 15-68890-1 U. S. GOVERNMENT PRINTING OFFICE

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: HONALO STATE: HAWAII YEAR: 1968 SECOND ORDER

SOURCE: G-12664

GEODETIC LATITUDE:	19 33 12.994	ELEVATION	387	METERS
GEODETIC LONGITUDE:	155 56 18.085	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE
HI 1	5101	349,080.98	261,753.54	- 0 08 48

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
AZIMUTH MARK	328 45 39.8	328 52 28	5101

QF 631

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 1016
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

Hualalai 2 (Hawaii Island, Hawaiian Government Survey, 1882).—On the western side of the summit of Mount Hualalai, western part of Hawaii. Marked by a copper triangle underground, and 3-inch pipe set vertically over same. Also by a large stone cairn.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: HUALALAI 2
 STATE: HAWAII YEAR: 1882 SECOND ORDER

SOURCE: G-SP106

GEODETIC LATITUDE:	19 41' 50.811	ELEVATION:	311	METERS
GEODETIC LONGITUDE:	155 52 23.240	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β HOR Δ θ ANGLE*
HI 1	5101	371,650.51	311,919.30	- 0 07 35

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

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

40 215

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191554 STATION 1017
 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. 1968

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: JUDD STATE: HAWAII COUNTY: HAWAII NORTH KONA DISTRICT

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

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK 1.7 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	
1A	Surface-station mark,					
7A	Underground-station mark					
			feet	meters		
	KEAUHOU COAST				00 00 00	
12c	Keahole Lighthouse	NW			107 04 12.9	
	R. M. No. 1	NE	18.090	5.514	176 18 05	
12c	R. M. No. 2	E	16.368	4.989	247 40 42	

The station is located about 5 miles northeast of Keauhou, about 5 miles southeast of Kailua, about 2 miles east southeast of Holualoa, about 0.2 mile east of a covered water tank, about 0.3 mile west of a covered water tank, about 0.3 mile west of the timber, about 0.2 mile north of a row of trees, about 150 feet south of a rock wall and about 100 feet north of the Judd Trail. The station is on the crest of an open, grassy, ridge with higher ground to the east and northeast.

To reach the station from the post office in Kealakakua; go north on the road toward Holualoa for 4.15 miles; continue straight ahead, on the road toward Holualoa, for 2.17 miles; turn right, pass under a wooden arch reading "Judd Road", and go easterly, on a steep, badly washed out road, for 1.5 miles to a covered water tank and the end of truck travel. From this point pack easterly for about 0.2 mile to the summit of a low knoll and the station.

The station is a standard disk, stamped JUDD 1948, set in the top of a square concrete post which projects about 3 inches and is 18 inches on each side.

The underground mark is a standard disk, unstamped, set in a drill hole in solid rock about 2 feet below the ground.

Reference mark number 1 is a standard disk, stamped JUDD 1 1948, set in a drill hole in solid rock which projects about 1 foot and is about 2 feet higher than the station.

Reference mark number 2 is a standard disk, stamped JUDD 2 1948, set in a drill hole in solid rock which projects about 6 inches and is about the same elevation as the station.

No azimuth mark was established for this station.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: JUDD
 ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii
 RECOVERED BY: C.A. Burroughs YEAR: 1962 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 reference marks were recovered in good condition and as described.

The station was visited by a lightkeeper only.
 A new "to reach" follows:
 To reach the station from the post office in Kealakakua, go north on the road toward Holualoa for 7.0 miles to a road right, turn right on paved side road between two garages and go 0.1 mile to a green water tank surrounded by an anchor fence, turn right around tank on a dim track road and follow it for 0.4 mile to a stone wall and aluminum gate. Continue past the gate for 0.4 mile on the same road to the end of truck travel. Here pack 500 feet south from the road to the station.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: JUDD
 STATE: HAWAII YEAR: 1948 SECOND ORDER

SOURCE: G- 9279

GEODETIC LATITUDE:	19 36 29.446	ELEVATION:	500.9 METERS
GEODETIC LONGITUDE:	155 56 21.131		1840 FEET

STATE COORDINATES (Foot)				
STATE & ZONE	CODE	X	Y	β OR Δ β ANGLE
HI 1	5101	348,840.59	281,572.09	- 0 08 51

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From mark)	PLANE AZIMUTH (From mark)	CODE
KAHELO	107 58 44.4	108 07 35	5101

QE 049

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1017
 LATITUDE ° ' TO ° '
 LONGITUDE ° ' TO ° '
 DIAGRAM

JUDD (continued)

Form 526
 (11-8-66)

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

R

NAME OF STATION: Judd
 ESTABLISHED BY: LCW YEAR: 1948 STATE: Hawaii
 RECOVERED BY: RPC YEAR: 1964 COUNTY: Hawaii

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

The station was recovered as originally described. The badly washed out road mentioned is now impassable and a pack is required.

FORM 526a
 (9-18-66)

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

R

NAME OF STATION: Judd
 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	
KAHELO (HGS) 1882 -----1948 DISTANCE and DIRECTION-----				00 00 00.0
R.M. No. 1	NE	18.090	5.514	97 22 58
R.M. No. 2	E	16.368	4.989	168 45 37
KAHELO (HGS) 1882 -----1967 DISTANCE and DIRECTION-----				00 00 00.0
Kailua Light, 1957	WNW			10 10 02.5
R.M. No. 1	NNE	17.891	5.454	97 22 15
R.M. No. 2	E	16.325	4.977	168 47 40

Station was recovered and all marks found in good condition. A discrepancy of 0.06 meter was noted in the distance to RM No. 1; it was double-checked and the 1967 distance is correct. A witness post was set at station. A complete description follows:

Station is located about 4-1/4 miles southeast of Kailua and 1-1/4 miles southeast of Holualoa, along the north side of the old Judd Trail, at about 1840 feet elevation, on a grassy point on west end of a ridge in pasture, about 1/4-mile west of timber-line and about midway between

2 covered water tanks that set east-west, about 2200 feet apart. The upper tank is not visible from station; the lower (west) tank has a red roof over it.

To reach station from the post office in Holualoa, go south on State Highway 18 for 1.0 mile to narrow macadam side road left, between two small garage sheds. Turn left and go 0.05 mile to board gate; pass through gate, go right, around green tank in mesh fence, and continue on track road for 0.6 mile to metal gate; pass through gate and continue for 0.4 mile to end of truck travel at fork, with gate on right fork.. Walk west along fence for 180 yards to mango trees, then go left, south, 247 feet to station. NOTE: Station is not visible from end of truck travel, but is just beyond the prominent grassy knoll.

Station mark is a standard disk stamped "JUDD 1948", set in the top of a 16-inch-square, concrete monument flush with ground. It is about 100 yards northeast of a gate in a fence corner, 265 feet south of fence line, 3 feet southeast of a white witness post, and 247 feet south from the center of a clump of 3 mango trees that appear as 1 tree.

Reference mark number one is a standard disk stamped "JUDD 1 1948", cemented in a drill hole in a 2-foot boulder projecting 1 foot above ground. It is 1-1/2 feet higher than station mark.

Reference mark number two is a standard disk stamped "JUDD 2 1948", cemented in a drill hole in a 1 x 2-foot rock projecting 3 inches above ground. It is 0.7 foot higher 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.

USCOMM-DC 27173-P58

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151554 STATION 1018
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1,5 HAWAII

NO ORIGINAL TEXT

Kahelo (Hawaii Island, Hawaiian Government Survey, 1882; T. J. Maher, 1928).—On west coast of Hawaii, in North Kona District, at Kailua, about 2,000 meters south of the courthouse, and immediately south of Kahului Bay, about 70 meters north of the well-marked shore trail, and about 230 meters inshore from the point. Kahului Bay will be recognized as the third yellow sand cove south of the courthouse, the first being close to the south side of the courthouse. Station is at the head of an ancient "holua" or toboggan slide, made of rough rock, and now resembling an abandoned roadway. The slide slopes to the west, toward the shore. Station marked by large triangle cut in rock. In 1928 station recovered as described, between road and beach. There is a slight break in the stone wall which parallels the road, where the old toboggan slide leads to the beach. At this place a tree on the outside of the road was blazed, and two nails driven in the blaze. Numerous small branches have been cut from this tree. A reference mark was cemented in the road, on west side near fence or wall, and to southward of tree. It is approximately 67 meters from station. Inshore from the station, and distant 3.89 meters (12.8 feet) therefrom, a standard reference disk was cemented in the rocks. Station was re-marked with standard triangulation disk. In 1913 a large cairn, painted white, was left over the station.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 1308

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **KAHELO**
 ESTABLISHED BY: Hawaiian Govt. Year: 1882 STATE: **HAWAII**
 RECOVERED BY: L. C. Wilder Year: 1948 COUNTY: **HAWAII**

Detailed statement as to the fitness of the original description: The station and two reference marks were recovered in good condition. An azimuth mark was established for this station. A new description follows—

The station is located on flat, rocky, ground at the head of ancient toboggan slide, about 4.5 miles north northwest of Keauhou Bay, about 2 miles south southeast of Kailua, about 200 meters east of the beach, about 75 meters west of the highway which runs between Kailua and Keauhou and under an elevated concrete platform.

To reach the station from the post office in Kailua; go south, on the road which leads toward Keauhou, for 1.75 miles to a point about midway between power poles number 19 and 20 and the end of truck travel. From this point pack westerly, through the dense brush, for about 250 feet to the concrete platform and the station.

The station is a standard disk, unstamped, set in the top of a square concrete post which is flush with the surface of the ground. It is located under a concrete platform which is 6 feet square and projects 5 feet.

Reference mark number 1 is a standard disk, unstamped, set into a drill hole in bedrock which is flush with the surface of the surrounding rock and is about the same elevation as the station.

Reference mark number 2 is a standard disk, unstamped, set in the top of a square concrete post which is flush with the surface of the surrounding rock. It is located about 65 meters east of the station, 79.5 feet southwest of power pole number 19, 19.7 feet west of the centerline of the highway which runs between Kailua and Keauhou and 5.9 feet east of the center of a rock wall.

The azimuth mark is a standard disk, stamped KAHELO 1948, set into a drill hole in bedrock which projects about 1 foot. It is located about 1.5 miles northeast of the station, 40.9 feet northwest of the center of a circular, steel, water trough, 16 feet southwest of the centerline of the highway, 6.6 feet west of the junction of two rock walls and about 3 feet lower than the highway. To reach from the station; go northerly, on the road which leads toward Kailua, for 1.35 miles; turn right and go west and south, on the road which leads toward Holualoa, for 2.0 miles to the azimuth mark on the right hand side of the road.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **KAHELO**
 STATE: **HAWAII** YEAR: 1882 SECOND ORDER
 SOURCE: **G- 9279**

GEODETIC LATITUDE	19 37 23.477	ELEVATION:	16.1 METERS
GEODETIC LONGITUDE	155 59 16.911		53 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	PLANE ANGLE *
HI 1	5101	332,050.94	287,068.34	0 05 50

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
AZIMUTH MARK	247 26 52.8	247 36 43	5101

QE 048

HORIZONTAL CONTROL DATA

QUAD 191554 STATION 1018

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

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

KAHELO (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

Object	1928 Distance	1948 Distance	Direction
KEAHUOLU R M 1928			00 00 00
Kailua Lighthouse NW 2 miles			12 14 35.6
Azimuth mark NE 1.5 miles			119 42 44.9
R. M. No. 1 ESE	3.89 m	12.8 ft	3.845 m 12.611 ft 134 46
R. M. No. 2 E	About 67 meters	About 65 meters	Not observed

G. J. Hoepfel

R

RECOVERY NOTE, TRIANGULATION STATION

FORM 526a
 (6-18-69)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

NAME OF STATION: KAHELO
 ESTABLISHED BY: HGS YEAR: 1882 STATE: Hawaii
 RECOVERED BY: D.M. Whipp YEAR: 1967 COUNTY: Hawaii
 Island: Hawaii

HEIGHT OF TELESCOPE ABOVE STATION MARK 2.75 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	
KEAHUOLU R.M. NO 1 1948-----1948	DISTANCE and DIRECTION	00	00	00° 0'
Azimuth Mark	NE	1.5 miles	119	42 44.9
R.M. No. 1	ESE	12.011	3.845	134 46
R.M. No. 2	E	about 65 m		not observed.
KEAHUOLU R.M. NO 1 1948-----1967	DISTANCE and DIRECTION	00	00	00° 0'
Azimuth Mark	NE	1-1/2 miles	119	42 44.5
R.M. No. 2	ENE	183.040 (55.791)	126	03 51.2
R.M. No. 1	ENE	12.613	3.845	134 35 12

NAME OF STATION: KAHELO
 ESTABLISHED BY: Hawaiian Govt. YEAR: 1882 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: C. L. Novak YEAR: 1977 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: At south edge of Kailua

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

The station mark was recovered in good condition but the reference marks were found to have been destroyed. The station mark was in the way of construction so a new station, KAHELO 2, was established about 166 meters to the west-southwest and the KAHELO HGS 1882 station mark was then removed.

Station was recovered and all marks found in good condition. R.M. No. 2 had not been previously tied in. A complete description follows:
 Station is located about 1-1/2 miles south-southeast of Kailua, in a brush-covered lot along west side of State Highway 182, where it passes over a low rise, about 550 feet east from the beach, and along north side of old track road.
 To reach station from the post office in Kailua, go southerly on

road along coast for 1.75 miles to track road right, about midway between power poles 19 and 20 (there are also newer and larger numbers 32 and 33 on these poles). Turn right and go west on track road for 200 feet to station on right.

Station mark is a standard disk, unstamped, cemented in a drill hole in lava bedrock projecting 2 inches. It is 30 feet north of center line of track road, 202.8 feet west of center line of highway, and opposite a point on the road 160 feet north from power pole No. 20 (33) and 66 feet south from power pole No. 19 (32).

Reference mark number one is a standard disk, unstamped, cemented in a drill hole in lava bedrock at about same elevation as station.

Reference mark number two is a standard disk, unstamped, set in the top of a 12-inch-square, concrete monument about flush with surrounding rock. It is 79.5 feet southwest of power pole No. 19, 19.8 feet west of center line of road, 62.8 feet north of a fireplug, 29.8 feet north-northwest of a water valve in metal box in edge of highway, and about 2 feet higher than station mark. NOTE: The mark is usually covered with dirt and debris.

Azimuth mark is a standard disk stamped "KAHELO 1948", cemented in a drill hole in bedrock 6 feet west of the T-intersection of 2 stone fences, 18.0 feet southwest of center line of highway, 41 feet northwest of center of a circular, steel, water tank, 82 feet west of an old board gate in V-junction of 2 stone walls, and about 3 feet lower than road. To reach mark from post office in Kailua, go north on State Highway 19 for 0.5 mile; turn right and go 0.45 mile; angle left and follow old highway upgrade for 1.85 miles to left curve and the azimuth mark on right.

*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.

USCOMA-DC 27173-P59

NOAA FORM 76-165
 (12-72)
 (OLD CGS 828)

U.S. G.P.O. 1973-769-566/563 REG.#6

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

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1019
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

OAA FORM 76-39
 2-701
 (FORMERLY CGS FORM 523)

U.S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **KAHELO 2 (HGS)** STATE: **Hawaii** COUNTY: **Hawaii**
 NEAREST TOWN: **Kailua** QUADRANGLE NO.: **191554**
 CHIEF OF PARTY: **C. L. Novak** YEAR: **1977** DESCRIBED BY: **L.A.C.**

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK SURFACE-STATION MARK, UNDERGROUND-STATION MARK	1 METERS.†	HEIGHT OF LIGHT ABOVE STATION MARK DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	1 METERS.	DISTANCE			DIRECTION‡
					FEET	METERS		
12a	KEAHUOLU RM NO 1 1928-1948	NW	#5259.926 m.	00 00 00.00				
	KAILUA LIGHT 1957	NW	About 1-1/2 miles	14 18 38.9				
	RM 3	ENE	33.15 10.105	117 11 04				
12a	KAHELO HGS 1882	ENE	#165.503 m.	118 59 57.72				
	RM 4	SSE	27.38 8.344	214 12 31				
	RM 3 to RM 4		45.50 13.869					

Geodetic distance

Detailed description

The station is located at the south edge of Kailua, about 1-1/2 miles south-southeast of the center of the business district of town, and is on a large ledge of pahoehoe lava at Puapua Point at the south end of Kahului Bay.

To reach the station from the post office at Kailua go southerly on Alii Drive 1.8 miles to the Kona Makai Condominium buildings on the right. Turn right and go west between the buildings 0.15 mile to the ocean edge and the station site.

The station mark is a Hawaii state survey triangulation station disk stamped KAHELO 2 1977 cemented in a drill hole in a ledge of pahoehoe lava at the edge of the ocean and is 81 feet northwest of the southwest corner of one of the Kona Makai south unit buildings, 54 feet northwest of the northwest corner of a building pillar, and about 120 feet east of the limu line.

Reference mark 3 is a USGS disk stamped KAHELO 2 NO 3 1977 cemented in a drill hole in a ledge of pahoehoe lava and is 65 feet northwest of the southwest corner of a building, 24 feet northwest of the northwest corner of a building corner pillar, and 150 feet east of the limu line.

Reference mark 4 is a USGS disk stamped KAHELO 2 NO 4 1977 cemented in a drill hole in a ledge of pahoehoe lava and is 65 feet northwest of the southwest corner of a building, 57 feet southwest of the southwest corner of a building corner pillar, and about 40 feet east of the limu line.

*Refers 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.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **KAHELO 2 HGS**

STATE: **HAWAII**

YEAR: **1977**

SECOND ORDER

LOCALITY:

SOURCE: **G-12664**

FIELD SKETCH:

GEODETIC LATITUDE:	19 37 21.48576	ELEVATION:	2.7	METERS
GEODETIC LONGITUDE:	155 59 22.18801		9	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ (OR Δ) ANGLE
HI 1	5101	331,545.91	286,868.91	- 0 09 52

TO STATION OR OBJECT		GEODETIC AZIMUTH (From mark)	PLANE AZIMUTH (From mark)	CODE
KEAHUOLU	RM 1	129 17 16.6	129 27 08	5101

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151554 STATION 1020
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

Kailua (Hawaii Island, Hawaiian Government Survey, 1887; T. J. Maher, 1928).—On west coast of Hawaii, Kona District, in land of Moeauoa, northeast of Kailua Bay, in yard of what was in 1913 the Kailua sisal mill, being in the continued line of east side (tank side) of building, and 31.9 meters from corner of foundation. In 1928 this mill was reported as having been moved 2 miles further north, but the foundations of the old building remain in good condition. Kailua Church tower bears S. 16° E. about 300 meters from the station. Station is 1 meter south of a brick pier erected by the British Transit of Venus expedition in 1874. In 1913 the station and the remains of the brick pier were recovered. This is not the pier actually used by the British expedition. It is said that two piers were built and the other one used; it was not recovered, but is said to be under the Ikeda Hotel. Station marked by triangle cut in rock; re-marked in 1928 by standard disk station mark. In 1928 two standard reference disks were set as follows: No. 1, cemented in lava rock 6 feet north of yard, and near road; it is 21.39 meters (70.2 feet) from station on bearing N. 65° W. (mag.); No. 2, cemented in southeast corner of foundation of former sisal mill; it is 32.3 meters (106 feet) from station on bearing N. 25° E. (mag.).

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION **KAILUA**
 STATE **HAWAII** YEAR **1887** SECOND ORDER
 SOURCE: **G- 9275**

GEODETIC LATITUDE	19 38 43.856	ELEVATION	24.5 METERS
GEODETIC LONGITUDE	155 59 48.988		80 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE*
HI 1	5101	329,008.16	295,185.81	- 0 10 02

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
AZ MK NORTH MERIDIAN	181 40 36.0	181 50 38	5101

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 Form 536
RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **KAILUA**
 ESTABLISHED BY: **Hawaiian Govt.** YEAR: **1887** STATE: **HAWAII**
 RECOVERED BY: **L. C. Wilder** YEAR: **1948** COUNTY: **HAWAII**

Detailed statement as to the fitness of the original description: **The station and marks were recovered, as described, in good condition. An azimuth mark was established for this station. A new description follows—**

The station is located about 0.2 mile northwest of the Kailua Dock, 105 feet west southwest of the southwest corner of the old cement foundation of the Kailua sisal mill, 74.5 feet southeast of a fence corner, 21.7 feet east of a rock wall and under a concrete observing platform.

The station is a standard disk, stamped **KAILUA 1928**, set into a drill hole in a lava outcrop which is flush with the surface of the ground. A concrete platform, 6 feet square, projects about 4 feet above the station disk. A pipe, centered over the mark, projects 2 feet above the top of the concrete platform.

Reference mark number 1 is a standard disk, stamped **KAILUA 1928**, set into a drill hole in the southwest corner of the concrete foundation of the old sisal mill. It is about 4 feet higher than the station.

Reference mark number 2 is a standard disk, stamped **KAILUA 1928**, set into a drill hole in outcropping lava which is flush with the surface of the ground. It is located 7 feet east of a fence corner and 3 feet south of a rock wall.

The azimuth mark is a standard disk, stamped **NORTH MERIDIAN 1948**,

* 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.

U. S. GOVERNMENT PRINTING OFFICE

11-2010-3

(continued on next page)

4E 050

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 191554 STATION 1020

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

KAILUA (continued)

set into a drill hole in a lava outcrop which is flush with the surface of the ground. It is located about 300 feet north of the station, 83.4 feet northeast of the northeast corner of a house and 3 feet south of a wire fence.

To reach the station from the post office in Kailua; go north, on the road which leads toward Waimea, for 0.1 mile; turn right, onto a graded road, and go easterly for 0.15 mile to the end of truck travel at a point about 80 feet north of the station.

Object	1928 Distance	1948 Distance	Direction
KEAHUOLU R. M. 1928			00 00 00
R. M. No. 2 NW	21.39 m	70.2 ft 21.410 m	70.244 ft 30 39 40
Azimuth mark N		About 300 feet	78 02 52.8
R. M. No. 1 NE	32.3 m	106 ft 32.190 m	105.608 ft 122 25 20
Kailua, Spire S		About 0.3 mile	248 53 25.9
Kailua, Lighthouse WSW		About 0.6 mile	311 02 16.0

The measurements to the reference marks were verified in the field and should supersede all previous measurements.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAILUA
ESTABLISHED BY: HGS YEAR: 1887 STATE: Hawaii BENCH MARK(S) ALSO
RECOVERED BY: R.C. Munson YEAR: 1968 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 mark, RM No. 2 and azimuth mark were recovered in good condition. RM No. 1 has been destroyed.

A complete description follows:

Station is located about 1000 feet northeast of the center of Kailua, 700 feet east-northeast of the junction of State Highways 11 and 19, and along the southeast side of a macadam road, in a vacant lot.

To reach station from the post office in Kailua, go northeast 0.05 mile on State Highway 19 to crossroad. Turn right and go 0.05 mile, then turn left on macadam drive, up past the Kona Tradewinds Hotel, and go 0.1 mile to station on right.

Station mark is a standard disk, unstamped, set in the center of a 12 x 12-inch concrete cap on bedrock flush with ground. It is 89 feet southeast of center line of road and 22 feet northeast of a stone fence between station and a yellow house. There is a Type A signal erected over the mark, with the 6-foot-square, concrete platform supported 4 feet above ground by 2 stone and concrete piers, and a red and white metal target extending above center of platform.

Reference mark number two is a standard disk stamped "KAILUA 1928", cemented in a drill hole in lava bedrock flush with ground, in west corner of the lot, 3 feet southeast of one stone fence, 7 feet northeast of other stone fence, and at about same elevation as station mark. It is 21.410 m (70.2 ft.) from station, in azimuth 134° 17' 23".

Azimuth mark is a standard disk stamped "NORTH MERIDIAN 1948", cemented in a drill hole in bedrock flush with ground. Located in kiawe grove, 83 feet northeast of the east corner of Mr. Spinney's house, 163 feet northwest of center line of macadam road, 151 feet northwest of telephone pole No. 5, and 15 feet southwest of a 12-foot-square, stone enclosure. It is about 300 feet from station, in azimuth 181° 40' 36.0".

Note: Azimuth mark stamping reported to be "NORTH MERIDIAN 1948" in 1968, whereas in 1948 the Azimuth mark was reported stamped "NORTH MERIDEAN 1948".

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAILUA
ESTABLISHED BY: Hawaiian Govt. YEAR: 1887 STATE: Hawaii BENCH MARK(S) ALSO
RECOVERED BY: GEH YEAR: 1972 COUNTY: Hawaii
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 and Reference marks have been destroyed. Local residents indicate that the station was removed for construction of a sewer several years ago. The State of Hawaii has set several unstamped substitute marks in the area.

FORM C&GS-526 (5-65)
USCOMM-DC 32486-P08

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

R

R

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191554 STATION 1021
 HAWAII
 LATITUDE 15° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1,5 HAWAII

NO ORIGINAL TEXT

KAILUA MOKUAIKAU CHURCH SPIRE

(Hawaii Island, E. R. Hand, 1913; T. J. Maher, 1928).—On west coast of Hawaii, Kona District, at Kailua, the spire of immense stone church. It has a red roof, with square tower at north end, on which is an octagonal tower, surmounted by spire. The square tower has railings around it. Entire tower painted red with white trimmings. The 1928 determination of position (which was well checked) differs considerably from the 1913 determination, which was without check. It is reported that there has been no change in the church.

RECOVERY

DESCRIPTION OF TRIANGULATION STATION

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 585
 Rev. Aug. 1965

MOKUAIKAU CHURCH, NORTH KONA DISTRICT
 NAME OF STATION: **KAILUA SPIRE** STATE: **HAWAII** COUNTY: **HAWAII**
 Established by: **E. R. Hand, 1913**
 CHIEF OF PARTY: **L. C. WILDER** YEAR: **1948** Described by: **G. J. HOEPEL**

NOTE.	HEIGHT OF TELESCOPE ABOVE STATION MARK METERS.1	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 feet meters	DIRECTION 1 2
	Surface-station mark, Underground-station mark					
	This station was located by intersection.					

The station is the top and center of a spire on the north end of the Mokuaiakau Church in the village of Kailua.

The church is a very old structure, constructed of stone and is located in the southern part of the village across from the old palace.

The spire is about 100 feet in height.

RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

NAME OF STATION: **Kailua, Mokuaiakau Church, Spire**
 ESTABLISHED BY: **E. R. Hand** YEAR: **1913** 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. Located in the middle of Kailua-Kona, across street from the old palace (now a museum). Station is the tall spire on the north end of the old stone and mortar church building.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **KAILUA MOKUAIKAU CHURCH SPIRE**

STATE: **HAWAII**

YEAR: **1913**

THIRD

ORDER

SOURCE: **G- 9279**

GEODETIC LATITUDE: 19 38 33.854	ELEVATION	METERS
GEODETIC LONGITUDE: 155 59 47.001		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	# OR Δ ◊ ANGLE *
HI 1	5101	329,137.80	254,176.43	- 0 10 01

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From 1913)	PLANE AZIMUTH (From 1967)	CODE

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1022
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

KAINALIU LANAKILA CHURCH SPIRE

(Hawaii Island, E. R. Hand, 1913).—Near the western coast of Hawaii, about 50 meters below the main government road between Kealahakua and Holualoa, and a short distance north of the village of Kainaliu, on a rise commanding an extensive view, the spire of the Lanakila Church. Church is painted a yellowish gray, with steeple of same color. Church has two windows at south end, three on seaward side, with door and steeple at north end.

RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

NAME OF STATION: Kainaliu, Lanakila Church, spire
 ESTABLISHED BY: E.R. Hand YEAR: 1913 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. Located in the north end of the village of Kainaliu, about 200 feet west of State Highway 11 and 100 feet south of a track road.

Station is the center of the sharp, cone-shaped spire with red top, on north end of the Lanakila Congregational Church, a white, wooden building with red tin roof. A red ball and wind arrow are mounted on top of the spire.

R

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAINALIU LANAKILA CHURCH SPIRE

STATE: HAWAII YEAR: 1913 ORDER: THIRD

SOURCE: G- 9279
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	19 32 16.61	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 55 52.73		FEET

STATE COORDINATES (feet)				
STATE & ZONE	CODE	X	Y	β (OR Δ) β ANGLE *
HI 1	5101	351,451.50	256,059.47	- 0 08 59

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE β (OR Δ) β 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

0 191554 STATION 1023
HAWAII
LATITUDE 19° 30' TO 20° 00'
LONGITUDE 155° 30' TO 156° 00'
DIAGRAM NE 5-1,5 HAWAII

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 525
Rev. Aug. 1965

RECOVERY OF TRIANGULATION STATION
ST. PAUL'S CATHOLIC CHURCH,
NAME OF STATION: **KAINALIU/SPIRE** STATE: **HAWAII** COUNTY: **NORTH KONA DISTRICT HAWAII**
Established By: **T. J. Maher** Year: **1928**
CHIEF OF PARTY: **L. C. WILDER** Year: **1948** Described by: **G. J. HOEPEL**

NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK METERS, I HEIGHT OF LIGHT ABOVE STATION MARK METERS.
Surface-station mark DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION
Underground-station mark

OBJECT	BEARING	DISTANCE		DIRECTION
		feet	meters	
This is an intersection station.				
Office Note: Computations indicate that this station is the same as located in 1928 by T.J.M.				

The station is the top of the spire in the top of the steeple of the Saint Paul's Catholic Church.

The church is constructed of stone and concrete, has a red tin roof, a red tin steeple, which is about 60 feet in height, and faces to the west.

The church is inclosed by a rock wall and is located about 0.25 mile west of the highway which runs between Holualoa and Kealahou, about 200 feet southwest of a house and about 125 feet south of a graded road.

Detailed description

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **Kainaliu, St. Pauls Catholic Church, spire**
ESTABLISHED BY: **T.J. Maher** YEAR: **1928** 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 was recovered. An angle check was made on it's position at station LUN 1948.
Located about 3/4-mile northwest of Kainaliu and 900 feet west of the village of Honalo and State Highway 11.
Station is the red steeple with white, wooden cross on top, on west end of the St. Paul's Catholic Church; a small, rectangular, gray, stone and mortar structure with red tin roof.

NAME OF STATION: **KAINALIU ST PAUL CATH CH SPIRE**
STATE: **HAWAII** YEAR: **1928** ORDER: **THIRD**

SOURCE: **G- 9279**
NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE: 19 32 40.51	ELEVATION:	METERS
GEODETIC LONGITUDE: 155 56 04.18		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE
HI 1	5101	350,402.48	258,473.23	- 0 08 43

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

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

QE 210

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1024
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

R

NAME OF STATION: Kalaoa, Catholic Church, Spire
 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

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

Station was recovered. Located about 6 miles north of Kailua, at Kalaoa Homesteads, on right, east side, of State Highway 19. Station is the sharp, white spire on the west end of the Holy Rosary Catholic Church, a small, white, rectangular, wooden building, with green trim, that sets on the slope, about 300 feet east of the highway, and slightly higher. A small, white cross is mounted on top of the spire.

INTERSECTION RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: Kalaoa, Catholic Church, Spire
 ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: J.V. Teater YEAR: 1973 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: About .6 miles north of Kailua-Kona.

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

The station was recovered as described.

NAME OF STATION: KALAOA CATHOLIC CHURCH SPIRE
 STATE: HAWAII YEAR: 1948

THIRD ORDER

SOURCE: G- 9279
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	19° 43' 46.72	ELEVATION:	METERS:
GEODETIC LONGITUDE:	155 58 51.54		FEET:

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE
HI 1	5101	334,585.57	325,723.05	- 0 09 45

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ OR Δ OR θ 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 191554 STATION 1025
 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. 1948

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **KANAKAU** STATE: **HAWAII** COUNTY: **HAWAII** DISTRICT: **SOUTH KONA**

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

NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK **1.7** METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.

NOTE	HEIGHT OF TELESCOPE ABOVE STATION MARK	HEIGHT OF LIGHT ABOVE 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	
	Surface-station mark, Underground-station mark			feet	meters	° ' "
						00 00 00
11c	R. M. 2	W	5.600	1.707	37 27	
11c	R. M. 1	N	22.211	6.770	155 09 14	
	Azimuth Mark	SW		0.2 Miles	338 45 56.2	

The station is located in the back yard of a house about 0.25 mile south of Kealakekua, about 150 feet west of the highway which runs between Kealakekua and Captain Cook, 70.2 feet south of a wooden water tank, 32 feet west of a rock house, 7.8 feet north of a large, prominent, tree and 6 feet north of the end of the concrete walk.

To reach from the post office at Kealakekua; go south on the road which leads toward Captain Cook for 0.25 mile to the end of truck travel at the Kona Meat Market. From this point pack south, around the house for about 200 feet to the large tree and the station.

The station is a standard disk, stamped **KANAKAU 1948**, set into a drill hole in a concrete walk.

Reference mark number 1 is a standard disk, stamped **KANAKAU NO 1 1948**, set into a drill hole in a concrete walk. It is located 1 foot east of the east edge of the walk and is about 1 foot higher than the station.

Reference mark number 2 is a standard disk, stamped **KANAKAU NO 2 1948**, set into a drill hole in a concrete walk. It is located 9.6 feet northwest of a large tree and is about 6 inches lower than the station.

The azimuth mark is a standard disk, stamped **KANAKAU 1948**, set in the top of a 3 inch pipe which projects about 2 feet. It is located about 0.2 mile south of the station, 100 yards west of a small house and is set in concrete in the top of a north-south rock wall.

U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
 (11-8-55)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: **KANAKAU**
 ESTABLISHED BY: **L. C. W.** YEAR: **1948** STATE: **Hawaii**
 RECOVERED BY: **U.S.G.S.** YEAR: **1958** COUNTY: **Hawaii**

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

Station destroyed, a nearby tree fell and uprooted the station mark.
 Reference mark 1 is still in place.
 Reference mark 2 has been disturbed.
 NOTE: This station can be reobserved only with a large tower, if its position is recovered.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

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

SOURCE: **G- 9279**

GEODETIC LATITUDE	19 30 48.035	ELEVATION:	457.4
GEODETIC LONGITUDE	155 55 23.499		1501 METERS FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ (OR Δ) ANGLE
HI 1	5101	354,265.23	247,117.25	- 0 08 29

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE ϕ (OR Δ) ρ FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
AZIMUTH MARK	29 22 37.8	29 31 07	5101

QE 056

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 1025

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

KANAKAU (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KANAKAU
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

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

Station mark and azimuth mark have been destroyed. Both reference marks were recovered in good condition. All lines are blocked by trees.

The end of the concrete sidewalk in which the station mark was set has been broken off. The azimuth mark was found laying beside the stone fence in which it had been set.

Station site is located 0.45 mile south from the post office in Keala-kekua, on makai side of a stone and mortar building up on cutbank on right, west, side of the highway, about 150 feet south of the Mauna Loa Dairy.

Reference mark number one is a standard disk stamped "KANAKAU NO 1 1948", cemented in a drill hole in the same sidewalk the station mark was set in. It is 17.5 feet west-northwest of the northwest corner of the building, 65 feet south of a power pole with transformer, and 8 inches west from east edge of the sidewalk.

Reference mark number two is a standard disk stamped "KANAKAU NO 2 1948", cemented in a drill hole in a section of old concrete walk, 12 feet east of edge of bluff and 33 feet west of door of stone building.

Both reference marks are hidden under very tall, dense grass and weeds.

CGS FORM 526 (1-63)
10-1959-P69

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191554 STATION 1026
 HAWAII
 LATITUDE 19 ° 30' TO 20 ° 00'
 LONGITUDE 155 ° 30' TO 156 ° 00'
 DIAGRAM NE 5-15 HAWAII

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

RECOVERY NOTE, TRIANGULATION STATION

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 228

NAME OF STATION: **KAUPULEHU** STATE: **HAWAII** COUNTY: **HAWAII**
 ESTABLISHED BY: HGS YEAR: 1906 LOCALITY: **N. KONA**
 RECOVERED BY: **L. C. Wilder** YEAR: 1948

R

NAME OF STATION **KAUPULEHU**
 STATE **HAWAII** YEAR **1906** SECOND ORDER

SOURCE G- 9279

GEODETIC LATITUDE	19 43 06.986	ELEVATION	1871.5 METERS
GEODETIC LONGITUDE	155 54 40.548		6141 FEET

STATE COORDINATES (feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ θ ANGLE °
HI 1	5101	358,553.53	321,651.66	- 0 08 20

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
AZIMUTH MARK	278 ° 31' 44.0	278 ° 40' 04 "	5101

Detailed statement as to the fitness of the original description: The 1906 station and the three original reference marks were recovered in good condition. The original station was a copper triangle marked with a copper bolt in its center, above which was an iron pot filled with bottles, tins and scraps of iron. In 1906 a 3 inch pipe was set "precisely" in the center of the copper bolt. Two additional reference marks and an azimuth mark were established. A new description follows--

The station is located on the western rim of an extinct volcanic cone which straddles the long western ridge of Hualalal Volcano. It is about 11 miles east of Keahole Point, about 8 miles northeast of Kailua, about 5.6 miles southeast of The Huehue Ranch, about 3 miles northwest of the summit of Hualalal Volcano, about 0.8 miles west of an old rock corral, about 0.6 mile west of a wire fence, about 0.2 mile west of a volcanic cone of about equal height, about 0.15 mile west of the trail which runs between the Huehue Ranch and the Forest Cabin and 9 feet west of the steep cliff. The station hill is heavily covered with timber on its west and north sides.

To reach from the post office in Kealahou; go north on the road toward Waimea for 23.9 miles to telephone pole number 298; turn right, onto a track road, pass through a locked gate, (key may be obtained at the Puu Waawaa Ranch which is located 6.5 miles east of gate) and go southerly for 1.0 mile to a wooden water trough and a pump station. From this point continue southerly, on the dim track road, for 0.6 mile; pass through a wire gate and continue southerly for 1.1 miles; pass through a wire gate and continue southerly for 1.1 miles; pass through a wire gate and continue for 0.7 mile to a number of large water tanks and a large, iron, water shed and the end of truck travel. From this point pack, westerly, along an old trail for about 0.4 mile; turn left and pick your way, through the heavy jungle growth, southwesterly for about 3 miles to the crest of the open ridge. The station hill may be seen as soon as you come into the open. The station may also be reached, by good trail, from the Huehue Ranch. Closest water is about 3 miles, by trail, west of the station, toward the Huehue Ranch.

The station is a standard disk, stamped KAUPULEHU RESET 1948, set in the top of a 3 inch iron pipe which projects about 2 feet. Reference mark number 1 is a standard disk, stamped KAUPULEHU NO 1 1948, set into a drill hole in bedrock. It is located 7 feet east of the crest of the craters rim, 1 foot west of the cliff and about 7 feet lower than the station.

Reference mark number 2 is a standard disk, stamped KAUPULEHU NO 2 1948, set into a drill hole in bedrock. It is located 11 feet northeast of the southwest rim of the crater, about 8 feet lower than the crest of the rim and 10 feet lower than the station.

Reference mark number 3 is a cross out in the vertical rock of the crater. It is about 4 feet lower than the station.

(continued on next page)

QE 044

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1026

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

KAUPULEHU (continued)

Reference mark number 4 is a cross cut in the vertical rock wall of the crater. There is the head of an old axe driven into the center of the cross. It is located about 10 feet lower than the station.

Reference mark number 5 is a copper bolt driven into the trunk of an Ohia tree. The tree is located in the crater about 8 feet lower than the rim and about 10 feet lower than the station.

The azimuth mark is a standard disk, stamped KAUPULEHU 1948, set into a drill hole in bedrock which forms part of the eastern rim of the crater. It is located on the highest point of the crater rim. A small cairn was erected 5 feet south of the disk.

Object	1906 Distance	1948 Distance	Direction
JUDD			00 00 00
R. M. 5 SSW	23.75 ft	24.711 ft 7.533 m	17 49 06
R. M. 2 SW		36.485 ft 11.121 m	33 10 46
R. M. 1 NE		26.463 ft 8.067 m	217 05 25
R. M. 3 NE	11.5 ft	11.501 ft 3.506 m	239 14 34
Azimuth mark East	0.1 mile		265 02 41.2
R. M. 4 SE	12.3 ft	13.285 ft 4.050 m	303 20 51

The 1948 measurements to the reference marks were checked in the field.

Form 526
 (11-8-55)

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

NAME OF STATION: KAUPULEHU

ESTABLISHED BY: H.G.S. YEAR: 1906 STATE: Hawaii
 RECOVERED BY: C.A. Burroughs YEAR: 1962 COUNTY: Hawaii

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

The station, azimuth and reference marks 1 and 2 were recovered in good condition and as described.

The distance and directions checked the data on the 1948 recovery note. The distance and directions to reference marks 3, 4 and 5 were not measured at this time.

A new "to reach" follows:

To reach from the junction of State Highway 18 and 19, which is 3.7 miles north of Kailua, by going northerly on State Highway 19 for 6.2 miles to a side road right (paved) turn right along the highway and continue for 0.1 mile to a life time gate along the side of the highway. The gate is locked, a key may be obtained at the Huehue Ranch. Pass through the gate and continue up hill along a powerline on a paved road for 1.8 miles to a telephone relay and building on the left. Continue on the same road up hill for 2.4 miles on a track road to a fork and a micro-wave reflector on the left. Take the right fork and continue 1.3 miles to the end of truck travel just past a lava cone on the right. Here pack westerly 10 minutes to the station.

* 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.

FORM 526a
 (9-18-55)

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

NAME OF STATION: KAUPULEHU
 ESTABLISHED BY: H.G.S. YEAR: 1906 STATE: Hawaii
 RECOVERED BY: R.C. Munson YEAR: 1968 COUNTY: Hawaii
 Island: Hawaii

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
		DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION		
JUDD 1948				00 00 00.0
R.M. No. 5	SW	23.888	7.282	17 35 26
R.M. No. 2	SW	36.480	11.120	33 11 22
R.M. No. 1	NE	26.425	8.055	217 04 47
Azimuth Mark	E			265 02 41
HUALALAI 2	ESE			293 14 53

Station was recovered and all marks found in good condition. Distance was checked to all marks except cross No. 4. A discrepancy of 0.251 m was noted in the distance to RM No. 5. A complete description follows:

Station is located about 8 miles northeast of Kailua, 5 miles south-east of the Huehue Ranch, and 3-1/2 miles northwest of the highest point of the Hualalai Range, on the west rim of Kaupulehu Crater, at about 6141 feet elevation.

To reach station from the post office in Kailua, go north on State Highway 19 for 3.8 miles to junction with State Highway 18; continue on

Highway 19 for 4.5 miles to paved road right, at sign "HUEHUE RANCH". Go right for 0.1 mile to locked gate. (Key was obtained at house on right). Pass through gate and follow track road along power line for 1.7 miles to side road left (leading to top of MOANUIAHEA Hill). Continue ahead for 0.75 mile to fence line; continue ahead, along right side of fence, for 2.5 miles to where road finally leaves fence. Go right for 0.2 mile to dim track road left. Turn left and go up through forest for 0.1 mile to T-junction; turn right and follow good track road easterly upgrade for 0.1 mile to a Kaupulehu Forest Reserve sign. Continue ahead for 0.95 mile to dim track road right, in saddle. (Azimuth mark is up on rim to right). Turn right and follow around base of hill for 0.2 mile to end of truck travel on hillside. Walk northeast up hill about 75 yards to station. (A 4-wheel-drive vehicle is required).

Station mark is a standard disk stamped "KAUPULEHU RESET 1948", set in the top of a concrete-filled, 2-1/2-inch, iron pipe that is set in concrete and projects 20 inches from ground.

Reference mark number one is a standard disk stamped "KAUPULEHU NO 1 1948", cemented in a drill hole in a bedrock ledge on inside of crater rim about 4 feet lower than station mark.

Reference mark number two is a standard disk stamped "KAUPULEHU NO 2 1948", cemented in a drill hole in a bedrock ledge on inside slope of the crater rim, and is 10.3 feet lower than station mark.

Reference mark number three is a 4-inch chiseled cross on face of ledge away from station, about 3-1/2 feet lower than station mark.

Reference mark number four is a 4-inch chiseled cross, with an old axe head driven into it, in soft rock on face of ledge away from station. It is down on inside slope of crater, several feet lower than station and obstructed by trees.

Reference mark number five is a 1-inch, copper bolt head, projecting about 1-1/2 inches from the northeast side of the trunk of an 8-inch ohia tree, 8 inches above ground and 10.9 feet lower than station mark.

Azimuth mark is a standard disk stamped "KAUPULEHU 1948", cemented in a drill hole in bedrock on highest point of east rim of the crater, overlooking the track road.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 151554 STATION 1027
 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 1963

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **KAUPULEHU FLOW** 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 METERS.1	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
		OBJECT	BEARING	DISTANCE feet meters	DIRECTION: ° ' "
4	1.5	HEIGHT OF LIGHT ABOVE STATION MARK METERS.			
12c		PUU WAAWAA WEST		67.560	00 00 00
12e		R. M. No. 2	WNW	20.593	210 56 10
		R. M. No. 1	NNE	13.425	293 10 52

The station is located on the Kaupulehu Lava Flow of 1800, about 11 miles north northeast of Kailua, about 6 miles west of the Puu Waawaa Ranch, about 6 miles south of Kiholo Bay, about 200 yards west of the east edge of the middle flow and 76.5 feet north of the centerline of the highway which runs between Waimea and the Kona Coast.

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; pass to the left hand side of a church in Anahulu Homesteads and continue southerly for 6.7 miles to a point near the center of the Kaupulehu Lava Flow and the end of truck travel. The station lies about 76 feet north of this point.

The station is a standard disk, stamped KAUPULEHU FLOW 1 1948, set into a drill hole in a boulder which projects about 3 inches.

Reference mark number 1 is a standard disk, stamped KAUPULEHU FLOW NO 1 1948, set into a drill hole in a boulder which is on the east edge of the lava flow and projects about 10 feet. It is about the same elevation as the station. It is 13.425 m or 44.043 ft. from the station.

Reference mark number 2 is a standard disk, stamped KAUPULEHU FLOW NO 2 1948, set into a drill hole in a boulder which is about 6 feet in diameter and projects about 4 feet. It is about 6 feet lower than the station.

A rock cairn with black and white pole plumbed over the mark has been built over this station.

* Refer to notes in manuals of triangulation and state publications of triangulation. (To nearest meter only, when no trigonometric leveling is being done.)
 † Direction-angle measured clockwise, reference to station monument.
 16-58500-1 U. S. GOVERNMENT PRINTING OFFICE

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **KAUPULEHU FLOW**
 STATE: **HAWAII** YEAR: **1948** SECOND ORDER

SOURCE: **G- 9279**

GEODETIC LATITUDE	19 46 39.164	ELEVATION	594.2 METERS
GEODETIC LONGITUDE	155 55 36.026		1949 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ or ANGLE
HI 1	5101	355,307.14	343,069.33	- 0 08 40

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
PUU PANINI HTS	238 00 50.1	238 09 30	5101

QE 042

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 1027

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

KAUPULEHU FLOW (continued)

FORM 520a
(9-18-69)

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

R

NAME OF STATION: KAUPULEHU FLOW
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 1.45 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	
PUU PANINI (HTS)----- 1948	DISTANCE	and DIRECTION-----		00 00 00.0
R.M. No. 2	WNW	67.560	20.593	246 20 33
R.M. No. 1	NNE		13.425	328 35 15
PUU PANINI (HTS) 1948 ----1967	DISTANCE	and DIRECTION-----		00 00 00.0
R.M. No. 2	NW	67.418	20.550	246 20 27
R.M. No. 1	NE	44.004	13.413	328 35 26

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

Station is located about 10-1/2 miles northeast of Kailua-Kona and 3-1/2 miles east-northeast of the Huehue Ranch, at about the middle of the Kaupulehu Lava Flow of 1800, along the north side of State Highway 19, at about 1949 feet elevation.

To reach station from the post office in Kamuela, go south on State Highway 19 for 6.4 miles to junction with State Highway 20; continue on State Highway 19 for 15.1 miles to the Puu Waawaa Ranch road on left.

Continue on the highway for 5.75 miles to power pole 252 and station on right.

Station mark is a standard disk stamped "KAUPULEHU FLOW 1948", cemented in a drill hole in lava bedrock. It is 53.5 feet north-northwest of power pole 252 and 73.5 feet north-northwest of center line of the highway. There is a cairn with a tall, white, 3 x 3-inch target centered over the station mark.

Reference mark number one is a standard disk stamped "KAUPULEHU FLOW NO 1 1948", cemented in a drill hole in a very large lava rock, about 10 feet in diameter and projecting 10 feet above ground on it's northeast side. It is located on the northeast edge of the lava flow, projects about 2 feet above top of flow, and is about 10 inches lower than station mark.

Reference mark number two is a standard disk stamped "KAUPULEHU FLOW NO 2 1948", cemented in a drill hole in the top of a round lava boulder about 8 feet in diameter and projecting 4 feet above general level of lava flow. The mark is 6.3 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.

USCOMM-DC 57173-P59

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1028
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

NAME OF STATION: Kealakekua, Kona Church, spire
 ESTABLISHED BY: L.C. Wilder YEAR: 1948 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

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

Station was recovered. Located 0.1 mile south from the post office in Kealakekua, along west side of State Highway 11 where it reaches it's highest elevation through the town.

Station is the center of a sharp, green spire, with a green ball and spike on top, setting atop a white tower on the east end of the church, which is a stone and mortar building, and is called the Kona Central Union Church.

NAME OF STATION: KEALAKEKUA KONA CHURCH SPIRE

STATE: HAWAII

YEAR: 1948

THIRD

-ORDER

SOURCE: G- 9279

NO OBSERVATION CHECK ON THIS POSITION

GEODETTIC LATITUDE:	19° 31' 05.51	ELEVATION:	METERS
GEODETTIC LONGITUDE:	155 55 24.69		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE *
HI 1	5101	354,155.66	248,680.37	- 0° 08' 29"

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

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1029
 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 255-B

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

Kealakekua, Radio
 NAME OF STATION: KONA, mast YEAR: 1968 STATE: Hawaii COUNTY: Hawaii
 Island: Hawaii
 CHIEF OF PARTY: R.C. Munson

Description, including sketch of object: Located in the village of Kealakekua, on the slopes east from main street, about 1800 feet east from the post office, and 1400 feet southeast of the Kona Hospital, at about 1760 feet elevation and at the KONA Radio Station buildings.
 The tower is a 4-legged, skeleton-steel structure, 325 feet high and painted alternate red and white. Object intersected was the red obstruction light on top.

U. S. GOVERNMENT PRINTING OFFICE 16-60891-1

Described by _____

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION KEALAKEKUA RADIO KONA MAST
 STATE HAWAII YEAR 1968 ORDER THIRD

SOURCE G-12664

GEODETIC LATITUDE	19 31 13.072	ELEVATION	METERS
GEODETIC LONGITUDE	155 55 03.982		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	$\rho \sin \Delta \theta$ ANGLE*
HI 1	5101	356,138.37	249,638.35	- 0 08 23

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

TO STATION OR OBJECT	GEODETIC AZIMUTH	PLANE AZIMUTH*	CODE
	(From south)	(From south)	
	0' " "	0' " "	

QF 628

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1030
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

Keamuku (Hawaii Island, Hawaiian Government Survey, 1882).—In the western part of Hawaii, due west of Mauna Kea, northeast of Mount Hualalai, on an eminence northwest of the end of the Keamuku lava flow. Marked underground by a copper bolt driven into a rock *in situ*, and on the surface by four crosses cut in rocks each 7 feet distant from the station.

RECOVERY NOTE, TRIANGULATION STATION

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

NAME OF STATION: Keamuku STATE: Hawaii COUNTY: Hawaii
 ESTABLISHED BY: H.G.S. YEAR: 1882 LOCALITY: N.Kona-S.Kohala Bdy., Hawaii
 RECOVERED BY: Chas. L. Murray YEAR: 1936

Detailed statement as to the status of the original description: Location of station is on the crest of the highest ridge about 1 1/2 miles above the Waimea Government main road at a point on the road marked with the Kona-Kohala Boundary sign, which is roughly 16 miles from Waimea. The station is best approached by automobile thru Keamuku Sheep Station and continuing over a Rough road Konawards another mile.

Old Station mark found: Copper bolt with 4 tie marks in rock each 7-feet from the bolt.

New Station Mark: H.T.S. Type D monument (Triangular concrete monument 7 1/2 ft. on each side with 2 1/2" pine 2 feet long set on steel legs over the old mark which is left exposed to view). A metal target is set over the 2 1/2" pipe.

RECOVERY NOTE, TRIANGULATION STATION

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

NAME OF STATION: KEAMUKU
 ESTABLISHED BY: Hawaiian Govt. YEAR: 1882 STATE: HAWAII
 RECOVERED BY: L. G. Wilder YEAR: 1948 COUNTY: HAWAII

Detailed statement as to the status of the original description: The station was recovered as described and is in good condition. The four reference marks mentioned in the 1882 description were not recovered. A new reference mark was established. A new description follows.

The station is located on the crest and the highest part of a long, low ridge which lies between the foot of the Keamuku Lava Flow and the road which runs between Waimea and the Kona District. The station is about 17 miles west of the summit of Mauna Kea, about 14 miles south-southwest of Waimea, about 1.5 miles south of the Waimea to Kona District Highway, about 0.5 mile north of the foot of the Keamuku Lava Flow and about 0.2 mile west of a fence intersection. The country in the vicinity of the station is badly broken up and the station hill could be easily overlooked although it is on the highest ground in the immediate vicinity.

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 7.4 miles to telephone pole number 550; turn left, south, off the highway, pass through a wire gate and go west on an old paved road for 100 feet; pass through a board gate and continue westerly for 0.25 mile; turn left, south, and go across country for about 0.5 mile to a point where it becomes too rocky for further truck travel.

From this point pack south, along the crests of several low ridges, for about 1.5 miles to the high ground and the station.

The station is the center of a small copper bolt which is set into rock. The station is surrounded by a triangular slab of concrete which is about 7 feet on each side and projects about 1 foot.

Reference mark number 1 is a standard disk, stamped KEAMUKU NO 1 1948, set into a drill hole in a boulder which projects about 6 inches and is about 2 feet lower than the station.

Object	Distance	Direction
PUU WAAWAA WEST		00 00 00
AHUMOA target SE	9.0 miles	220 12 11.52
R. M. No. 1 SE	5.123 m 16.805 ft	248 18 23
NOHONAOKAE (metal target)		147 48 44.4

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KEAMUKU

STATE: HAWAII

YEAR: 1882

SECOND ORDER

SOURCE: G- 9279

GEODETIC LATITUDE	15 49 50.551	ELEVATION	937.0 METERS
GEODETIC LONGITUDE	155 44 07.819		3074 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	OR Δ ANGLE
HI 1	5101	419,059.26	362,247.83	- 0 04 48

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From 1882)	PLANE AZIMUTH (From 1948)	CODE
PUU HINAI	150 03 35.7	150 08 24	5101

QE 037

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554

STATION 1030

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

KEAMUKU (continued)

FORM 526a
 (8-16-68)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KEAMUKU
 ESTABLISHED BY: HGS YEAR: 1882 STATE: Hawaii
 RECOVERED BY: D.M. Whipp YEAR: 1967 COUNTY: Hawaii
 Island: Hawaii

HEIGHT OF TELESCOPE ABOVE STATION MARK 2.0 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	
PUU HINAI -----1948 DISTANCE		and DIRECTION----		00 00 00.0
NOHONAOHAE (metal target)				56 40 03.4
R.M. No. 1	SE	16.805	5.123	157 09 42
PUU HINAI (HGS) 1938 -----1967 DISTANCE		and DIRECTION----		00 00 00.0
R.M. No. 2	NNE	9.716	2.962	52 33 26
NOHONAOHAE (HGS) 1882				56 40 03.0
R.M. No. 1	SE	16.812	5.125	157 04 51

Station mark and reference mark No. 1 were recovered in good condition, however the concrete platform over the station is beginning to deteriorate. A new reference mark was established. A complete description follows:

Station is located about 1 1/2 miles south-southwest of Kamuela, 1-1/2 miles southeast of State Highway 19, and 1-1/4 miles southwest of the 2 old water tanks and corral at Keamuku, on a hill of about 3074 feet elevation, in rough, hilly country.

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

Highway 19 for 11.9 miles to the Popoo Gulch bridge; continue ahead for 0.1 mile to board gate on left between power poles 110 and 111. Turn left through gate and go 0.2 mile; turn right and follow old macadam road for 0.5 mile; take side road left and follow track road 1.75 miles to board gate. Pass through gate, turn right, and go 0.2 mile to dim side road right, near two water tanks. Go right for 0.05 mile to board gate in stone fence. Pass through gate and continue on dim road, along water pipe, for 0.3 mile; go left, picking way on very dim road, southerly, for 0.7 mile to end of truck travel, about 0.1 mile after passing old fence-post row and board gate (too rocky to continue). Pack southerly across low hills about 1/2-mile to station.

Station mark is the center of a copper bolt in the bottom of a 3-inch diameter hole 15 inches deep in the center of a triangular, concrete platform 7 feet on each side. A 2-1/2-inch iron pipe is centered over the mark and supports a red and white metal target 8 feet high. Station is about 1/4-mile northwest of a large grove of trees and 1/2-mile south of a small water tank.

Reference mark number one is a standard disk stamped "KEAMUKU NO 1 1948", cemented in a drill hole in bedrock, about 1 foot lower than top of station platform.

Reference mark number two is a standard disk stamped "KEAMUKU HGS 1882 NO 2 1967", cemented in a drill hole in a bedrock ledge that projects 3 feet above ground, and is about 1 foot lower than top of station platform.

(USGS, 1978)

Station was recovered in good condition as described in recovery note by D. M. Whipp in 1967. A new to reach follows: From the P.O. in Kamuela, go S. on State Route 190 (Mamalahoa Hwy.) for 15 mi (6.5 mi S. of junction of the saddle rd.) to a track rd. on left leading onto PUU ANAHULU Game Management area, turn left, and go 2.3 mi easterly up hill to where the rd. branches into 3 rds., take the left rd. going over a sharp rise and go northerly 0.3 mi to fence and iron gate, turn left and follow track rd. along fence west (downhill) 0.2 mi to a lone tree on left and ETT, pack northerly to top of the prominent ridge and station, 5-min. pack; a concrete platform and metal target is centered over the mark.

Please Report

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151554 STATION 1032
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

Keauhou 2 (Hawaii Island, T. J. Maher, 1928).—On the west coast of Hawaii, Kona District, about 1½ miles east by south from Keauhou Bay, on a hill which does not show very prominently from off shore. Station is on cone-shaped nub, on side of ridge. It is reached by a trail which leads from the dock at Keauhou Bay east to the residence of Harry Haanio; there the trail turns south for about ½ mile. From offshore the hill on which the station is located appears to the southward of a prominent cultivated field, light green in color, which shows up well against a higher, dark background. To the southward about ½ mile is another hill similar to the one with the station and of about the same elevation; on it is a station probably established by the Territorial Survey, with marks similar to those at *Keauhou 2*, which is probably of similar origin. *Keauhou 2* is closely in the same position as the old station *Keauhou*, and is marked by a 1½-inch galvanized pipe projecting about 18 inches from a mass of lava rocks cemented together. The words "Keauhou Aug. 1924, J. H." are cut in the cement. A cross cut in a large boulder is distant 4.45 meters (14.6 feet) from station, in azimuth S. 5° W. (mag.).

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION KEAUHOU 2
 STATE HAWAII YEAR 1928 THIRD ORDER
 SOURCE G- 556

GEODETIC LATITUDE	19 33 55.233	ELEVATION	317	METERS
GEODETIC LONGITUDE	155 56 45.096	SCALED		FEET

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

NAME OF STATION: KEAUHOU 2
 ESTABLISHED BY: T. J. Maher YEAR: 1928 STATE: HAWAII
 RECOVERED BY: L. C. Wilder YEAR: 1948 COUNTY: HAWAII

Detailed statement as to the fitness of the original description:

This station was not visited as it was not tied to the 1948 triangulation. It is reported that the station is intact and some party has erected a long wooden pole. The Hawaii Territory Survey monumented the station in 1938 with concrete instrument platform, metal pole and target.

The station is best reached from the main highway east of the station, although the going is difficult because of thick brush.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KEAUHOU 2
 ESTABLISHED BY: T. J. Maher YEAR: 1928 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. The reference cross was found, although the boulder has rolled a bit, so the cross is now on back side of boulder and is 15.8 feet from station, instead of 14.6 feet.

Station is located about 6-1/2 miles southeast of Kailua, 1-1/4 miles east of Keauhou Bay, 1/2-mile north of the new Puu Loa subdivision, 0.3 mile southwest of old Keauhou School and about 800 feet west-southwest of new Highway 11, at about 1000 feet elevation, on a small rock knoll on the slopes overlooking Keauhou Bay.

To reach station from the post office in Kailua, go north on State Highway 19 for 0.05 mile; turn right and go southeast on State Highway 11 for 6.8 miles to macadam road right, at sign "FUULOLO RD". Turn right for 0.05 mile; turn right on track road at sign "KONA BAPTIST PARSONAGE" and go 0.1 mile to end of road at house. Pack northwest through heavy lantana brush for about 225 yards to station.

Station is marked by a 1-1/4-inch iron pipe projecting 20 inches from the top of a 2-foot concrete dome projecting 16 inches from ground. It has "KEAUHOU G.P. AUG 1924 JT" inscribed in the concrete.

STATE COORDINATES (feet)				
STATE & ZONE	CODE	X	Y	H OR Δ RIANGLE
HI 1	5101	346,508.86	266,021.22	- 0 08 58

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

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

QF 045

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1033
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-15 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 Form 525
 Rev. Aug. 1963

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **KEAUHOU COAST** STATE: **HAWAII** COUNTY: **HAWAII** NORTH KONA DISTRICT

CHIEF OF PARTY: **L. C. WILDER** YEAR: **1948** Described by: **C. J. HOEPEL**
 HEIGHT OF TELESCOPE ABOVE STATION MARK **1.7** METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.

NOTE*	HEIGHT OF TELESCOPE ABOVE 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†
2	Surface-station mark, Underground-station mark				
			feet	meters	
		KAHELO			00 00 00
		Δ POINT			20 25 12
12a		R M 1	N	0.3 Miles	
			NNE	84.995	25.907
12a		R M 2	S	27.499	8.383
					185 25 16

The station is located on a flat lava bed about 6.5 miles south southeast of Kailua, about 4 miles northwest of Kealakekua, about 0.4 mile south of the mouth of Keauhou Bay, about 150 feet south southwest of a clump of trees, about 125 feet north northwest of a clump of trees, 25 feet east of the sea bluff and about 20 feet above high tide mark.

To reach from the post office in Kailua; to south for 4.25 miles to the head of Keauhou Bay; pass through the shipyard and follow a track road along the south side of Keauhou Bay for 0.35 miles to a fence corner and the end of truck travel. From this point pack westerly for about 100 yards to the end of the point and triangulation station POINT, then turn south and follow along the top of the sea bluff for about 0.4 mile to the station.

The station is a standard disk, stamped KEAUHOU COAST 1948, set into a drill hole in bedrock which is about the same elevation as the surrounding rock.

Reference mark number 1 is a standard disk, stamped KEAUHOU COAST 1, 1948, set into a drill hole in bedrock which is flush with the ground. It is located about 2 feet lower than the station and 37 feet east of the edge of the sea cliff.

Reference mark number 2 is a standard disk, stamped KEAUHOU COAST 2, 1948, set into a drill hole in bedrock which is flush with the ground. It is located at about the same elevation as the station and is 30 feet east of the edge of the sea bluff.

* Refers 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: **KEAUHOU COAST**

STATE: **HAWAII**

YEAR: **1948**

SECOND

ORDER

SOURCE: **G- 9279**

GEODETIC LATITUDE: 19° 33' 23.387	ELEVATION: 0.8 METERS
GEODETIC LONGITUDE: 155° 58' 10.189	22 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	PLANE AZIMUTH ANGLE*
HI 1	5101	338,362.69	262,830.40	- 0 09' 26"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE $\theta = \tan^{-1} \frac{Y}{X}$ FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (from south)	PLANE AZIMUTH (from south)	CODE
LAALO A	172 05' 11.5	172 14' 38	5101

QE 051

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1033

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

KEAUHOU COAST (continued)

FORM 526
 (2-12-65)

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

R

NAME OF STATION: KEAUHOU COAST
 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	
LAALOA -----1948 DISTANCE and DIRECTION				00 00 00.0
POINT	N	0.3	mile	13 34 47.8
R.M. No. 1	NNE	84.995	25.907	31 08 11
R.M. No. 2	S	27.499	8.383	178 34 52
LAALOA 1948 ----- 1967 DISTANCE and DIRECTION				00 00 00.0
POINT 1928	N	0.35	mile	13 34 48.0
R.M. No. 1	NNE	84.992	25.906	31 08 16
R.M. No. 2	SSE	27.505	8.384	178 34 19

Station was recovered and all marks found in good condition. There is now a golf course on the point and it is possible to drive to station. A complete description follows:

Station is located about 6-1/2 miles south-southeast of Kailua and 1/2-mile south of Keauhou Bay, on flat lava point, about 20 feet above sea and 25 feet east of edge of sea bluff. It is near west edge of golf course, and is 215 feet southwest from edge of the 3rd green.

To reach station from the post office in Kailua, go south on road along coast for 6.2 miles to Keauhou Bay dock; continue for 0.15 mile to start of golf course; continue ahead on road across golf course for 0.3 mile to south edge of fairway. Turn right and go along edge of fairway for 0.4 mile to 3rd hole and station.

Station mark is a standard disk stamped "KEAUHOU COAST 1948", cemented in a drill hole in lava bedrock. It is 165 feet southwest from edge of fairway and 25 feet west of a 10 x 20-yard sand patch.

Reference mark number one is a standard disk stamped "KEAUHOU COAST 1 1948", cemented in a drill hole in bedrock. It is 80 feet southwest from edge of fairway, 130 feet southwest from edge of 3rd green, and about 14 inches lower than station mark.

Reference mark number two is a standard disk stamped "KEAUHOU COAST 2 1948", cemented in a drill hole in bedrock, 25 feet east from edge of sea bluff and about 6 inches higher than station mark.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KEAUHOU COAST
 ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: GEH YEAR: 1972 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 5.6 NM SSE of Kailua Kona

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 recovered as described by D.M. Whipp in 1967 in good condition.

DEC 1979

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

QUAD 191554 STATION 1034
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

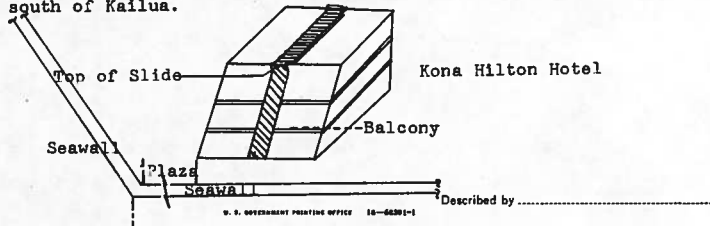
DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 523 D

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

Kona Hilton Hotel
 NAME OF STATION: Slide Top YEAR: 1972 STATE: Hawaii COUNTY: Hawaii
 CHIEF OF PARTY: G. E. Haraden

Description, including sketch of object:

The station is located on the top of a three story slide, which forms a prominent arc at the top and is lighted bright yellow in the evening. It is on the west side of the Kona Hilton Hotel, a three story beige structure, located on Kalae Paa Kai Point, about 0.5 nautical miles south of Kailua.



ADJUSTED HORIZONTAL CONTROL DATA

ADJUSTMENT BY NGS

NAME OF STATION: KONA HILTON HOTEL SLIDE TOP OBS BY NGS
 STATE: HAWAII YEAR: 1972 THIRD ORDER

SOURCE: G-14950

GEODETIC LATITUDE:	19° 38' 05.49642	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 59 36.03896		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE °
HI 1	5101	330,234.66	291,312.51	- 0 09' 57"

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

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

THESE DATA OBTAINED FROM ADJUSTMENT OF SEP 1979

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1035
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-15 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 535
 (REV. FEB. 1948)

DESCRIPTION OF TRIANGULATION STATION

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

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

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			
	Surface-station mark	Underground-station mark	OBJECT	BEARING	DISTANCE feet meters	DIRECTION: 0 1 #
2						
12a			KAHELO			00 00 00
2			R M 1	NNW	27.748 8.458	01 27 32
12a			Azimuth (POINT) 2 mi.	SSE		191 20 16.5
			R M 2	SSW	28.544 8.700	216 49 31

The station is located on a small point about 4.5 miles south southeast of Kailua, about 0.4 mile south of Holualoa Bay, about 0.4 mile north of Kahaluu Bay, about 125 feet west of the road which runs between Kailua and Keauhou Bay, about 75 feet east of the high tide mark, about 20 feet above the high tide mark and in open, rocky, ground about 6 feet west of a heavy growth of brush and timber.

To reach the station from the post office in Kailua; go south, on the road which leads toward Keauhou Bay for 4.25 miles to a point about midway between power poles number 74 and 75 and the end of truck travel. From this point peak westerly, through the heavy growth of brush and timber, for about 125 feet to the open ground and the station.

The station is a standard disk, stamped LAALOA 1948, set into a drill hole in bedrock which is flush with the ground on the east and drops off sharply toward the sea on the west.

Reference mark number 1 is a standard disk, stamped LAALOA 1 1948, set into a drill hole in bedrock which is flush with the ground on the east and projects about 2 feet on the west. It is about 15 feet west of the brush, about 60 feet east of the high tide mark and is about 6 feet lower than the station.

Reference mark number 2 is a standard disk, stamped LAALOA 2 1948, set into a drill hole in bedrock which is sloping sharply to the westward. It is located about 15 feet west of the edge of the brush and about 50 feet east of the high tide mark. It is about 7 feet lower than the station.

The azimuth is a standard triangulation station disk, unstamped, (POINT) which is located about 2 miles south of the station, about 0.4 mile south of Camp Maluhia, about 0.4 mile west of the Keauhou Bay Shipyard and on the summit of a low lava mound on the point just south of Keauhou Bay. To reach the azimuth from the station; go south for 2 miles to Keauhou Bay, continue south, around the head of the bay, and then follow the graded road westerly, keeping all left hand forks for 0.35 mile to the end of truck travel at a fence intersection. From this point peak westerly for about 75 yards to the summit of a low lava mound and the station.

A rock cairn with black and white pole plumbed over the station has been built at this station.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 536
 (REV. FEB. 1948)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **LAALOA** STATE: **HAWAII**
 ESTABLISHED BY: **L. C. Wilder** YEAR: **1948**
 RECOVERED BY: **W. R. Porter** YEAR: **1957** 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 except the power pole numbers have been changed.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **LAALOA**

STATE: **HAWAII**

YEAR: **1948**

SECOND ORDER

SOURCE: **G- 9275**

GEODETIC LATITUDE: 19° 35' 27.670	ELEVATION: 0.7 METERS
GEODETIC LONGITUDE: 155° 58' 28.410	22 FEET

STATE COORDINATES (FWS)				
STATE & ZONE	CODE	X	Y	θ OR Δ ANGLE
HI 1	5101	330,654.35	275,372.74	- 0 09 33

* 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
AZ MK POINT	349° 41' 34.1	349° 51' 07	5101

QE 052

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1035

LATITUDE 0 0 ' TO 0 0 '
 LONGITUDE 0 0 ' TO 0 0 '
 DIAGRAM

LAALOA (continued)

R

RECOVERY NOTE, TRIANGULATION STATION

R

FORM 526a
 (9-18-65)

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

NAME OF STATION: LAALOA
 ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii
 RECOVERED BY: R.C. Munson YEAR: 1968 COUNTY: Hawaii
 Island: Hawaii

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.7 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	
KEAHOHU COAST -----1948 DISTANCE and DIRECTION-----				00 00 00.0
R.M. No. 2	SSW	28.544	8.700	23 05 47
R.M. No. 1	NNW	27.748	8.458	167 43 48
Azimuth (POINT) 2 mi.	SSE			357 36 32.3
KEAHOHU COAST 1948 -----1968 DISTANCE and DIRECTION-----				00 00 00.0
R.M. No. 2	SSW	28.520	8.693	23 05 28
Kailua Light, 1957	NNW			158 57 02.1
R.M. No. 1	NNW	27.817	8.479	167 44 54.
POINT 1928 (Azimuth Mark)	SSW	2 miles		357 36 31.5

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

Station is located about 3-3/4 miles southeast of Kailua and 3/4-mile northwest of Kahaluu County Park, along coast, about 150 feet west of the macadam road, on a rocky point where the shoreline begins curve in to southeast into Kahaluu Bay. It is at west edge of brush-line, at about

22 feet elevation, at top of sloping rock beach bank.

To reach station from the post office in Kailua, go south on State Highway 19 for 0.05 mile to T-junction by harbor. Turn left and follow highway southerly through town and along coast for 4.2 miles to house just past power pole No. 75 (in small numbers, also has 89 in large numbers). Pack through yard of home and go right, along rocky beach about 150 feet northwest to station.

Station mark is a standard disk stamped "LAALOA 1948", cemented in a drill hole in bedrock, and surrounded by an 8-foot-diameter stone platform extending 1 foot above the mark. It is 68 feet south of a stone wall bordering the south side of a lawn.

Reference mark number one is a standard disk stamped "LAALOA 1 1948", cemented in a drill hole in an open bedrock area, 40 feet south of the corner of the stone wall and 5.5 feet lower than station mark.

Reference mark number two is a standard disk stamped "LAALOA 2 1948", cemented in a drill hole in bedrock 1 foot northwest of the base of a 2-foot ledge, and is 6.2 feet lower than station mark.

POINT 1928 (Azimuth Mark) is a standard triangulation disk, stamped "POINT 1928", cemented in a drill hole in bedrock on low knoll on Kauka-laelae Point, near south side of Keahou Bay.

NAME OF STATION: LAALOA
 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: 3.5 NM SSE of Kailua, Kona
 HEIGHT OF TELESCOPE ABOVE STATION MARK Tripod FEET. HEIGHT OF LIGHT ABOVE STATION MARK FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KEAHOHU RM 1 1928/1948				00 00 00.0
KAILUA LIGHT 1957/1972	NNW			10 31 09.12
RM 1	N	28.80	8.760	19 17 53.5
RM 2	SW	28.08	8.509	234 44 41.9

Station mark and Reference marks recovered as described in good condition. Power pole number 74 has been renumbered 89; however, the original number is still visible.

* 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-P-80

* 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&GS-526a (12-65)

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 Old Hawaiian Datum

QUAD 191554 STATION 1036
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1,5 HAWAII

NOAA FORM 76-39
 12-70
 FORMERLY CGS FORM 520

U. S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: LAE NIAU 2 · STATE: Hawaii · COUNTY: Hawaii ·
 NEAREST TOWN: Kailua · QUADRANGLE NO.: 191554
 CHIEF OF PARTY: GEH · YEAR: 1972 · DESCRIBED BY: RDB

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK		HEIGHT OF LIGHT ABOVE STATION MARK		METERS
	METERS	FEET	METERS	FEET	
	SURFACE-STATION MARK, DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
	UNDERGROUND-STATION MARK		DISTANCE		DIRECTION
	OBJECT	BEARING	FEET	METERS	
	Keahole Point Light, 1928 ·				00 00 00.0
	R. M. No. 1 (Old LAE NIAU).	SSW	23.68	7.220	258 20 39.2

Detailed description:

Station is located on the Kona Coast of Hawaii island, 3 miles northwest of Kailua, 1.2 miles south of intersection of State Highway 18 and State Highway 19 (Palani Junction) and about 200 feet west of Highway 18.

To reach station from Kailua post office, follow State Highway 19 northeast to junction with State Highway 18. Turn right and head south on State Highway 18 for 1.2 miles to the Taniguchi residence, a well landscaped home overlooking the coast north and south of Kailua. Station is located near the northwest corner of the Taniguchi property, about 200 feet west of the highway. Follow a natural lava walkway on north side of property up the hill to lava rock protrusions. Station is located on a lava rock about 4 feet wide and 8 feet long, 20 feet north of higher, more prominent lava protrusion in which old LAE NIAU station is located.

Station is a standard disk stamped "LAE NIAU 2 1972" cemented in drill hole in lava rock.

Reference mark 1 is old station LAE NIAU established by the State Highway Department. It is a 5 inch triangle inscribed in lava rock around a drill hole. It is about 2 ft. higher than LAE NIAU 2 on a more prominent lava protrusion.

* Refers 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. § U. S. GOVERNMENT PRINTING OFFICE: 1971-760-091

ADJUSTED HORIZONTAL CONTROL DATA

ADJUSTMENT BY NGS

NAME OF STATION: LAE NIAU 2 OBS BY NGS
 STATE: HAWAII YEAR: 1972 SECOND ORDER

SOURCE: G-14950

GEODETIC LATITUDE: 19° 40' 39.05468	ELEVATION: 453.1 METERS
GEODETIC LONGITUDE: 155 58 13.73521	1487 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE °
HI 1	5101	338,144.72	306,781.20	- 0° 09' 30"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From 1928)	PLANE AZIMUTH* (From 1928)	CODE
KEAHOLE POINT LIGHTHOUSE	121° 08' 33.8	121° 18' 04"	5101

THESE DATA OBTAINED FROM ADJUSTMENT OF SEP 1979

RL 175

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 151554 STATION 1037
 HAWAII
 LATITUDE 19 ° 30' TO 20 ° 00'
 LONGITUDE 155 ° 30' TO 156 ° 00'
 DIAGRAM NE 5-1,5 HAWAII

Lava Cone (Hawaii Island, E. R. Hand, 1913).—In North Kona, northwest of Mount Hualalai, a steep lava cone, black and bare, below the Government road near John Maguire's house, and 1,200 meters northwest of station Akahipuu. It is the source of the lava flow, probably of 1801, which ran down to the north side of Keahole Point, and may be identified by following with the eye to the inshore and upper apex of this roughly triangular area of black, and comparatively recent lava. Not marked.

RECOVERY NOTE, TRIANGULATION STATION
 INTERSECTION

NAME OF STATION: Lava Cone
 ESTABLISHED BY: E.R. Hand YEAR: 1913 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:

The hill was identified by angle, and visited. Located about 8 miles north of Kailua and 0.6 mile north-northwest of the Huehue Ranch headquarters, on slopes running down toward sea from State Highway 19. A bare, black, jagged-topped volcanic cone, named Puhia Pele, at about 1637 feet elevation.

There is now a survey mark, consisting of a 1-inch, iron pipe projecting 1 foot from the top of a 14-inch-diameter, concrete mound, with the word "NEAR" inscribed in the concrete, on the southeast rim of the crater, about 50 feet southeast from highest point of the rim. Observations made at this mark indicated that the center of the hill was intersected in 1913.

RECOVERY NOTE, TRIANGULATION STATION
 INTERSECTION

NAME OF STATION: LAVA CONE
 ESTABLISHED BY: E.R. Hand YEAR: 1913 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: R.L. Newsom YEAR: 1968 COUNTY: Hawaii
 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 is located about 8 miles north of Kailua-Kona and about 1000 yards north-northwest of State Route 19 on land sloping down to the coast. From the highway this feature appears to be a ridge of volcanic rock running east-west with the east end being a cone-shaped formation which is the highest point on the ridge. The rim of this cone is very irregular and is about 100 feet across. Not to be confused with a smaller cone only half as high and located 150 feet east of the major cone. A sign on the highway points out the cone as named Puhia Pele.

To reach the station from the post office in Kamuela, go south on State Route 19 for 6.3 miles to junction with State Highway 20. Continue on State Route 19 for 24.2 miles and pass Huehue Ranch driveway on left. Continue south another one-half mile to paved side road on right. The locked gate at the entrance to this road has the sign "Private road-Huehue/Kona Village" on it and permission to enter may be obtained at the Huehue Ranch. Pass through gate and proceed downhill for 0.9 mile to unlocked gate on right. After passing through this gate follow a jeep trail that parallels the fence in a northerly direction; this trail can

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: LAVA CONE

STATE: HAWAII

YEAR: 1913

THIRD

ORDER

SOURCE: G-SP156

GEODETTIC LATITUDE:	19 ° 45' 53.08	ELEVATION:	METERS
GEODETTIC LONGITUDE:	155 58 39.65		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE
HI 1	5101	335,757.35	338,467.15	- 0 ° 09' 42"

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

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

90 250

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 191554 STATION 1037

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

LAVA CONE (continued)

be followed 300 yards to come within 75 yards of the base of the cone. There is no marked trail to the top and the most direct ascent is rather steep.

The station was intersected in 1913 and the description does not specify which part of the rim was actually intersected. However there is a survey marker on the east edge of the rim consisting of a one-inch iron pipe projecting one-foot from the top of a 14-inch diameter concrete mound, with the word "NEAR" inscribed in the concrete. This mark is about 50 feet southeast of the highest rock on the rim. The recovery note of this intersection station says that observations in 1967 indicated that the center of the cone was intersected in 1913. This recovery (November, 1968) does not speculate as to the location of the intersection. The iron pipe was occupied and two photo-identifiable substitute stations were established with respect to the pipe initializing on station MOANUIAHEA, 1948.

In November 1968 Cdr. R. L. Newson photo-identified two substitute stations and referenced them to iron pipe "NEAR". The Photogrammetry Division completed an aerotriangulation bridge of the area in December 1968. The bridge had four triangulation stations within a tolerance of 5 ft. LAVA CONE, 1913 and the two substations for "NEAR" were floated and read as pass points. The aerotriangulation difference between the two subpoints checked the field difference within a 1 ft. tolerance verifying the accuracy of the prefield identification and field measurements.

The aerotriangulation positions iron pipe "NEAR"
80 ft. south of Intersection station
LAVA CONE, 1913.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1038
 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 502
 Rev. Aug. 1958

DESCRIPTION OF TRIANGULATION STATION

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

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

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK FEET	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†
			feet	meters		
4	Surface-station mark, Underground-station mark	2.5				
12a	PUU OHAU (metal target)				00 00 00	
12a	R. M. 1		14.910	4.545	239 07 20	
12a	R. M. 2		18.381	5.603	317 45 47	
	Kainaliu Spire (St. Pauls)				320 20 58.2	

The station is located in the front yard of a residence about 3 miles north northwest of Kainaliu, about 2.5 miles east southeast of Keaunou, about 1.5 miles south of the Keaunou School, about 0.1 mile north of the Tong Wo Tong Cemetery, about 500 feet west of the highway which runs between Kainaliu and Holualoa, about 50 feet west of a water tank and 21.5 feet southwest of the southwest corner of a house.

To reach from the post office in Kealahou; to northerly on the road which leads toward Holualoa for 3.1 miles; pass to the right hand side of the Tong Wo Tong Cemetery and continue north for 0.05 mile to the end of truck travel at the side of the road. From this point peak westerly, along a cleared trail, for about 500 feet to the house and the station.

The station is a standard disk stamped LUN 1948, set in solid ledge about three feet below the surface of lease rock.

Reference Mark No. 1 is a standard disk, stamped LUN 1 1948, set in a drill hole in solid ledge which projects about 4 inches and is about 2 feet higher than the station. It is located one foot west of the edge of the porch of the house.

Reference Mark No. 2 is a standard disk, stamped LUN 2 1948, set in a drill hole in solid ledge which projects about 1 foot and is 1.15 feet lower than the station.

* 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: **LUN**
 STATE: **HAWAII** YEAR: **1948** SECOND ORDER

SOURCE: **G- 5279**

GEODETIC LATITUDE:	19 33 26.850	ELEVATION:	356.9 METERS
GEODETIC LONGITUDE:	155 56 21.648		1302 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (OR Δ) ANGLE*
HI 1	5101	348,743.82	263,152.79	- 0 08 50

* 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
PUU OHAU	19 59 16.5	20 08 06	5101

QE 053

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1038
 LATITUDE ° ' TO ° '
 LONGITUDE ° ' TO ° '
 DIAGRAM

LUN (continued)

FORM 526a
 (6-18-65)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: LUN
 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 1.94 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	
PUU OHAU -----1948	DISTANCE			00 00 00.0
R.M. 1	E	14.910	4.545	239 07 20
R.M. 2	SSE	18.381	5.603	317 45 47
Kainaliu Spire (St. Pauls)				320 20 58.2
PUU OHAU (HGS) 1883 -----1967	DISTANCE			00 00 00.0
R.M. No. 1	ENE	14.901	4.542	239 05 42
R.M. No. 2	SSE	18.391	5.607	317 41 11
Kainaliu, St. Pauls Catholic Church, spire, 1928.	SSE			320 20 59.8

Station was recovered and all marks found in good condition. The house mentioned in original description is gone and the area is overgrown with dense grass and weeds. A complete description follows:

Station is located about 4-1/2 miles south of Holualoa, 1-1/2 miles north-northwest of Kainaliu, and 1-3/4 miles east-southeast of Keauhou Bay, at about 1302 feet elevation, on a brush and tree-covered high point between old State Highway 11 and new Highway 11.

To reach station from the post office in Holualoa, go south on State Highway 18 for 3.9 miles to junction with State Highway 11. Continue south, on State Highway 11, for 1.0 mile to end of truck travel at power pole 76X, at row of mailboxes on left. Pack southwest, passing power pole 323, and go down slope covered with high, dense grass for about 300 feet to station on point of hill.

Station mark is a standard disk stamped "LUN 1948", cemented in a drill hole in bedrock 2-1/2 feet down inside a 16-inch-diameter hole in the level layer of loose rocks. It is 150 feet west of a rectangular stone pen, 100 feet west-northwest of a large avocado tree, 100 feet west-southwest of a large, lone, breadfruit tree, and about 75 yards northeast of new State 11, up on the bluff about 75 yards higher than the highway and on a line about midway between power poles 34 and 34X, and 4 feet west of a white witness post.

Reference mark number one is a standard disk stamped "LUN 1 1948", cemented in a drill hole in bedrock flush with ground, about 2 feet higher than station mark.

Reference mark number two is a standard disk stamped "LUN 2 1948", cemented in a drill hole in bedrock flush with ground. It is 1 foot west of a low, loose, rock fence and is 2 feet lower than station mark.

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

NOTE - One of

forms must be used for every station recovered.

USCGM-DC 8717

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: LUN
 ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: R.C. Munson YEAR: 1968 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 and all marks found in good condition, however, the lot was recently purchased by Mr. G. Hakoda, who plans to build a home, and the station will be covered either by the house or by landscaping, and he requested that it be moved. A new station, HONALO, was established about 1/4-mile south; see description for that station.
 NOTE: The station mark was not removed.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: LUN
 ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: GEH YEAR: 1972 COUNTY: Hawaii
 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 D.M. Whipp (1967) in good condition. An asphalt drive has been constructed, exiting State Hwy 11 near power pole 76X and traveling downslope to a point approximately 30 feet south of the station.

FORM CGS-526 (6-65)
 USCGM-DC 86496-P-60

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151554 STATION 1039
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-15 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 525
 Rev. Aug. 1963

DESCRIPTION OF TRIANGULATION STATION

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

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

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.		DIRECTION	
			feet	meters	0	1
1a	6.3					
12a	R M 2	NE 29.862	9.103	00	00	00
11c	R M 1	SE 26.130	7.966	175	21	52
	Kealakekua Spire (Kona Church)			286	00	07
				328	12	29.1

The station is located on the top of a rock wall about 3 miles southeast of Keauhou Bay, about 2.5 miles east of the beach, about 1.5 miles north of Kealakekua, about 100 yards north of a small shack, about 250 feet south of a small shack, 16 feet west of the junction of two rock walls and on the eastern edge of a coffee plantation.

To reach from the post office in Kealakekua, go north, on the road which leads toward Holualoa, for 2.1 miles; turn right and follow a track road, northerly, for 0.2 mile; turn right and go easterly for 0.1 mile; turn left and go across country, northerly, keeping close to the rock wall, for about 100 yards to the end of truck travel at a rock fence corner. From this point the station lies about 75 feet to the west.

The station is a standard disk, stamped MAIHI 1948, set in a mound of concrete which is on the top of a stump which projects about 1 foot above the top of a rock wall.

Reference mark number 1 is a standard disk, stamped MAIHI 1 1948, set into an irregular mass of concrete which is on the top of a rock wall. It is located 10 feet south of the junction of two rock walls and is about 4 feet higher than the station.

Reference mark number 2 is a standard disk, stamped MAIHI 2 1948, set into a drill hole in a boulder which is about 5 feet in diameter and projects about 1 foot. It is located 22 feet north of a rock wall and is about 5 feet lower than the station.

No azimuth mark was established for this station.

A cairn of rocks 6 ft square and 4 ft high, with black and white pole plumbed over the mark was erected 2/7/49.

* Refers 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: **MAIHI** STATE: **HAWAII** YEAR: **1948** ORDER: **SECOND**

SOURCE: **G- 9279**

GEODETIC LATITUDE: 19 32 55.104	ELEVATION: 479.5 METERS
GEODETIC LONGITUDE: 155 55 52.078	1575 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE
HI 1	5101	351,564.65	260,546.03	- 0 08 39

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
KEOPIKA	18 54 51.2	19 03 30	5101

QE 055

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 191554 STATION 1039

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

MAIHI (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: MAIHI
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

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

Station was recovered and all marks found in good condition. All lines are blocked by trees. A discrepancy of .051 meter was noted in the distance to RM No. 2, this was double-checked and the 1967 distance is correct. A complete description follows:

Station is located about 8 miles southeast of Kailua, 2 miles north-northwest of Kealakekua, and 1/4-mile north of Honalo, at about 1573 feet elevation, in the Ikedas' coffee grove, on the north wall of an old heeiau.

To reach station from the post office in Holualoa, go south on State Highway 18 for 3.9 miles to junction of State Highways 18 and 11. Continue south, on State Highway 11, for 1.9 miles to highway junction at north edge of Honalo. Turn back sharp left and go north on narrow macadam road for 0.2 mile to side road right at telephone pole 62. Turn right and go 0.1 mile to top of grade and old house on left. From here pack north through old coffee grove for 150 feet to station just beyond banana clump.

Station mark is a standard disk stamped "MAIHI 1948", set in the top of a concrete monument on top of an old heeiau wall. A large, 8-foot square, flat-topped cairn, or working platform, has been built of rock around the mark, and it is 3-1/2 feet down inside a hole in center of platform. Station is 25 feet north-northeast of a clump of banana and hala, about 150 feet north of Ikedas' house and coffee mill, 200 feet south of old house in coffee grove. Top of rock platform extends about 8 feet above ground at north side. There is a 2 x 2 target pole 12 feet long centered over the mark.

Reference mark number one is a standard disk stamped "MAIHI NO 1 1948" set in a 10-inch mass of concrete in depression on top of east wall of the heeiau, 9 feet north of a stone wall running east from east edge of heeiau, and 4 feet higher than station mark. The mark is 7.964 meters, (26.128 ft.) southeast from station mark.

Reference mark number two is a standard disk stamped "MAIHI NO 2 1948", cemented in a drill hole in bedrock in the coffee grove. It is 18 feet north from north end of heeiau wall and about 2 feet lower than station mark. The mark is 9.062 meters (29.730 ft.) northwest of station mark.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: MAIHI
ESTABLISHED BY: LC Wilder YEAR: 1948 STATE: Hawaii BENCH MARK(S) ALSO
RECOVERED BY: GEH YEAR: 1972 COUNTY: Hawaii
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 was recovered and all marks found in good condition as described by D. M. Whipp in the 1967 recovery with the exception that the target pole no longer stands. The cairn is beginning to fall apart at the top, some rocks had to be cleared away before the station mark could be seen.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151554 STATION 1040
 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 528
 Rev. Aug 1968

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **MOANUIAHEA** STATE: **HAWAII** COUNTY: **HAWAII**

CHIEF OF PARTY: **L. C. WILDER** YEAR: **1948** Described by: **G. 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		
			OBJECT	BEARING	DIRECTION †
2	Surface-station mark, Underground-station mark	1.35			
			feet	meters	
					00 00 00
					25 09 49
					46 24 10.4
12c	R. M. No. 2, 1948		12.22	3.725	54 15 48
12c	R. M. No. 1, 1948		16.58	5.055	133 22 37

Located about 1.5 miles southeastward of the main highway and the Huehue Ranch main buildings, in South Kona. On the westerly end of a prominent grassy hill with a flat top about 80 feet long by 40 feet wide and which overlooks the entire seacoast from Kailua to Kohala. A fence running east and west is situated 300 feet north of the station.

To reach station, take road beginning at and running southeastward from Huehue Ranch headquarters and follow same for a distance of about one mile, to a point about 500 feet from a water-tank, from which point Moanuihea hill can be seen about 1/2 mile to the southeast. Follow trail eastward to the water-tank and continue eastward about 500 feet, to a gate and fence crossing the trail. Then right or southward after going thru gate and follow a trail towards the hill. The trail is not clear but open pasture areas make it easy to reach the station.

Center mark is a standard disk set in solid rock, 3 feet long and about 1 foot above the ground.

Two reference marks were set in solid rock.

There is a cross and drill hole out in rock, under a cairn, located on the westerly end of the hill. This is probably an old station or boundary marker.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **MOANUIAHEA**

STATE: **HAWAII**

YEAR: **1948**

SECOND

-ORDER

SOURCE **G- 5275**

GEODETIC LATITUDE	19 44 30.505	ELEVATION	962.0 METERS
GEODETIC LONGITUDE	155 57 22.046		3222 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE
HI 1	5101	343,146.97	330,116.50	- 0 05 15

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
KUILLI HGS	139 03 16.8	139 12 32	5101

QE 047

† Before to notes in manuals of triangulation and state publications of triangulation. † Direction-angle measured clockwise, referred to initial station.
 † † nearest meter only, when no trigonometric leveling is being done. 16-50882-1 U. S. GOVERNMENT PRINTING OFFICE

(continued on next page)

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1040

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

MOANUIAHEA (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

FORM 526a
 (9-18-69)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

R

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

NAME OF STATION: MOANUIAHEA
 ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: R.L. Newsom YEAR: 1968 COUNTY: Hawaii
 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 was recovered in good condition (the drill hole mentioned in the original description was not recovered).

Location is about 1.5 miles southeastward of State Route 19 and the main buildings of the Huehue Ranch (10.5 miles north of Kailua-Kona). On the westerly end of a prominent grassy knoll with a flat top about 80 feet by 40 feet and which overlooks the entire seacoast from Keauhou to Kohola. A fence running east-west is situated 300 feet north of the station. The hill has upon it several wooden power line poles and a small building used to house a substation.

To reach the station from the post office in Kamuela, go south on State Route 19 for 6.3 miles to junction with State Route 20. Continue on State Route 19 for 24.2 miles to the Huehue Ranch driveway on left. Enter driveway, go to right of garage building towards frame house. Proceed on dirt road through locked gate (key obtained at frame house to right of road from ranch owner). Road goes uphill through unlocked gate to base of the hill where power line poles can be seen on the side of hill. Follow rough road to the right around base of hill for 200 yards where road switches back to the left and becomes a jeep trail for 250 yards to the top.

Station is a standard disk stamped MOANUIAHEA, 1948 set in solid rock 3 feet long by 2 feet wide and 6 inches above ground. There is a small pile of rocks set around the station.

Reference mark number one is a standard disk, unstamped, about 2 feet lower than the station in solid rock which barely protrudes out of the heavy growth of grass.

Reference mark number two is a standard disk unstamped about 3 feet lower than the station set in solid rock which is also hidden in the heavy grass.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: MOANUIAHEA
 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: 6.9 NM NNE of Kailua Kona
 HEIGHT OF TELESCOPE ABOVE STATION MARK 5.0 FEET. HEIGHT OF LIGHT ABOVE STATION MARK FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KUILI (HGS) 1882-----1948 DISTANCE and DIRECTION-----		00	00	00.0
R.M. No. 1	N	16.58	5.055	31 50 30
Keahole Point Lighthouse	W			304 52 03.4
R.M. No. 2	W	12.22	3.725	312 43 41
KUILI (HGS) 1882-----1967 DISTANCE and DIRECTION-----		00	00	00.0
R.M. No. 1	NNW	16.531	5.039	31 46 55
Keahole Point Lighthouse, 1928	WSW			304 52 00.6
R.M. No. 1	W	12.181	3.713	312 41 19

Station was recovered and all marks found in good condition. The old drill hole was recovered at the published distance and azimuth from the station mark. A complete description follows:

Station is located about 7-1/2 miles northeast of Kailua-Kona and 1-1/2 miles southeast of the Huehue Ranch headquarters, on the northwest end of a long hill of about 3222 feet elevation, called Moanuihea. Two power poles of a northeast-southwest power line are on the hill near the

station, and a radio relay station, with 2 tall wooden antenna poles and a small building, are just southeast of the station.

To reach station from the post office in Kamuela, go south on State Highway 19 for 6.4 miles to junction with State Highway 20; continue on State Highway 19 for 24.4 miles to macadam side road left and sign "HUEHUE RANCH". Turn left and go 0.1 mile to locked gate. (Key was obtained at house to right of gate). Pass through gate and go 0.1 mile to second gate; pass through gate and follow track road southeast along power line and around right side of hill, for 1.6 miles to side road left. Turn left and go up steep road for 0.3 mile to top of hill and station.

Station mark is a standard disk stamped "MOANUIAHEA 1948", cemented in a drill hole in a bedrock outcrop projecting 6 inches from ground; on small grassy hump, 32.5 feet west-northwest of the northwest 1 of 2 antenna poles, 38 feet northwest of edge of radio building, and 18.0 feet west of power pole 24.

Reference mark number one is a standard disk stamped "MOANUIAHEA 1 1948", cemented in a drill hole in bedrock flush with ground, hidden in heavy grass on northeast edge of hill, 1 foot from ledge, and 2 feet lower than station mark.

Reference mark number two is a standard disk stamped "MOANUIAHEA 2 1948", cemented in a drill hole in bedrock flush with ground and hidden in heavy grass, 2 feet lower than station mark.

Drill hole is a shallow, 1-inch-diameter, hole in center of a chiseled cross in rock flush with ground, hidden by a cover of heavy grass. The top of the rock is beginning to deteriorate due to root growth on it.

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.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KUILI 1882				00 00 00.0
RM 1	NNW	16.55	5.045	31 48 37.3
RM 2	W	12.23	3.720	312 43 52.3
RM 3	ESE		55.151	159 45 38.2

Station mark and Reference marks No. 1 and 2 were recovered as described by D.M. Whipp (1967) in good condition. Reference mark No. 3 was set and its position established as a location for a Hi-Fix antenna.

Reference mark No. 3 is a standard disk stamped "MOANUIAHEA 3 1972" set in a concrete monument flush with the surrounding ground. It is set in the middle of an open grassy area approximately 10 feet below the station mark. A small wooden shack was erected approximately 45 feet WNW of the reference mark.

DEC 1979
 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

QUAD 191554 STATION 1041
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

SEE STATION MOANUIAHEA

ADJUSTED HORIZONTAL CONTROL DATA ADJUSTMENT BY NGS

NAME OF STATION MOANUIAHEA RM 3 OBS BY NGS
 STATE HAWAII YEAR 1972 SECOND -ORDER

G-14950
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE	19° 44' 29.64050	ELEVATION	979.3 METERS
GEODETIC LONGITUDE	155 57 20.38637		3213 FEET

STATE COORDINATES (feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE
HI 1	5101	343,305.27	330,028.86	- 0° 09' 14"

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

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

THESE DATA OBTAINED FROM ADJUSTMENT OF SEP 1979

RL 182

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 151554 STATION 1042
 HAWAII
 LATITUDE 15° 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: **NAPUKALUA**
 STATE: **HAWAII** YEAR: **1882** ORDER: **THIRD**
 SOURCE: **G-SP156**

GEODETIC LATITUDE:	15 44 56.047	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 37 59.325		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE*
HI 1	5101	454,216.03	332,500.21	- 0 02 42

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

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

QQ 246

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1043
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1,5 HAWAII

Nawai (Hawaii Island, K. T. Adams, 1928).—On the northwest coast of Hawaii, on Mano Point, south side of Kiholo Bay, at an elevation of about 50 feet, on a large boulder or lava cinder, which is on the highest and most prominent point looking from the northwest. It is nearly in the center of a lava "aa" flow, 3 meters west of the trail which crosses the flow, and about 200 meters back from the shore line. Station is 1,050 meters, N. 77° W. (true) of the southwest end of a small sand beach, and 2,780 meters, S. 78° W. (true) of the outlet of a fish pond at the east side of a deep bight in east side of Kiholo Bay. Marked with a standard disk station mark according to note 5, while two standard disk reference marks, note 12c, were set at the following distances and azimuths from the station: No. 1, 12.82 meters (42.1 feet), 340° 02'; No. 2, 14.64 meters (48.0 feet), 79° 28'.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **NAWAI**
 ESTABLISHED BY: **K. T. Adams** YEAR: **1928** STATE: **Hawaii** BENCH MARK(S) ALSO
 RECOVERED BY: **R. L. Newsom** YEAR: **1968** COUNTY: **Hawaii**
 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 was recovered and all marks found in good condition; station was not occupied at this time.

Station is located about 15 miles north-northeast of Kailua and 8½ miles northwest of Puu Waawaa Ranch headquarters; at the west end of Kiholo Bay, about 2200 feet northwest of Luahinawai Pond and small clump of palms and 600' south from Nawaikulia Point, at north side of trail and on a large flat rock in midst of lava flow.

To reach station from post office in Kamuela, go south on State Highway 19 for 6.3 miles to junction with State Highway 20. Continue on State Highway 19 for 15.3 miles to Puu Waawaa Ranch driveway on left. Continue on the highway for 2.85 miles to locked gate on right, 30 yards before power pole #226. (Key from Puu Waawaa Ranch office) Pass through gate and follow rough road for 6.2 miles to beach at 2 stone house ruins. Go left on beach road for 1.3 miles to end of beach and road. Pack westerly on old trail across lava flow about 200 yards to fish ponds; continue on trail about 2200 feet to station.

Station mark is a standard disk, unstamped, cemented in a drill hole in west side of bedrock knoll 3 feet from highest part and 11 feet north of north side of trail.

Reference mark number one is a standard disk, unstamped, cemented in a drill hole in large black lava rock projecting 3 feet above ground. It is 7.4 feet lower than station mark.

Reference mark number two is a standard disk, unstamped, cemented in a drill hole in large oval-shaped rock projecting 3 feet above ground at north edge of trail and is 2½ feet lower than station mark.

CAUTION: A four-wheel-drive vehicle is required.

R

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **NAWAI**
 STATE: **HAWAII** YEAR: **1928** **THIRD** ORDER
 SOURCE: **G-SP15c**

GEODETIC LATITUDE:	19 51 19.307	ELEVATION	17	METERS
GEODETIC LONGITUDE:	155 56 57.389	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE °
HI 1	5101	345,611.85	371,350.63	- 0 09 05

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
ANAEHOOMALU	215 54 18.9	216 03 28	5101

QD 249

(continued on next page)

HORIZONTAL CONTROL DATA

QUAD 191554 STATION 1043

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

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

NAWAI (continued)

FORM 3200
 (9-18-69)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: NAWAI
 ESTABLISHED BY: K.T. Adams YEAR: 1928 STATE: Hawaii
 RECOVERED BY: R.C. Munson YEAR: 1968 COUNTY: Hawaii
 Island: Hawaii

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
ANAHOOMALU 1913 -----1928 DISTANCE	CE and	DIRECTION-----	00 00 00.0	
R.M. No. 1		42.1 12.82	124 07 41	
R.M. No. 2		48.0 14.64	223 33 41	
ANAHOOMALU 1913 -----1968 DISTANCE	CE and	DIRECTION-----	00 00 00.0	
R.M. No. 1	SE	41.806 12.743	124 09 20	
R.M. No.2	W	48.026 14.639	229 30 25	

Station was recovered and all marks found in good condition, however, a discrepancy of nearly 6 degrees was noted in the direction to RM No. 2. A complete description follows:

Station is located about 15 miles north-northeast of Kailua and 8-1/2 miles northwest of Puu Waawaa Ranch Headquarters; at the west end of Kiholo Bay, about 2200 feet northwest of Luahinawai Pond and small clump of palms and 600 feet south from tip of Nawaikulua Point, at north side of trail, and on a high point in lava area, at about 55 feet elevation.

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

Highway 19 for 6.3 miles to junction with State Highway 20. Continue on State Highway 19 for 15.3 miles to Puu Waawaa Ranch driveway on left. Continue on the highway for 2.85 miles to locked gate on right, 30 yards before power pole 226. (Key was obtained at Puu Waawaa Ranch office). Pass through gate and follow rough road for 6.2 miles to beach at 2 stone house ruins. Go left on beach road for 1.3 miles to end of beach and road. Pack westerly on old trail across lava flow about 200 yards to pond; continue on trail about 2200 feet to station.

Station mark is a standard disk, unstamped, cemented in a drill hole in west side of a bedrock knoll, 2 feet from highest part, and 15 feet north of trail.

Reference mark number one is a standard disk, unstamped, cemented in a drill hole in large black lava rock projecting 3 feet above ground. It is 7.4 feet lower than station mark.

Reference mark number two is a standard disk, unstamped, cemented in a drill hole in a large, oval-shaped rock projecting 3 feet above ground, at north edge of trail and 2-1/2 feet lower than station mark.

NOTE: A 4-wheel-drive vehicle is required.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: NAWAI
 ESTABLISHED BY: K. T. Adams YEAR: 1928 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: R. H. Houlder YEAR: 1971 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 13 miles south-southwest 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 as described in 1928. No measurements were made to the reference marks.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191554 STATION 1044
 HAWAII
 LATITUDE 15° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-15 HAWAII

Nohonaohae (Hawaii Island, Hawaiian Government Survey, 1873).—In the northern part of Hawaii, southern part of Waimea District, in Waikoloa, on a conspicuous hill, Mount Nohonaohae. Marked by an iron bolt let into the rock. A cairn of stones was built over the station.

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

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: Nohonaohae STATE: Hawaii COUNTY: Hawaii
 ESTABLISHED BY: H.G.S. YEAR: 1873 LOCALITY: South Kohala, Hawaii
 RECOVERED BY: Chas. I. Murray YEAR: 1933

Detailed statement as to the fitness of the original description:

Location of Station: On the West Crater rim of a high conspicuous hill of the same name just above the Waimea-Kona Government Main Road and about 3 miles distant from Waimea. The station is best approached from the upper side of the hill to which point a car can be driven by taking the Waiki Road and branching off through the pasture at telephone post No. 45. A horse trail goes up along the Kona slope of the hill directly to the station.
 Old Mark Found: 3/4" iron bolt driven in the ground with a large stonepile over it.

New Station Mark: H.T.S. Type D monument (Triangular concrete monument 7 1/2 ft. on each side with 2 1/2" pipe 2 feet long set on steel legs over the old mark which is left exposed to view). A metal target is set over the 2 1/2" pipe.

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

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: NOHONAOHAE STATE: HAWAII COUNTY: HAWAII
 ESTABLISHED BY: Hawaiian Govt. YEAR: 1873
 RECOVERED BY: L. C. Wilder YEAR: 1948

Detailed statement as to the fitness of the original description: In 1873 the station was reported to be "an iron bolt let into the rock". In 1938 the station was reported recovered by the Hawaiian Government Survey. Also in 1938 a new station, consisting of a 2 1/2 inch iron pipe, was reported to have been centered over the original mark. One reference mark was established. A new description follows—

The station is located on the western rim of an extinct volcanic cone, named Nohonaohae. The station lies about 16 miles northwest of the summit of Mauna Kea, about 11 miles southeast of Puako Bay, about 7 miles south of Waimea, about 1.2 miles south of the junction of the Saddle Road and the Waimea to Kona District road and about 0.7 mile west of the Saddle Road.

To reach from the post office in Waimea; go south on the road which leads toward the Kona District for 6.4 miles; turn left, southeast, onto the Saddle Road, which leads toward Hilo, and go 0.8 miles to telephone pole number 23; turn right, onto a track road, and go southwest for about 0.3 mile to the base of the hill and the end of truck travel. From this point pack southwesterly up the steep slope to the western rim of the cone and the station.

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. The concrete platform projects about 1 foot above the ground.

Reference mark number 1 is a standard disk, stamped 1 1948, set in concrete in the top of a 2 1/2 inch iron pipe which is flush with the ground and is about 2 feet lower than the station.

Object	Distance	Direction
AHUMOA (metal target)		00 00 00
R. M. No. 1 NE	6.713 m 22.026 ft	224 08 11
HOLOHOLOKU target NE	5 miles	246 04 36.08
PAPALEKOKI cairn ESE	14 miles	315 14 08.86

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

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

SOURCE G- 9275

GEODETIC LATITUDE	15 55 21.487	ELEVATION:	990.3 METERS
GEODETIC LONGITUDE	155 41 11.617		3249 FEET

STATE COORDINATES (feet)				
STATE & ZONE	CODE	X	Y	BIGN Δ ANGLE
HI 1	5101	435,918.16	395,611.65	- 0 03 49

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
HOLOHOLOKU	214 13 16.8	214 17 06	5101

QE J36

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1044
 LATITUDE ° ' TO ° '
 LONGITUDE ° ' TO ° '
 DIAGRAM

NOHONAOHAE (continued)

Form 526
 (11-8-65)

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

R

NAME OF STATION: NOHONAOHAE
 ESTABLISHED BY: H.G.S. YEAR: 1873 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:
 Station was found as described, however the reference mark has been dis-
 turbed. The reference mark No. 1 1943 was found loose and standing
 about a ft. above ground. A new description follows:
 Reference mark No. 1: Standard USGS disk stamped "1 1943" cemented on
 top of 2-in. pipe mounted in cairn, 22.19 ft. from station mark in
 azimuth W29°10'.
 Reference mark No. 2: Standard reference mark tablet stamped "2 1955"
 cemented on top of boulder, 11.43 ft. from station mark in azimuth 32°24'.

FORM 526
 (1-19-62)

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

R

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

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.65 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
HOLOHOLOKU (HGS) 1873				00 00 00.0
R.M. No. 2 (USGS)	SSW	11.296	3.444	177 56 38
R.M. No. 3	NNW	28.066	8.555	292 13 34
R.M. No. 1	NNE	22.010	6.710	337 57 50

Station mark and a U.S. Geological Survey reference mark number two were recovered in good condition. Reference mark number one was found setting on top of the ground, supported by a small cairn. A new reference mark, number three, was established. A complete description follows:

Station is located about 7 miles south of Kamuela and 1 mile southeast of the junction of State Highways 19 and 20, on the summit of Nohonaoahae, a prominent, bare hill of about 3249 feet elevation.

To reach station from the post office in Kamuela, go south on State Highway 19 for 6.6 miles; take left fork and go southeast on State Highway 20 for 1.15 miles to board gate on right, by telephone pole 36. Pass

through gate and go 0.2 mile to top of cinder pit. Continue ahead, around left side of hill, for 0.5 mile to end of truck travel at south side of hill. Pack up to top of hill and along rim to highest point and station. A 15-minute pack.

Station is marked by a 3/4-inch, iron pin, with the top battered to about 1-1/2 inches diameter, 6 inches down inside a 4-inch-diameter recess in the center of a triangular, concrete platform about 7 feet on each side and projecting 6 inches above ground. A 2-1/2-inch iron pipe, mounted on 3 iron legs, is centered over the mark and supports a red and white metal target.

Reference mark number one is a standard disk stamped "1 1948", cemented in the top of a 2-inch iron pipe that is set in the middle of a 2-foot cairn, and projects 2 feet above ground.

Reference mark number two is a USGS reference mark disk stamped "2 1955" cemented in a drill hole in a 3-foot boulder projecting 16 inches from ground. It is 1 foot lower than station mark.

Reference mark number three is a standard disk, stamped "NOHONAOHAE HGS 1873 NO 3 1967", cemented in a drill hole in a 20-inch-diameter bedrock outcrop projecting 2 inches above ground. It is 2.3 feet lower than station mark.

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 151554 STATION 1046
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

Pack (Hawaii Island, K. T. Adams, 1928).—Near northwest coast of Hawaii, in South Kohala District, at an approximate elevation of 225 feet, in a large outcropping of rock on top of a small rounded rocky knoll about 1,800 meters due east of Puako Point, and about 1,000 meters due east of the town of Puako. The country around this station is very uniform in character, consisting of rolling hills partially covered with algeroba bushes. The station can best be recovered from station *Puako*. Marked by a bronze hydrographic disk set in the outcropping bedrock.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **PACK**
 ESTABLISHED BY: **K.T. Adams** 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**

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

Station mark was recovered and found in good condition. Located about 4-1/2 miles south of Kawaihae Harbor, 3/4-mile east of Puako Bay and 800 feet southeast of station PUAKO NEW 1948, along the south side of a track road, on a small rounded knoll of about 231 feet elevation.

To reach station from the post office in Kawaihae, go southerly on the main road for 1.55 miles to fork and sign "PUAKO". Take right fork and go 3.9 miles to crossroad where macadam road turns right and the road left leads to a garbage dump. Continue ahead, on rough track road, for 0.1 mile to wire gate. Pass through gate and continue for 0.2 mile to second gate. Pass through gate and continue ahead for 0.2 mile to station on right.

Station mark is a Topographic Survey disk, unstamped, cemented in a drill hole in a boulder that projects 16 inches above ground. It is 5 feet north of a cairn.

FORM CGS-526 (1-65)
 US COM-GC 189 (9-78)

U. S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

ADJUSTED HORIZONTAL CONTROL DATA

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

SOURCE **G-SP156**

GEODETIC LATITUDE:	19 58 31.334	ELEVATION	70	METERS
GEODETIC LONGITUDE:	155 49 26.153	SCALED		FEET

STATE COORDINATES (Foot)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE
HI 1	5101	388,769.02	414,835.36	- 0° 06' 38"

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

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

QQ 242

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1047
 HAWAII
 LATITUDE 19 ° 30' TO 20 ° 30'
 LONGITUDE 155 ° 30' TO 156 ° 00'
 DIAGRAM NE 5-15 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 Form 535
 Rev. Aug. 1965

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **TANK A** STATE: **HAWAII** COUNTY: **HAWAII** SOUTH KOHALA DISTRICT

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

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK METERS.1	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	
	Surface-station mark, Underground-station mark		feet	meters	G I H
	This station was located by intersection.				

The station is the center of a wooden water tank which is about 15 feet in diameter and about 10 feet high. The tank has a flat roof and is painted red.

The station is located about 2.2 miles south of Waimea, about 0.5 mile east of the road which runs between Waimea and the Kona District, about 150 feet north of a concrete water trough, about 100 feet south of a grove of trees and about 50 feet south of a rock wall.

The station is on Parker Ranch property.

RECOVERY NOTE, TRIANGULATION STATION
 INTERSECTION **R**

NAME OF STATION: **Parker Ranch, tank A**
 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**

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 2 miles airline south of Kamuela, 1/2-mile southeast of the southwest end of the Kamuela Airport runway, and 1/2-mile east of State Highway 19, at 2676 feet elevation, in pasture land, at the southeast corner of a large, square, grove of trees.

Station is the center of a green, wooden, flat-topped, water tank 18 feet in diameter and 14 feet high.

RECOVERY NOTE, TRIANGULATION STATION **R**

NAME OF STATION: **PARKER RANCH TANK A**
 ESTABLISHED BY: **LCW** YEAR: **1948** STATE: **Hawaii** BENCH MARK(S) ALSO
 RECOVERED BY: **PDC** YEAR: **1978** COUNTY: **HAWAII**
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: **2.3 mis. south of Waimea**

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:
 Station recovered as described and in good condition.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **PARKER RANCH TANK A**
 STATE: **HAWAII** YEAR: **1948** **THIRD** ORDER

SOURCE: **G- 9275**

GEODETIC LATITUDE:	19 ° 55' 35.847	ELEVATION	METERS
GEODETIC LONGITUDE:	155 40 21.272		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ 10R Δ #1 ANGLE *
HI 1	5101	440,748.19	421,266.58	- 0 ° 03' 32"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE § 10R Δ #1 FORMULA NEGLECTING THE SECOND TERM.

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

QE 246

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191554 STATION 1048
 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 535
 Rev. Aug. 1968

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **PARKER RANCH, TANK C** STATE: **HAWAII** COUNTY: **HAWAII** DISTRICT: **SOUTH KOHALA DISTRICT**

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

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		
			DISTANCE		DIRECTION
			feet	meters	
This station was located by intersection.					

The station is the center of a wooden water tank which is about 15 feet in diameter and about 12 feet high. The tank has a flat roof and is painted red.

The station is located about 6.2 miles south of Waimea, about 1.5 miles east of junction of the road which goes to Hilo and the road which runs between Waimea and the Kona District, about 1.0 mile south of The Kamakoa Gulch, about 200 feet north of a smaller water tank and about 200 feet northeast of a concrete water trough.

The station is on Parker Ranch property.

RECOVERY NOTE, TRIANGULATION STATION
INTERSECTION

NAME OF STATION: **Parker Ranch, tank C**
 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**

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 5-1/2 miles south of Kamuela and 1-1/4 miles east of the junction of State Highways 19 and 20, at 2693 feet elevation, in open pasture land, along a 6-inch pipeline.

Station is the center of a red, wooden, flat-topped, water tank 30 feet in diameter and 17 feet high; 165 feet north of the end pole of a power line and 63 feet north of a group of red-roofed shacks.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **PARKER RANCH TANK C**
 STATE: **HAWAII** YEAR: **1948** THIRD ORDER

SOURCE **G- 9279**

GEODETIC LATITUDE:	19 56 29.062	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 40 17.031		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ or ANGLE
HI 1	5101	441,133.41	402,423.11	- 0 03 30

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

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

QE 248

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191554 STATION 1049
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-15 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 502
 Rev. Aug. 1965

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **TANK D** STATE: **HAWAII** COUNTY: **SOUTH KOHALA DISTRICT HAWAII**

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

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK METERS.1	HEIGHT OF LIGHT ABOVE STATION MARK METERS.	DISTANCE		DIRECTION 0 1 #
			feet	meters	
	Surface-station mark	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
	Underground-station mark				
	OBJECT	BEARING	DISTANCE		DIRECTION
			feet	meters	0 1 #
	This station was located by intersection.				

The station is the center of a wooden water tank which is about 10 feet in diameter and about 8 feet high. The tank has a flat roof, a ladder on its north side and is painted red.

The station is located about 5 miles south southwest of Waimea, about 0.8 mile west of the road which runs between Waimea and the Kona District, about 100 yards south of The Kamakoa Gulch and about 100 feet south of a concrete water trough.

The station is on Parker Ranch property.

RECOVERY NOTE, TRIANGULATION STATION
INTERSECTION

NAME OF STATION: **Parker Ranch, tank D**
 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**

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 4-3/4 miles south-southwest of Kamuela and 0.8 mile west of State Highway 19, at about 2398 feet elevation, on a knoll in pasture land, on a line and exactly midway between stations PUU PA (HGS) and NOHONAOHAE (HGS).

Station is the center of a green, wooden, flat-topped, water tank 18 feet in diameter and 14 feet high; about 45 feet southwest of a concrete water trough.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **PARKER RANCH TANK D**
 STATE: **HAWAII** YEAR: **1948** **THIRD** ORDER

SOURCE: **G- 9279**

GEODETIC LATITUDE:	19 57' 28.179	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 41 49.397		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	# OR Δ or ANGLE
HI 1	5101	432,328.39	408,396.55	- 0 04 02

* 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

QE 247

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151554 STATION 1050
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 30' TO 156° 00'
 DIAGRAM NE 5-1.5 HAWAII

Point (Hawaii Island, T. J. Maher, 1928).—On the west coast of Hawaii, Kona District, on south side of entrance to Keauhou Bay, just southward of a crevice in the rock. This crevice extends in an east and west direction, and just east of the station it bends in a southerly direction. The most northerly part of the crevice is about 18 inches higher than the station. Station is marked according to note 2, a standard disk in outcropping bedrock. Reference marks, note 12a, standard reference disks in outcropping bedrock, were set at the following distances and azimuths from the station: No. 1, 3.92 meters (12.9 feet), 342° 54'; No. 2, 10 meters (approximate), 55° 23'. A cross cut in a stone is 1.89 meters (6.2 feet) from station in azimuth 158° 50'. Station and reference mark 1 are in range with Puu Ohau. Station and reference marks form a range which passes just westward of the south point of entrance; extended to Kailua Bay it passes eastward of the wharf and just westward of red house at eastern end of bay. From the station three houses on hill eastward of Keauhou Bay are on range. Station is inshore from western edge of point, to avoid Puu Ohau being cut out by a high point about ¼ mile to southward.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION POINT
 STATE HAWAII YEAR 1928 THIRD ORDER
 SOURCE G- 9279

GEODETIC LATITUDE	19 33 42.326	ELEVATION	9.0 METERS
GEODETIC LONGITUDE	155 58 08.207		30 FEET

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 836
RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: POINT
 ESTABLISHED BY: T. J. Maher YEAR: 1928 STATE: HAWAII
 RECOVERED BY: L. C. Wilder YEAR: 1948 COUNTY: HAWAII

Detailed statement as to the fitness of the original description: The station and two reference marks were recovered in good condition. This station was not occupied at this time but was used as an azimuth to triangulation station LAALOA which is about 2 miles to the north. A new description follows—

The station is located on Kaukaelaes Point about 6 miles south southeast of Kailua, about 0.4 mile west of the Keauhou Bay Shipyard, about 0.4 mile south of Hawaii Board of Mission's Camp, about 0.2 mile south of the mouth of Keauhou Bay, about 100 feet east of the edge of the cliff forming the shoreline at this point and on the summit of a low lava knoll.

To reach the station from the Keauhou Bay Shipyard; go westerly, along the south side of the bay, keeping all left hand forks, for 0.35 mile to a fence intersection and the end of truck travel. From this point pack westerly about 75 yards to the high ground and the station.

The station is a standard disk, unstamped, set into a drill hole in bedrock which is about flush with the surrounding rock.

Reference mark number 1 is a standard disk, unstamped, set into a drill hole in bedrock which is about flush with the surrounding rock. It is located about 1 foot lower than the station.

Reference mark number 2 is a standard disk, unstamped, set into a drill hole in bedrock which is about flush with the surrounding rock.

* 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.

14-2518-2

R

STATE COORDINATES (FIPS)				
STATE & ZONE	CODE	X	Y	B OR Δ θ ANGLE*
HI 1	5101	338,557.47	264,740.42	- 0 05' 25"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (from south)	PLANE AZIMUTH* (from south)	CODE
LAALOA	169 41 40.9	169 51 06	5101

QE 192

(continued on next page)

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191554 STATION 1050
 LATITUDE ° ' TO ° '
 LONGITUDE ° ' TO ° '
 DIAGRAM

POINT (continued)

FORM 526a
 (8-18-68)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: POINT
 ESTABLISHED BY: T.J. Maher YEAR: 1928 STATE: Hawaii
 RECOVERED BY: D.M. Whipp YEAR: 1967 COUNTY: Hawaii
 Island: Hawaii

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.66 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	
LAALOA 1948 -----1928 DISTANCE	and DIRECTION	00	00	00.0
R.M. No. 1		12.9	3.92	173 12
R.M. No. 2		(Approx.) 10.0		245 41
LAALOA 1948 -----1967 DISTANCE	and DIRECTION	00	00	00.0
SIGNAL 1928				13 05 03.3
R.M. No. 1	SSE	12.764	3.891	173 21 31
R.M. No. 2	SW	44.641	13.607	245 40 23

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

Station is located about 6 miles south-southeast of Kailua and 4 miles northwest of Kealahou, on Kaukalaelae Point, about 2000 feet southwest of the small-boat docks at Keauhou Bay, and at the south side of the mouth of Keauhou Bay, on a brushy, lava mound about 80 yards southwest of a home.

To reach station from the post office in Kailua, go south on State Highway 19 for 0.1 mile to T-intersection; turn left and follow highway

southeast, through Kailua, and along coast, for 6.3 miles to Keauhou Bay. Continue ahead for 0.2 mile to side road right. Turn right and follow macadam track road along power line for 0.1 mile to end of road at house. Walk about 80 yards southwest to station.

Station mark is a standard disk stamped "POINT 1928", cemented in a drill hole in bedrock on top of lava mound, at northwest edge of brush patch, about 75 feet east of edge of sea bluff.

Reference mark number one is a standard disk stamped "POINT NO 1 1928", cemented in a drill hole in bedrock on south slope of station mound, in thorny brush, 1 foot lower than station mark.

Reference mark number two is a standard disk stamped "POINT NO 2 1928", cemented in a drill hole in lava bedrock, 45 feet east of edge of sea bluff and 1 foot lower than station mark.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: POINT
 ESTABLISHED BY: T.J. Maher YEAR: 1928 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: GEH YEAR: 1972 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 6 miles SSE of Kailua Kona

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

Station was recovered and all marks found in good condition, stamped as indicated by D.M. Whipp, 1967. A revised description follows:

Station is located about 6 miles south-southeast of Kailua and 4 miles northwest of Kealahou, on Kaukalaelae Point, between the northern and western wings of the Kona Surf Hotel, on a landscaped lava mound about 15 yards north of the hotel's west wing.

To reach station from the post office in Kailua, go south on State Hwy 19 for 0.1 mile to T-intersection; turn left and follow highway southeast through Kailua and along the coast for 6.3 miles to Keauhou Bay. Continue ahead for 0.2 miles to the Kona Surf Hotel entrance on the right. Turn right and travel 0.3 miles to the hotel main entrance. Access to the station is through the hotel lobby to the western end of the hotel's west wing and northeast along the asphalt path about 100 feet to the station.

FORM CGS-526 (9-68)
 JSCOMM-DC 36496-P88

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

*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 27178-P88