Akokoa (Hawaii Island, F. R. Hand, 1913)—On the north coast of Hawaii, out on the extreme end of Akokoa Point, which is the most easterly of the points of the Kohala District, being at a place where the shore line turns abruptly to the south, meeting the high cliff line that extends almost in a straight line to Kukulhaleu Landing, Hanokua. Station is 10 meters from cliff edge north; 8 meters from cliff edge north; and 11 meters from cliff edge west. Marked by a cylinder of concrete with rounded top level with ground, and 1½ feet in diameter. Cylinder extends to depth of about 3½ feet.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: AKOKOA
ESTABLISHED BY: E.R. Hand YEAR: 1913 STATE: Hawaii
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Island: Hawaii

A detailed description of the location and recovery of the station includes the distance from the nearest town, the recovery process, and the geographic coordinates. The station was recovered and is located on the north coast of the island, about 3/4 mile east-southeast of Kukulhaleu Landing, on the north end of Akokoa Point, about 93 feet above the sea, on the bare, brown, dirt point extending northward from brush line.

To reach station from the post office in Kohala, go east on State Highway 27 for 4½ miles; take right fork at sign "POLOU VALLEY", and go 1½ miles to side road left, at top of winding grade. Turn left and go down through cane field for 0.95 mile; turn right, entering trees, and go 0.05 mile to end of truck travel. Walk northeast about 75 yards to station.

Station mark is the center of a 1-inch iron pipe in the center of a 12-inch-diameter, round-topped, concrete monument, flush with the ground. It is 27 feet south of north end of the point, in the middle of the narrow (about 20 yards wide) point, 24 feet southeast of a 1/2-inch iron pipe and an iron pin near end of bluff, 35 yards north from edge of brush line and about 20 feet lower than brush line.

### ADJUSTED HORIZONTAL CONTROL DATA

**NAME OF STATION:** AKOKOA
**STATE:** HAWAII
**YEAR:** 1913
**THIRD ORDER**

**SOURCE:** G-921A4

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X</th>
<th>Y</th>
<th>Z (N.O.D. + MILE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI 1</td>
<td>5101</td>
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<td>504,578.91</td>
<td>- 0 06 52</td>
</tr>
</tbody>
</table>

The plane azimuth has been computed by the 2 (COS) formula reflecting the second term.
# HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

HAWAII
LATITUDE 20°00' TO 20°30'
LONGITUDE 155°20' TO 160°00'

ADJUSTED HORIZONTAL CONTROL DATA

**NAME OF STATION:** ALAUAHII
**STATE:** HAWAI'I
**YEAR:** 1913
**THIRD OR ORDER**

**SOURCE:** G-SP156

<table>
<thead>
<tr>
<th>DEGREES LATITUDE</th>
<th>ELEVATION</th>
</tr>
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<tbody>
<tr>
<td>20°15'47.615'</td>
<td>METER:</td>
</tr>
<tr>
<td></td>
<td>FEET:</td>
</tr>
<tr>
<td>155°49'17.149'</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X</th>
<th>Y</th>
<th>Z (N.O.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI I</td>
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<td>369,829.56</td>
<td>519,377.51</td>
<td>0°06'41&quot;</td>
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* PLANAR AZIMUTH HAS BEEN COMPUTED BY THE 2 OR 0 FORMULA NEGLECTING THE SECOND TERM

<table>
<thead>
<tr>
<th>TO STATION OR OBJECT</th>
<th>DEGREES AZIMUTH</th>
<th>PLANAR AZIMUTH</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**QD 223**
HORIZONTAL CONTROL DATA

by the
National Ocean Survey
Old Hawaiian Datum

NO ORIGINAL TEXT

Anuenue (Hawaii Island, Hawaiian Government Survey; E. R. Hand, 1913; K. T. Adams, 1929)—Near the northern coast of Hawaii, in Northern Hamakua, in the land of Ahihau, adjoining Kapulena, on the highest point of a well-defined steep hill, 1 mile above the government road between Honokaa and Kukuihaele post offices, and 3/4 miles from the latter. This wooded hill is the most northerly of all the wooded areas, jutting out conspicuously from the dense growth behind, to the southward. From the hill Honokaa stack bears N. 76° E.; and Kukuihaele stack, N. 48° W. Station reached from Camp 12 which is directly on government road by going 'mauka' (inland) toward the wooded top which shows against the skyline and is the highest point seen; the station is immediately behind this hill, being part of it, slightly higher. Station marked by concrete post evidently cast in mold of corrugated roof iron, about 1 foot in diameter, and having United States Geological Survey plate in center. It is covered by a cairn of stones 3 feet high.

RECOVERY NOTE, TRIANGULATION STATION


ADJUSTED HORIZONTAL CONTROL DATA

HAWAII
LATITUDE 20° 00' TO 20° 30'
LONGITUDE 155° 30' TO 156° 00'
DIAGRAM SCALE 5:1.5 HAWAII

STATE: HAWAII
YEAR: 1913
SECOND ORDER

SOURCE: G-9279

STATE COORDINATES (WGS 72)

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X</th>
<th>Y</th>
<th>Z (M.D. + MILE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI 1</td>
<td>5101</td>
<td>467,707.37</td>
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<td>- 0.00 44</td>
</tr>
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</table>

PLANE AZIMUTH HAS BEEN COMPUTED BY THE F. J. K. FORMULA NEGLIGENT THE SECOND TERM.

TO STATION OR OBJECT GEODESIC AZIMUTH PLANET AZIMUTH CODE

FUU MAUU NORTH

101 27 11.5 101 27 56 5301

(continued on next page)
HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

ANUEHUE (continued)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: ANUEHUE
ESTABLISHED BY: E.R. Hand YEAR: 1913 STATE: Hawaii BENCH MARKS ALSO
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Island: Hawaii

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

Station was recovered in good condition. The knoll has been cleared and now has sugar cane planted on it. A complete description follows:

Station is located about 4-1/2 miles west of Honokaa and 1 mile southeast of Kahakolea, along the north boundary of the Hamakua Forest Reserve, at about 150 feet elevation, on the highest point of a knoll in a cane field, overlooking a quarry to the north, and about 500 feet south of a macadam road. There are a few small ironwood trees about 8 feet tall by the station.

To reach station from the post office in Honokaa, go west on Mamane St. and continue on the road towards Waipio for 2.4 miles to crossroad. Turn left and go 0.6 mile to fork. Take right fork and go 0.25 mile to macadam landing strip on right. Continue ahead for 2.4 miles to quarry on left, and end of truck travel. Pack south up around quarry and along edge of cane field on east side of the bluff to top of hill and station.

Station mark is a U.S. Geological Survey disk stamped "1608", set in the top of an 8-inch-square, concrete monument. A Type B-1 signal is centered over the mark, with the 6-foot-square, concrete platform projecting 1 foot above ground. A red and white metal target extends 9 feet above platform.
HORIZONTAL CONTROL DATA

by the National Ocean Survey

O.HAWAIIAN DATUM

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BENCH MARK USGS NR KEHENA
STATE: HAWAII
YEAR: 1948
SECOND ORDER

SOURCE: G-9279
NO OBSERVATION CHECK ON THIS POSITION

<table>
<thead>
<tr>
<th>DEGREES LATITUDE</th>
<th>DEGREES LONGITUDE</th>
<th>ELEVATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>20° 00' 20.584''</td>
<td>155° 33' 21.775''</td>
<td>76.0 METERS</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>STATE CODE</th>
<th>X</th>
<th>Y</th>
<th>Z (OR, ft) ANGLE</th>
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</thead>
<tbody>
<tr>
<td>HI 1</td>
<td>5101</td>
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<td>474,328.75</td>
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</table>

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE Z (OR, ft) FORMULA NEGLECTING THE SECOND TERM.

POSITION DETERMINED BY TRAVERSE FROM STATION KEHENA

QE 284
NO ORIGINAL TEXT

RECOVERY NOTE, INTERSECTION STATION

NAME OF STATION: Cairn

ESTABLISHED BY: L.C. Wilder YEAR: 1946 STATE: Hawaii


AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Island:Hawaii

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

Station was not visited, but was verified by angle from stations PUU AIEA (HTS) and PUU KAHUNA (HTS). Located about 7-1/2 miles southeast of Hawi and 1-1/4 miles northwest of the Kahua Ranch Headquarters, on Puu o Lani, which is at 2852 feet elevation and lies 0.4 mile southwest of State Highway 19. Station is a pole target projecting from the center of a large, symmetrical cairn.
HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: CAST
STATE: HAWAII
YEAR: 1910
SECOND ORDER

SOURCE: G-9279

Geodetic Longitude: 155° 33' 51.563"
Geodetic Latitude: 20° 11' 41.498"
Elevation: 784.8 meters

STATE & ZONE

STATE COORDINATES

HI 1
5101
361.643.18
444.606.64
- 0.08 14

PLAN aberration has been computed by the 2nd-order formula neglecting the second term.

TO STATION OR OBJECT

DESCRIPTIVE DISTANCE DIRECTION

RIDGE
355 15 58.2
353 24 12
5101

* Plane aberration has been computed by the 2nd-Order formula neglecting the second term.

(continued on next page)
CAST (continued)

HORIZONTAL CONTROL DATA
by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: CAST
ESTABLISHED BY: O.B.F.
RECOVERED BY: B.M. Whipp
YEAR: 1910
STATE: Hawaii
COUNTY: Hawaii
Island: Island of Hawaii

HEIGHT OF TELESCOPE ABOVE STATION MARK: 1.5 Meters
HEIGHT OF LIGHT ABOVE STATION MARK: Meters
DISTANCES AND DIRECTIONS TO feature MARK, Reference MARKS AND Prominent OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

<table>
<thead>
<tr>
<th>OBJECT</th>
<th>Bearing</th>
<th>Distance</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ridge 1910 ------------ 1948 Distance</td>
<td>61.51</td>
<td>18.75</td>
<td>222</td>
</tr>
<tr>
<td>Ridge 1910 ------------ 1967 Distance</td>
<td>61.517</td>
<td>18.751</td>
<td>222</td>
</tr>
<tr>
<td>R.M. No. 1</td>
<td>NNE</td>
<td>61.517</td>
<td>18.751</td>
</tr>
<tr>
<td>R.M. No. 2</td>
<td>NE</td>
<td>8.138</td>
<td>2.478</td>
</tr>
</tbody>
</table>

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

Station is located about 1/2-mile northeast of Mahukona and 5 miles southwest of Hawi, at about 259 feet elevation, on the south 1 of 2 similar, round-topped, rocky knolls, hidden by kiawe trees, about 125 yards east-southeast of State Highway 27 (the Mahukona - Hawi road), and 80 yards south of a wide, culverted strip running eastward from the highway. There are 3 small, circular, stone enclosures about 15 yards west, downslope from station, hidden by kiawe trees.

To reach station from the post office in Kawaihae, go northwest on the new highway along the coast for 12.0 miles to the road left to Mahukona; continue ahead on the highway for 0.35 mile to side road right, at telephone pole 75. Go right, on wide culverted strip, for 0.05 mile to end of truck travel. Walk southerly about 80 yards to top of rise and station.

Station mark is the center of a 1-1/2-inch iron pipe set in concrete in the center of a 4-inch-diameter hole in the center of a triangular concrete platform about 7 feet on each side. NOTE: There was formerly a 2-inch-diameter, iron shaft about 2 feet long, mounted vertically over the station, supported by 3 iron legs, upon which a red and white metal target was mounted, but the 3 iron legs have rusted off and the shaft is lying nearby. At time of recovery a black and white, wooden target was guyed over the mark.

Reference mark number one is a standard disk stamped "CAST 1 1948", cemented in a drill hole in the top of a 2-foot-diameter boulder that projects 1 foot. It is on the north one of the 2 similar knolls, and at about same elevation as station mark.

Reference mark number two is a standard disk stamped "CAST 1910 NO 2 1967", cemented in a drill hole in a boulder about 3 feet in diameter and projecting 3 feet above ground. It is set in a niche about 6 inches lower than top of boulder and is about 4 inches lower than station mark.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: CAST
ESTABLISHED BY: O.B.F.
RECOVERED BY: B.M. Whipp
YEAR: 1910
STATE: Hawaii
COUNTY: Hawaii

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

The station and both reference marks were recovered as described by David in 1967.
CATHOLIC CHURCH EAST CROSS ON BELFRY (Hawaii Island, L.O.W.,
1968) -- Church is located 1/4 mile W of Hau'ula-Nanakuli road,
feet above Hau'ula-Nanakuli road.

RECOVERY NOTE, TRIANGULATION STATION

Name of Station: CATHOLIC CHURCH, EAST CROSS ON BELFRY
Established by: L.O.W. Year: 1948 State: Hawaii
Recovered by: B.O.F. Year: 1958 County: Hawaii

Recovery Note:
Recovered as described in 1968; 0.25 west of the junction on Hau'ula village;
100 feet above and on the south side of the Hau'ula-Nanakuli road. Church has four
similar crosses on it. The two on the belfry, which is located on the S.W. corner
of the church, are the highest and taken as the described East & West cross. One
cross, about 30 feet lower than the belfry crosses, is above the entrance, the other
cross, about 20 feet lower, is located on the east end of the main part of the church,
which is now painted a cream color.

RECOVERY NOTE, TRIANGULATION STATION

Name of Station: Catholic Church, east cross on belfry
Established by: L.C. Wilder Year: 1948 State: Hawaii
Recovered by: D.M. Whipp Year: 1967 County: Hawaii

Airline Distance and Direction from Nearest Town: Island: Hawaii

Station was recovered. Located 0.25 mile west of the main intersetion in Hau'ula
and on south side of State Highway 27. Station is the small wooden cross on the east end of the gable-roofed spire of the
Sacred Heart Catholic Church, a cream-colored, wooden building.
Spire is on the northwest corner of the church.
CATHOLIC CHURCH WEST CROSS ON BELFRY (Hawaii Island, L.O.W. 1988)—Church is located 1/4 mile W of Hawi Village, about 100 feet above Hawi-Mahukona road.

RECOVERY NOTE, TRIANGULATION STATION

Name of Station: Catholic Church, West Cross on Belfry
Established by: L.C. Wilder
Year: 1966
State: Hawaii
Recovered by: D.J. Whipp
Year: 1967
County: Hawaii

Station was recovered. Located 0.25 mile west of the main intersection in Hawi and on south side of State Highway 27. Station is the small wooden cross on the west end of the galvanized spire of the Sacred Heart Catholic Church, a cross-colored, wooden building. Spire is on the northwest corner of the church.

RECOVERY NOTE, INTERSECTION

Name of Station: Catholic Church, west cross on belfry
Established by: L.C. Wilder
Year: 1966
State: Hawaii
Recovery by: D.J. Whipp
Year: 1967
County: Hawaii

Original position was described in 1948: 0.25 west of the junction in Hawi village; 100 feet above and on the south side of the Hawi-Mahukona road. Church has four smaller crosses on it. The one on the belfry, which is located on the N.W. corner of the church, are the highest and taken as the described East & West crosses. One cross, about 20 feet lower than the belfry crosses, is above the entrance, the other cross, about 20 feet lower, is located on the east end of the main part of the church, which is now painted a cream color.
HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM


In the southern part of Hawaii, in Waimea village, between 300 and 400 feet
north of Imiola Church, in E. W. Lyon's lot. Marked by a granite post.

RECOVERY NOTE. TRIANGULATION STATION

This station was recovered in 1938 by the Hawaii Territory Survey
and a concrete instrument platform built around it. The granite post,
at this date 1948, appears to be in its original position.

Trees have grown so that few lines seen without clearing through
private property.

RECOVERY NOTE. TRIANGULATION STATION

The state of Hawaii.

Geodetic Latitude: 20°00'48.444"
Geodetic Longitude: 155°39'55.688"
Elevation: 840 feet

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: HAWAII WEST BASE
STATE: HAWAII
YEAR: 1872
SECOND ORDER

STATE COORDINATES (FOOT)

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X</th>
<th>Y</th>
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</tr>
</thead>
<tbody>
<tr>
<td>MI 1</td>
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<td>840</td>
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</table>

*Plane Azimuth has been computed by the A N N Formula neglecting the second term.

TO STATION OR OBJECT | GEODETIC AZIMUTH | PLANE AZIMUTH | CODE

Q1 452
**Description of Triangulation Intersection Station**

**Name of Station:** HAWI UPOLU AIRPORT BCN  
**Chief of Party:** L. A. Critchlow  
**Year:** 1977  
**State:** Hawaii  
**County:** Hawaii  

The station is located at the Upolu Airport, about 2-1/2 miles northwest of Hau and 3/4 mile southwest of Upolu Point, and is the center of a revolving beacon light mounted on a 4-1/2' deep steel tower that is about 50 feet high.

---

**Adjusted Horizontal Control Data**

**Name of Station:** HAWI UPOLU AIRPORT BCN  
**OBS By NGS**  
**State:** Hawaii  
**Year:** 1977  
**Third Order**  

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

**Quad:** 401553  
**Station:** 1010  
**Hawaii**  
**Latitude:** 20° 00' 10"  
**Longitude:** 155° 30' 13"  
**Diagram:** HE 51-5  
**HAWAI**

**Geodetic Latitude:** 20° 15' 57.59570  
**Geodetic Longitude:** 155° 01' 53.07580  
**Elevation:** 15.7800  
**Meters:** 51.69  
**Feet:** 5101

**State Coordinates (FWS)**

<table>
<thead>
<tr>
<th>State Code</th>
<th>X</th>
<th>Y</th>
<th>E.D. A. Angle</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3101</td>
<td>520,466.13</td>
<td>0 07 35'</td>
</tr>
</tbody>
</table>

*Plane azimuth has been computed by the F.W.S. formula neglecting the second term.*

**To Station or Object**

<table>
<thead>
<tr>
<th>Geodetic Azimuth (From North)</th>
<th>Plane Azimuth (From North)</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**These data obtained from adjustment of Jan 1979**

**SM 056**
HIND STACK (Hawaii Island, L.O.W., 1948) -- Located in Hāwii Village, about 400 feet E of Lakūlū Sugar Company's office and store. It is constructed of cemented rocks. It is circular in shape, 15 feet wide at bottom and 7 feet at top.

RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

NAME OF STATION: HIND STACK

YEAR: 1948

STATE: HAWAI'I

COUNTY: HAWAI'I

Island: HAWAI'I

Station was recovered. Located in the center of Hāwii Village, about 600 feet southeast of the main intersection and 400 feet east of State Highway 25. Station is the center of a tapering, gray stack about 80 feet tall, 15 feet in diameter at the base and 7 feet in diameter at the top, constructed of cemented stone.
HORIZONTAL CONTROL DATA

NAME OF STATION: MOEA MILL CHIMNEY WEST STACK
STATE: HAWAII
YEAR: 1910
THIRD ORDER

SOURCE: G-SP156

GEODETIC LATITUDE: 20° 15' 55.533"
GEODETIC LONGITUDE: 155° 50' 35.610"

ELEVATION: 0.5113 FEET

STATE ZONE CODE X Y W (X, Y AND W IN FEET)
HI 1 5101 382,361.03 520,191.32 - 0 07 08

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

TO STATION OR OBJECT GEODETIC AZIMUTH PLANAR AZIMUTH (From north) (From north) 

00 224
Hokūla (Hawaiian Island, Hawaiian Government Survey, 1873).—In northern part of Hawaii, northwest of the village of Waima, on Mount Hokūla, on the east side of the crater toward ʻImla Church. Marked by an iron pin adjoining a manamane post.

HORIZONTAL CONTROL DATA

by the National Ocean Survey
OLD HAWAIIAN DATUM

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: Hokūla
STATE: Hawaii
YEAR: 1873
SECOND: 0

SOURCE: G-SP156

DE KRETIC LATITUDE: 20° 02' 06.630"
DE KRETIC LONGITUDE: 155° 41' 30.365"
ELEVATION: 1025 Meters 3351 Feet

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X</th>
<th>Y</th>
<th>Z or H. A. Angle</th>
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</thead>
<tbody>
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<td>436,481.78</td>
<td>0 03 46</td>
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</tbody>
</table>

* Plane azimuth has been computed by the "old X" formula neglecting the second term.
**HORIZONTAL CONTROL DATA**

by the National Ocean Survey
OLD HAWAIIAN DATUM

---

### DESCRIPTION OF TRIANGULATION STATION

**NAME OF STATION:** HOKOULA 2  
**STATE:** HAWAII  
**YEAR:** 1948  
**COUNTY:** HAWAII  

Detailed statement as to the dates of the original description: The original station, "an iron pin adjoining a manana post" was not recovered. At the present time a bronze disk, probably a U.S. Geological Survey disk, is set in concrete which is under a 2 1/2 inch iron pipe. The pipe projects about 3 feet from the top of a square concrete slab which is about 6 feet on each side and is flush with the surface of the soil. A new description follows:

The station is located about 1 mile west-northwest of Waima; near the summit of a hill named Hokuula.

To reach from the post office in Waima; go northerly on the road which leads toward Waima for 0.1 mile; continue straight ahead; north, for 0.3 mile to a T road intersection; turn left; west, and go 0.25 mile to a T road intersection; turn right; north, and go, up grade, for 0.2 mile; turn left; onto a track road, and go northerly for 0.5 mile to the summit of a low saddle and the end of truck travel. From this point, pack westward for about 200 yards to the crest of the ridge, then westerly along the crest of the ridge for about 400 yards to the western edge of the hill and the station.

Reference mark number 1 is a standard disk, stamped 1948, set in the top of a 2 inch iron pipe which projects about 4 inches and is about 4 feet lower than the station.

**Object**  
**Distance**  
**Direction**

<table>
<thead>
<tr>
<th>EAST BASE</th>
<th>1.0 mile</th>
<th>28,918 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>WALAIA RED TANK</td>
<td>00 00 00</td>
<td>44 49 12.5</td>
</tr>
<tr>
<td>WAIKOLOA</td>
<td>8,601 m</td>
<td>102 19 52</td>
</tr>
<tr>
<td>Puu 10 (metal target)</td>
<td>11 19 36.9</td>
<td></td>
</tr>
<tr>
<td>MOKUHANA (metal target)</td>
<td>76 12 12.0</td>
<td></td>
</tr>
</tbody>
</table>

An early recovery note reports: Description for station calls for iron pipe on east rim of crater. This is evidently in error. Wooden center stake and 4 stakes for guy wires recovered by W.E. Harringer in January 1911. On highest point on west rim of crater. This point marked by bronze tablet set in concrete, centered over old stake, stamped 1977.

---

### ADJUSTED HORIZONTAL CONTROL DATA

**SOURCE:** 9275  

| STATE & ZONE | CODE | X | Y | Z HORZ ANG.
|--------------|------|---|---|------
| HI 1         | 5101 | 437,023.26 | 436,426.51 | - 0.03 46 |

---

<table>
<thead>
<tr>
<th>TO STATION OR OBJECT</th>
<th>GEOGRAPHIC AZIMUTH (from north)</th>
<th>PLANE AZIMUTH (from north)</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puu Pa HGS</td>
<td>27 45 31.1</td>
<td>27 49 17</td>
<td>5101</td>
</tr>
</tbody>
</table>

---

(continued on next page)
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 1 mile northwest of Kamuela, on the summit of a prominent, grassy hill of about 1777 feet elevation.

To reach station from the post office in Kamuela, go westerly on State Highway 25, towards Kawaihae, for 0.6 mile to macadam crossroad by Union Service Station. Turn right and go up steep grade for 0.35 mile to board gate at fence corner on left, at macadam side road left. Pass through gate and follow track road upgrade for 0.45 mile; take left fork and go 0.1 mile; take dim track road left and go 0.05 mile to base of steep hill and end of truck travel. Pack southwest up hill about 300 yards to station.

Station mark is a USGS disk, stamped "HOKULA 2 1948", set in concrete about 6 inches below ground level, at the center of a 5 x 5-foot, concrete platform flush with ground, and is at the bottom of an 8 x 30-inch recess in the platform. A tapering, concrete monument, 2 feet high, is centered over the mark and holds a target pole. Four iron fenceposts, one at each corner of the platform, surround the station.

Reference mark number one is a standard disk stamped "HOKULA 2 1 1948", set in the top of a 2-inch iron pipe projecting 2 inches above ground, and is about 6 inches higher than station mark.

Reference mark number two is a standard disk stamped "HOKULA 2 USGS 1948 NO 2 1948", braced on the top of a 2-inch iron pipe that is set in concrete. It projects 8 inches above ground and is about 6 inches higher than station mark.
Honopu (Hawaii Island, E. R. Hand, 1913).—On northwest coast of Hawaii, and of Kohala, the sea gable of the Honopu landing house, on the edge of the bluff at Honopu. The seaward side of building is red; roof, ends, and back are black. This building and all others adjacent are to be moved and the landing abandoned; the foundations, however, will remain and form a very conspicuous mark from seaward. Station mark is on outer edge of foundation at seaward end, midway between the corners, and directly under gable.

RECOVERY NOTE, TRIANGULATION STATION

Name of Station: Honopu
Established by: E.R. Hand
Year: 1913
State: Hawaii
County: Island: Hawaii

The station was established as described in 1913, except only the foundation now remains of the old landing house. Station used only for photogrammetry control point.

To reach go southwestward along the beach for 2.7 miles from the terminal building of the Upolu Airport, past the Coast Guard Loran Station, to end of dirt road at teomoline. Take trail directly at end of road and walk for about 0.5 mile to ruins of old landing house at top of cliff.

RECOVERY NOTE, TRIANGULATION STATION

Name of Station: Honopu
Established by: E.R. Hand
Year: 1913
State: Hawaii
County: Island: Hawaii

Station is gone. The bluff is breaking back gradually and about 20 feet of the old concrete foundation has fallen off.
ISLAND HIGHEST POINT

(Hawaii Island, E. R. Hand, 1913).—Off the north coast of Hawaii, the highest point on larger and higher of the two islands just off Honokea Gulch, which gulch is the dividing line between Hanakua and Kohala Districts. There is a third island or islet, which is little more than a pinnacle of rock.

RECOVERY NOTE. TRIANGULATION STATION INTERSECTION

NAME OF STATION: Island Highest Point
ESTABLISHED BY: E.R. Hand YEAR: 1913 STATE: Hawaii
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Island: Hawaii

Detailed description of the location of the station, including rocks, lighthouses, other prominent marks:

Station was not visited. It is the highest point of Paukalani Island, the west one of 2 small islands which lie about 1/2-mile northwest of the mouth of Honokea Gulch, along the north coast of the island. It projects about 240 feet above water and has a rounded top with no definite point.

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X</th>
<th>Y</th>
<th># CAL. &amp; ANGLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI 1</td>
<td>5101</td>
<td>429.458.14</td>
<td>499.650.66</td>
<td>- 0 04 16</td>
</tr>
</tbody>
</table>

*Plane azimuth has been computed by the & CAL. & ANGLE formula neglecting the second term.

TO STATION OR OBJECT | GEOGRAPHIC AZIMUTH | PLANE AZIMUTH | ECOE
|---------------------|-------------------|--------------|---------|

OF 115
Ka'ala (Hawaii Island, Hawaiian Government Survey, 1877).—In the northern part of Hawaii, on the northeastern summit of Mount Ka'ala, overlooking the Waipio Valley, and about 30 feet south of an ohia tree. Marked by three triangular pits, 3 feet on a side; the center marked with charcoal and a copper tube marked "H. G. S."

RECOVERY NOTE. TRIANGULATION STATION R

NAME OF STATION: KA'ALA
ESTABLISHED BY: Hawaiian Govt. Year: 1877
RECOVERED BY: "L. G. Wilder Year: 1948
COUNTY: HAWAII

The original station was not recovered. A U. S. Geological Survey disk was found in the top of a 4 inch concrete cylinder, it is not known if this was placed over the original station which was described as a copper tube. Two reference marks were established. A new description follows—

The station is located on the summit of a hill known as Ka'ala; about 0.8 mile southwest of the head of Waipio Canyon, about 3.5 miles northeast of Waima and about 0.5 mile north of a wire fence which marks the southern boundary of the Forest Reserve.

To reach from the post office in Waima, go easterly, on the road which leads toward Honoka'a for 2.2 miles; pass the main gate leading into the abandoned OCG camp and continue easterly for 1.4 miles; turn left, pass through a wire gate and follow the lane northerly for 0.7 mile to its end at a small creek and a wire fence and the end of truck travel. From this point, cross over the fence, and pass northerly for about 0.4 mile to the edge of the timber and a wire fence. From this point, look northwesterly, through the dense jungle to the foot of a long northwesterly ridge. Follow the crest of this ridge for about 0.8 mile to the highest point of the hill and the station. This is about a one hour hike but can be cut down to one hour by cutting out a trail. A four foot wooden stand was left, staked out at the station to assist in later recovery. In addition, long lengths of wire were strung from the tripod over the crest of the ridge.

The station is a U. S. Geological Survey disk, stamped HAWAI'I 3983, set in the top of a 4 inch concrete cylinder which projects about 6 inches.

Reference mark number 1 is a standard disk, stamped 1948, set in the top of a 3/8 inch iron pipe which projects about 1 inch and is about 1 foot lower than the station.

Reference mark number 2 is a standard disk, stamped 2 1948, set in the top of a 3/8 inch iron pipe which projects about 1 inch and is about 1 foot lower than the station.

Object Distance Direction

WAIPIO (metal target)
R. M. No. 1 ENE 4.114 m 13,494 ft 00 00 00
R. M. No. 2 ENE 4.165 m 13,661 ft 97 27 36
PUU 10 SE 7 miles 115 27 40.00

A short early recovery note reports; original station recovered by F. N. Duval on September 1911. Marked by bronze tablet stamped 3983, set in concrete cylinder and centered over old mark.

(continued on next page)
HORIZONTAL CONTROL DATA
by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

KAALA (continued)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAALA
ESTABLISHED BY: HOG
RECOVERED BY: D.M. Whipp
YEAR: 1877
YEAR: 1987
STATE: Hawaii
COUNTY: Hawaii
Island: Hawaii

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

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

Station was recovered and all marks found in good condition. Distance to reference marks was checked and found correct. Station was reached by a different route than the 1948 description; it was somewhat shorter and is believed easier. Vegetation on top of the hill does not exceed 3 to 4 feet in height, but is very dense, with heavy root growth, which soon covers the marks. A complete description follows:

Station is located about 3 miles northeast of Kamuela and 0.8 mile west-northwest of Waimea Reservoir, on the summit of a brush-covered hill known as Kaala, at about 3985 feet elevation.

To reach station from the post office in Kamuela, go easterly on State Highway 19 for 3.5 miles to a graded side road left at telephone pole 299. Turn left and go 0.5 mile to a green, board gate. Pass through gate and continue for 0.2 mile to end of truck travel opposite gate in reservoir fence. Walk westerly across open pasture, keeping around left end of trees in gully, for about 1/4-mile, to fence on right. Pass through fence and cut trail through dense forest and up brush-covered ridge line for about 1/2 mile to top and station. Trail can be cleared in about 2 hrs.

Station mark is a USGS disk, stamped "1 1948", set in the top of a 4-inch iron pipe projecting 2 inches from ground. It is located near the east end of the flat top of the hill.

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

Reference mark number two is a standard disk stamped "2 1948", set in the top of a 2-inch iron pipe, flush with ground and about 1 foot lower than station mark.
Description of Triangulation Station

NAME OF STATION: KAEHE (HTS)  
STATE: HAWAII  
COUNTY: HAWAII

CHIEF OF PARTY: L. G. WILDER  
YEAR: 1948

DETAILED STATEMENT AS TO THE STONES OR THE ORIGINAL DESCRIPTION INCLUDING MARKS FOUND, STAMPINGS, CHANGES MADE, AND OTHER PERTINENT FACTS:

The station was recovered as described in 1968. The metal legs have rusted off and the metal target has fallen to one side. Brush now surrounds the platform.

To reach go 0.5 mile west along the highway from the junction in Hapu'i. Turn right on dirt road and go 0.05 mile. Station is to the east about 300 yards along the high road and about 50 feet east of a ditch in a clump of brush.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAEHE (HTS)  
ESTABLISHED BY: L.C.W.  
YEAR: 1948  
STATE: Hawaii

RECOVERED BY: H.J.S.  
YEAR: 1962  
COUNTY: Hawaii

These data are obtained from adjustment of 1951.

(continued on next page)
HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

recover note, triangulation station

Name of station: KAEHI (HTS)
Established by: L.C. Wilder 1948
Year: 1967
State: Hawaii
County: Hawaii
Airline distance and direction from nearest town: Island: Hawaii

Detailed statement on the sources of the original description, including marks found, reunions, checks made, and other pertinent facts:

Station was recovered. The support legs for the metal target have rusted off and the target no longer stands. A complete description follows:
Station is located about 1/2 mile west-northwest of the main intersection in Hawi, and 700 feet north of State Highway 27, on a low knoll in cane field, in the southeast angle of a crossroad.
To reach station from the post office in Hawi, go north on State Highway 25 for 0.4 mile; turn left and go west on State Highway 27 for 0.45 mile to side road right, at power pole 22. Turn right and go north on cane field road for 0.2 mile to crossroad and station on right.
Station is marked by a hole in rock at the bottom of a 3-inch-diameter hole 12 inches deep, in the center of a triangular, concrete platform 7 feet on each side. It is 20 feet southeast of the southeast leg of an 18-foot, wooden tower and 72 feet east-southeast of irrigation hydrant No. 3. The station is surrounded and protected by a ring of very large rocks about 4 feet higher than the platform, and is obscured by a growth of brush.

recovery note, triangulation station

Name of station: KAEHI (HTS)
Established by: L.C. Wilder 1948
Year: 1967
State: Hawaii
County: Hawaii
Airline distance and direction from nearest town: Island: Hawaii

Distance and directions to adjacent marks, reference marks, and prominent objects which can be seen from the ground at this station:

The station was recovered in good condition but it was not occupied or measurements made to the reference marks at this time. The previous descriptions are adequate.
HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAIMUKA

STATE: HAWAII

YEAR: 1910

THIRD ORDER

SOURCE: G-SP156

GEODETIC LATITUDE: 20° 08' 19.098
GEODETIC LONGITUDE: 155° 51' 26.763

ELEVATION: 19.098

METERS

TABLE: STATE COORDINATES (ECEF)

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
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<td>474,154.25</td>
<td>-3.0723</td>
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</tbody>
</table>

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE F. G. O. K. FORMULA, NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT | GEODETIC AZIMUTH (FROM NORTH) | PLANE AZIMUTH (FROM NORTH) | TIME |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

QQ 233
HORIZONIAL CONTROL DATA
by the
National Ocean Survey
OLD HAWAIIAN DATUM

KAMAKAMAKA (HTS)
(Hawaii Island, E. R. Hand, 1913).—On north coast of Hawaii,
directly inshore from Kamakamakoa Point and distant 900 meters from it, on a
prominent hill, cane covered. The plantation camp named Kamala lies just to
the west of a line from the point to the top of the hill and is distant 275 meters.
The flagstaff in center of camp bears N. 14° W. from station, and the Kukualoae
stock bears N. 80° W.; the shack on the end of Kamakamakoa Point bears N. 4°
W., and Honokaa stock bears S. 80° W. The station is reached by railroad
from either Honokaa or Kukualoae to the camp, or by boat to Kamakamakoa
Point, thence up the abandoned inclined railway to the camp. Station marked
underground by an iron cylinder about 4½ inches in diameter and 3½ inches high,
resting on solid rock 2 feet below surface of ground; it is set in concrete. About
2 inches of soil separate it from the surface mark, the sharp corner of a pyramidal
rock, painted white, set in concrete and projecting about 6 inches above the
ground. A cairn of stones was built over the station.

NAME OF STATION: KAMAKAMAKA (HTS)
ESTABLISHED BY: E. R. Hand YEAR: 1913 STATE: Hawaii
RECOVERED BY: H. C. Munson YEAR: 1966 COUNTY: Hawaii
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Island: Hawaii

The point was located by intersection and some digging done
but underground mark was not found. This hill has been in culti-
vation for a long time and the mark has probably been lost.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAMAKAMAKA HTS
STATE: HAWAII YEAR: 1913
THIRD ORDER

SOURCE: G-52184

<table>
<thead>
<tr>
<th>GEODETIC LATITUDE</th>
<th>22° 56' 24.22&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEODETIC LONGITUDE</td>
<td>155° 30' 04.08&quot;</td>
</tr>
</tbody>
</table>

ELEVATION: 171 FT

STATE COORDINATES (FUS)

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X</th>
<th>Y</th>
<th>H - W.A.D. - ANGLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI 1</td>
<td>5101</td>
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<td>462,433.31</td>
<td>0 00' 01&quot;</td>
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</tbody>
</table>

Plane Azimuth has been computed by the J. R. O. formula neglecting the second term.

TO STATION OR OBJECT

GEODETIC AZIMUTH

PLANE AZIMUTH

CODER

105
HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

Kapaiki (Hawaii Island, E. R. Hand, 1913).—On north coast of Hawaii, northwest coast of Kohala District, out on the end of the flat granite point on the west, and about 10 meters from the cliff edge on the north. From the station Kaulola Point Light bears N. 70° W.; and Niulii stack, S. 40° E. Marked by hole in center of triangle on top of a concrete cylinder about 10 inches in diameter, and projecting 1 ½ feet above the ground. Cylinder surrounded by an iron form in which it was cast. This mark placed by the Territorial Survey, but position determined independently by United States Coast and Geodetic Survey party in 1913.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAPAIIKI
SUBMITTED BY: E. R. Hand
RECOVERED BY: *Chas. J. Murray

Detailed statement as to the site of the original description:

Location of Station: On southeast about 1 mile northeast of Halawa School. Take road about 500 feet East of Halawa School which goes down from the main government road. At junction with H.H. track turn East and proceed along cane field to division line between this cane field and ironwood forest. Continue division line to the sea. The site is slightly easterly from this point.

Station Mark Found: A on top of 10” concrete-filled cylinder set firmly in the ground.

New Mark: H.T.S. Type D Monument Triangular concrete monument 6 feet on each side with 2 ½” pipe 2 feet long set on steel legs over the old mark which is left exposed to view. A standard metal target is set in the 2 ½” pipe.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAPAIIKI
SUBMITTED BY: E. R. Hand
RECOVERED BY: L. G. Wilder

Detailed statement as to the site of the original description:

The station was recovered as described and is in good condition. Two reference marks were established for this station. A new description follows:

The station is located about 2 miles southwest of Akaka Point, about 1.5 miles southeast of Kaulola Point Lighthouse, about 1.5 miles east of Halawa Post Office, 40 feet west of the edge of the sea bluff, 40 feet east of a grove of trees and on the highest point of Kapaiki Point.

The station is the center of a drill hole, surrounded by a triangle, which is in the center of a concrete cylinder. The concrete cylinder is about 10 inches in diameter and projects about 1½ feet above the ground. The concrete slab of concrete which is 6 feet on each side and projects about 1½ feet surrounds the station mark. The top of the concrete cylinder is flush with the top of the concrete platform.

Reference mark number 1 is a standard disk, stamped KAPAIIKI 1 1946, set in the top of a 12 inch iron pipe which projects about 4 inches and is about 2 feet lower than the station.

Reference mark number 2 is a standard disk, stamped KAPAIIKI 2 1946, set in the top of a 12 inch iron pipe which projects about 4 inches and is about 2 feet lower than the station.

*Plan of field of party should be inserted here. The officer who actually visited the station should date this note at the end of the recovery note.

(continued on next page)
HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY

KAPAIAKI (continued)

To reach the post office in Kapaau, go southeast on the paved road which leads toward Peololo Valley for 4.9 miles; turn left, onto a dirt road, pass to the right hand side of a field shed, and go northeast, through a cane field, for 0.7 mile; turn right and go easterly for about 100 yards; turn left and go northeasterly, keeping to the left hand side of a grove of ironwood trees, for 0.2 mile; turn right and pick your way through the trees for about 300 yards to the open ground and the station.

Object Distance Direction

KAUHOLA
R. M. No. 2 NW 6.217 m 20.206 ft 00 00 00
R. M. No. 1 S 4.671 m 15.262 ft 255 19 58
KAUHOLA PT LIGHTHOUSE

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAPAIAKI
ESTABLISHED BY: E.R. Hand YEAR: 1913 STATE: Hawaii
RECOVERED BY: D.R. Whipp YEAR: 1967 COUNTY: Hawaii
Island: Hawaii
HEIGHT OF TELESCOPE ABOVE STATION MARK: 1.5 METER
NET WORK OF LIGHT ABOUT STATION MARK: METER

DISTANCES AND DIRECTIONS TO責SHUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

<table>
<thead>
<tr>
<th>OBJECT</th>
<th>MEASUREMENT</th>
<th>DISTANCE</th>
<th>DIRECTION</th>
<th>MEASUREMENT</th>
<th>DISTANCE</th>
<th>DIRECTION</th>
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</thead>
<tbody>
<tr>
<td>KAUHOLA</td>
<td>R. M. No. 2</td>
<td>NW 20.396</td>
<td>6.217</td>
<td>00 00 00</td>
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<td>R. M. No. 1</td>
<td>S 15.320</td>
<td>4.671</td>
<td>255 19 58</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Station is located about 5 miles east of Hawi and 1.3 miles southeast of Kauhola Point Lighthouse, on Kapaau Point, on the bluff about 75 feet above the sea. There are low, brushy, ironwood trees on the point, which obstruct the view in most directions.

To reach station from the post office at Kohala, go east on State Highway 27 for 4.7 miles to the W. O. Store on right; continue on the highway for 0.3 mile to crossroad; turn left on cane field road and go northerly for 1.05 miles to crossroad at ironwood trees. Turn right and go along edge of cane field for 0.2 mile to end of truck travel 75 yards after crossing in a deep dip. Walk northerly through trees about 80 yards to station on bluff.

Station is marked by a 1-inch drill hole, surrounded by an 8-inch triangle, in the top of a 10-inch-diameter concrete monument set in the middle of a triangular, concrete platform about 7 feet on each side and projecting 16 inches above ground. It is 10 feet south of the ironwood row along bluff edge.

Reference mark number one is a standard disk stamped "KAPAIAKI 1 1948", cemented in the top of a 2-inch, iron pipe projecting 2 inches above ground. It is about 6 inches higher than station mark.

Reference mark number two is a standard disk stamped "KAPAIAKI 2 1948", cemented in the top of a 2-inch, iron pipe flush with ground, 5 feet south of edge of ironwood trees and about 2 feet lower than station mark.

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

NOTE - One of these forms must be used for every station recovered.
**HORIZONTAL CONTROL DATA**

**ADJUSTED HORIZONTAL CONTROL DATA**

**NAME OF STATION:** KAPAAKEA

**STATE:** HAWAII

**YEAR:** 1910

**SOURCE:** G-I915b

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X</th>
<th>Y</th>
<th>Z OR Δ H (FEET)</th>
</tr>
</thead>
<tbody>
<tr>
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*Plane Azimuth has been computed by the $\phi, \delta, \gamma$ formula neglecting the second term.*

**TO STATION OR OBJECT**

<table>
<thead>
<tr>
<th>GEODETIC AZIMUTH (FROM SURVEY)</th>
<th>PLANE AZIMUTH* (FROM SURVEY)</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 201553 STATION 1022

HAWAII

LATITUDE 20° 30’ to 20° 39’

LONGITUDE 155° 30’ to 156° 00’

DIAGRAM NE 51.5 HAWAII

OLD HAWAIIAN DATUM

NO TEXT
HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

NAME OF STATION: KAHOULA
STATE: HAWAII
COUNTY: Hawaii

RECOVERY NOTE, TRIANGULATION STATION

NAME OF PERSON: H. G. S.
YEAR: 1981

NAME OF PERSON: L. C. Wilder
YEAR: 1984

DEPARTMENT OF COMMERCE
NO. 201553
STATION 1023
HAWAII
LATITUDE 20° 00' TO 20° 30'
LONGITUDE 155° 30' TO 156° 00'
DIAGRAM SE 1/4 HAWAI

ADJUSTED HORIZONTAL CONTROL DATA

<table>
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<tr>
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<th>CODE</th>
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<th>Y</th>
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**PLANE AZIMUTH HAS BEEN OBTAINED BY THE A = 0 FORMULA NEGLIGERING THE SECOND-TERM**

TO STATION OR OBJECT

<table>
<thead>
<tr>
<th>OBJECT (FROM point)</th>
<th>PLAN COORDINATE</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>KAPAA XI</td>
<td>302 41 16.8</td>
<td>302 46 59</td>
</tr>
</tbody>
</table>

NO ORIGINAL TEXT

Kaohuola (Hawaii Island, Hawaiian Government Survey, 1881; E. R. Hand, 1913).—On the northern coast of Hawaii, at the northeastern point of Kohala District, on a high promontory known as Kaohuola Point. Station is on the low flat grass-covered end of the point, a short distance south-southwest of the light, about 30 meters from the cliff edge on the west, and 22 meters from the edge on the north. The nearest corner of the light building is 16.30 meters (50 feet) distant, on bearing N. 54° W. The near corner of an astronomical pier of brick, about 3 ½ feet high, resembling section of chimney, is 40.7 meters (134.4 feet) from station, on bearing N. 76° E. Station marked by a post of dressed granite 6 inches square, and projecting about one foot above the ground. It leans a trifle toward the west. In its top is a plate of the United States Geological Survey.

RECOVERY NOTE, TRIANGULATION STATION

Newark: H.C.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 lags with over the station mark which is left exposed to view. A standard metal target is set over the steel rod.

(continued on next page)
HORIZONTAL CONTROL DATA
by the
NATIONAL GEOETIC SURVEY
OLD HAWAIIAN DATUM

KAUHOLA (continued)

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

NAME OF STATION: KAUHOLA

ESTABLISHED BY: HGS
YEAR: 1881 STATE: Hawaii
RECOVERY NOTE: DR. W. Whipp
YEAR: 1967 COUNTY: Hawaii
NAME OF DEPARTMENT: HGS
COUNTY: Hawaii
COUNTY: Hiein

HEIGHT OF TELESCOPE ABOVE STATION MARK: 1.5 Meters
HEIGHT OF MARK ABOVE STATION MARK: 1.5 Meters

DISTANCES AND DIRECTIONS FROM STATION MARK: REFERENCES MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION.

OBJECT
KAPAUKI 1913
KAUHOLA 1948
KOHALA LATITUDE STATION 1881

REMARKS ON RECOVERY

The station was recovered. The station disk had been removed but the station mark remained in place. Reference mark number one had been removed but the drill hole was recovered. A new station disk was set after removing the old shank, and a new reference mark number one was set in the old drill hole. KONA LATITUDE STATION 1881 was recovered in good condition. A complete description follows:

Station is located about 4 miles east-northeast of Hau and 1 mile north-northeast of the Kohala Sugar Mill, on Kauhola Point, just north of the Kauhola Point Lighthouse.

To reach station from the Hauala post office, go north-northeast on main road for 0.25 mile to end of macadam road. Continue ahead on track road for 0.43 mile; take left fork, straight ahead, and go 0.25 mile; take right fork, along trees, for 0.05 mile; take left fork, gradually bearing west, and go 0.15 mile to end of road at lighthouse and station. Station mark is a standard disk stamped "KAUHOLA HGS 1967", cemented in a drill hole in the top of the original, 8-inch-square, granite post, in the center of a triangular concrete platform about 7 feet on each side and projecting 1 foot above ground. It is 7.4 feet north of the edge of the lighthouse foundation. Reference mark number one is a standard disk stamped "KAUHOLA HGS 1967", cemented in a drill hole in the southwest one of 4 concrete foundation blocks. It is 1.7 feet higher than station mark and projects 2 feet above ground.

Kohola-2 is the center of a 1-1/4-inch iron pipe flush with the top of a 15-inch-diameter, concrete monument projecting 4 inches above ground, and with "KAUHOLA" inscribed in the concrete. It is 15.7 feet west of the northeast one of the 4 concrete foundation blocks and 0.26 foot lower than station mark.

Kohala Lighthouse station is marked by a 2-inch, chiseled cross in the top of a red brick pier, 1.4 x 2.5 feet in size, and 3.4 feet high. It is 6.6 feet north of north edge of lighthouse foundation and is 3 feet higher than station mark.

*Note 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.
This station was probably established by a private surveyor. It appears to be a concrete cylinder at the center of which is a hole and 'Kaubola 2' has been marked in the cement. It is not very solid in the ground. It is 73.47 feet from Station Kaubola and was located by direction and distance from that station.

To reach the station go past the Kohala Sugar Co. mill and proceed to Kaubola Point Lighthouse.
Kauhola Point Light (Hawaii Island, E. R. Hand, 1913).—On north coast of Hawaii, northeast shore of Kohala, out on the end of the long flat grass-covered Kauhola Point. Point is perfectly level, covered with short grass; it is about 30 feet in elevation. The light is hoisted to top of a support which stands immediately behind a small white shed, gray trimmed, with gable roof painted red. Light is 35 feet above ground.

### HORIZONTAL CONTROL DATA

<table>
<thead>
<tr>
<th>NAME OF STATION</th>
<th>KAULOA POINT LIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATE</td>
<td>HAWAII</td>
</tr>
<tr>
<td>YEAR</td>
<td>1913</td>
</tr>
<tr>
<td>THIRD ORDER</td>
<td></td>
</tr>
</tbody>
</table>

#### ADJUSTED HORIZONTAL CONTROL DATA

| GEOGRAPHIC LATITUDE | 20° 14' 58.232" |
| GEOGRAPHIC LONGITUDE | 156° 46' 27.705" |
| ELEVATION          | 35 FT.            |

#### STATE COORDINATES (Feet)

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X</th>
<th>Y</th>
<th># &amp; A = Z. E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI 1</td>
<td>5101</td>
<td>405,955.56</td>
<td>314,366.46</td>
<td>-0 05 42</td>
</tr>
</tbody>
</table>

* Planes azimuth has been computed by the $\tan \delta = \cot \alpha$ formula neglecting the second term.

#### TO STATION OR OBJECT

<table>
<thead>
<tr>
<th>TO STATION OR OBJECT</th>
<th>GEOGRAPHIC AZIMUTH (Plane meter)</th>
<th>PLANES AZIMUTH* (Plane meter)</th>
<th>CODE</th>
</tr>
</thead>
</table>

QF 120
**NO ORIGINAL TEXT**

**RECOVERY NOTE, TRIANGULATION STATION**

**INTERSECTION**

NAME OF STATION: Kauhola Point Light

ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii BENCH MARKS: ALSO

RECOVERED BY: D.M. Whipp YEAR: 1967 COUNTY: Hawaii AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

Island: Hawaii

Station was recovered. Located about 4 miles east-northeast of Hawi and 1 mile north-northeast of the Kohala Sugar Mill, on Kauhola Point. Station is the center of a large, cylindrical, cream-colored tower; top of tower is 85 feet above ground.

**RECOVERY NOTE, TRIANGULATION STATION**

NAME OF STATION: Kauhola Point Light

ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii BENCH MARKS: ALSO


Detailed statements as to the features of the original description, including marks found, compasses, changes made, and other pertinent facts:

**ADJUSTED HORIZONTAL CONTROL DATA**

NAME OF STATION: Kauhola Point Light

STATE: Hawaii YEAR: 1948 THIRD ORDER

SOURCE: G-9279

| DEEPER LATITUDE | 20° 1' 57.6" N |
| DEEPER LONGITUDE | 155° 46' 27.1" W |

<table>
<thead>
<tr>
<th>STATE &amp; CODE</th>
<th>CODE</th>
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<th>Y</th>
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</thead>
<tbody>
<tr>
<td>HI 1</td>
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<td>514,311.35</td>
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</table>

*Plane azimuth has been computed by the 2n d formula neglecting the second term.*

**STATE COORDINATES (FT)**

**TO STATION OR OBJECT**

<table>
<thead>
<tr>
<th>DEEPER AZIMUTH (DEGREES)</th>
<th>PLANAR AZIMUTH (DEGREES)</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>QE 257</td>
</tr>
</tbody>
</table>
KAUHOLA STACK

(Hawaii Island, E. R. Hand, 1913).—On north coast of Hawaii, northern part of Kohala, behind Kauhola Point, on a bearing S. 28° W. from Kauhola Point Light, the brick stack at the mill of the Kohala Sugar Co.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAUHOLA STACK
STATE: HAWAII
YEAR: 1913
THIRD ORDER

SOURCE: G-52184

<table>
<thead>
<tr>
<th>GEOGRAPHIC LATITUDE</th>
<th>20° 14' 13.086&quot;</th>
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</thead>
<tbody>
<tr>
<td>GEOGRAPHIC LONGITUDE</td>
<td>155° 46' 54.759&quot;</td>
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ELEVATION: METERS

<table>
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<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
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</thead>
<tbody>
<tr>
<td>HI 1</td>
<td>5101</td>
<td>403,372.37</td>
<td>509,816.24</td>
<td>- 0 05 51</td>
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*PLANAR AZIMUTH HAS BEEN COMPUTED BY THE J. (N.C. R. FORMULA NEGLECTING THE SECOND TERM.

TO STATION ON OBJECT | GEOGRAPHIC AZIMUTH | PLANAR AZIMUTH | CODE
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

QP 118
## HORIZONTAL CONTROL DATA

**Name of Station:** Kawaihae  
**State:** Hawaii  
**Year:** 1892  
**Second Order**

**Source:** G-SP150

<table>
<thead>
<tr>
<th>State &amp; Zone</th>
<th>Code</th>
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*Plane Azimuth has been computed by the formula neglecting the second term.*

<table>
<thead>
<tr>
<th>To Station or Object</th>
<th>Geodetic Azimuth</th>
<th>Plane Azimuth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Code | 00 405 |
Kawaihae Light (Hawaii Island, K. T. Adams, 1926).—On the northwest coast of Hawaii, at the north end of the village of Kawaihae, and about 230 meters north-northwest along the shore from the wharf. This is the third light which has been erected at Kawaihae. The first light, prior to and during 1905, was exhibited from the old masonry conical frustum now standing between the present light and the radio mast. The second and third lights were identical in position. The lens lantern first exhibited in 1906 was supported on an open skeleton pyramidal wooden tower, which was replaced in 1914 with the present concrete tower. The present tower is 34 feet in height. The 1913 determination of the geographical position of this light was apparently in error by several meters and is superseded by the 1928 determination.

RECOVERY NOTE, TRIGONOMETRIC STATION

NAME OF STATION: Kawaihae Light
ESTABLISHED BY: K. T. Adams YEAR: 1926 STATE: Hawaii BENCHMARK ALSO:
RECOVERED BY: D.H. Whipp YEAR: 1967 COUNTY: Hawaii
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Island: Hawaii

Determined according to the formula of the original description, including media token, enumerative, diagrams, code, and other pertinent data:

Station was recovered in good condition. Located about 1800 feet northwest from the post office at Kawaihae, 300 feet southeast from old Kawaihae Pier, 50 yards southwest of the highway, and 20 yards northeast from sea bluff.

Station is center of white light mounted atop a square, white, tapering, concrete tower. Light is 30 feet above ground.

RECOVERY NOTE, TRIGONOMETRIC STATION

NAME OF STATION: Kawaihae Light
ESTABLISHED BY: K. T. Adams YEAR: 1926 STATE: Hawaii BENCHMARK ALSO:
RECOVERED BY: D.H. Whipp YEAR: 1967 COUNTY: Hawaii
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

Determined according to the formula of the original description, including media token, enumerative, diagrams, code, and other pertinent data:

Station was recovered in good condition as previously described by D.H. Whipp.
HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAWAIHAE LIGHTHOUSE
STATE: HAWAII
YEAR: 1928
THIRD ORDER

SOURCE: G-SP150

<table>
<thead>
<tr>
<th>DEGREE LATITUDE</th>
<th>DEGREE LONGITUDE</th>
<th>ELEVATION</th>
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</thead>
<tbody>
<tr>
<td>20° 02' 39.08&quot;</td>
<td>159° 50' 37.03&quot;</td>
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<table>
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<tr>
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<th>X</th>
<th>Y</th>
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<tbody>
<tr>
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<td>384,915.65</td>
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*PLANE ADJUSTMENT HAS BEEN COMPUTED BY THE Z (gradation of the second term)

<table>
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<tr>
<th>STATION OR OBJECT</th>
<th>GEODETIC ADJUSTMENT</th>
<th>PLANAR ADJUSTMENT</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

03 215
NO ORIGINAL TEXT

Kawaihæ wireless (Hawaii Island, E. R. Hand, 1913; K. T. Adams, 1928)—On northwest coast of Hawaii, at Kawaihæ, the wireless mast owned but no longer operated by the Mutual Telephone Co., of Honolulu. The position of this point, determined without check, is in doubt by several meters, and should not be used on large scale maps or charts.

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

NO OBSERVATION CHECK ON THIS POINT

STATE & TOWN  CODE  X  Y  Z
HI 1  5101  385,002.93  439,795.74  0 06 53

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

**NAME OF STATION**: KAHULUI

**STATE**: HAWAII

**YEAR**: 1948

**SECOND ORDER**

**SOURCE**: G-5276

**NO OBSERVATION CHECK ON THIS POSITION**

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X</th>
<th>Y</th>
<th>Z OR AZ ANGLE</th>
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<tbody>
<tr>
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<td>418,456.12</td>
<td>440,200.51</td>
<td>0 04' 53&quot;</td>
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</table>

*PLATE AZIMUTH HAS BEEN COMPUTED BY THE 2 OR Az, Pl FORMULA WITH THE SECOND ORDER.*

**POSITIVE DETERMINED BY TRAVERSE FROM STATION KAHULUI 2**
HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAMA\(\text{I}M\) 2
STATE: HAWAI\(\text{I}\)
YEAR: 1948
THIRD

SOURCE: G\text{-}9275

<table>
<thead>
<tr>
<th>STATE GEOID CODE</th>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>N</th>
<th>V</th>
<th>Z</th>
<th>U.M.</th>
<th>H.U.</th>
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</thead>
<tbody>
<tr>
<td>20 02 43 091</td>
<td>155 44 15 359</td>
<td>982.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3222</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STATE GEOID CODE</th>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>N</th>
<th>V</th>
<th>Z</th>
<th>U.M.</th>
<th>H.U.</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 02 43 091</td>
<td>155 44 15 359</td>
<td>982.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3222</td>
</tr>
</tbody>
</table>

DETAILED DESCRIPTION

At about the highest part of the southeastern part of two humps constituting Pu\(\text{u}\) Kawielai, which is located close to the Kohala-Waimea highway, about 6 miles from Kama\(\text{I}\)a. The northwesterly tip or hump of this hill is the highest of the two. Station is not difficult to reach. It is a standard disk set in ledge and two reference marks were similarly established.

There have been several stations placed on the hill in the past. What appears to be old station Kawielai (Hawaii Territory Survey) a chiseled triangle with chiseled cross inside, on a boulder about 25 feet in diameter, set in a cairn of rocks, is distant 17.76 feet.

RECOVERY NOTE. TRIANGULATION STATION

NAME OF STATION: KAMA\(\text{I}M\) 2
ESTABLISHED BY: L\text-C\text-W
YEAR: 1948
STATE: HAWAII
RECOVERED BY: R\text-E\text-A
YEAR: 1961
COUNTY: HAWAII

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

The station was recovered as described with the exception of the two reference marks which were not recovered. The station mark was found in good condition.

A new to reach follows:

To reach the station from the intersection of State Highways 25 and 19, in the center of the town of Waimea, go north on State Highway 25 for 1.0 mile to the intersection of State Highways 25 and 26. Continue right on State Highway 25 for 1.7 miles to the center one of three track roads on the left. Turn left and follow the track road up the side of a hill to the north of a gravel pit for .3 miles to the west side of the hill. From this point follow a dim track road across the side of the hill for about 100 yards and the end of two-wheel drive travel. From this point cross a short saddle and continue up a dim track road for about 100 yards to the top of the southeasterly one of two hills and the station.

*Name of chief of party should be inserted here. The officer who actually located the station should sign his name.

Note: One of these forms must be filled out for every station recovered.

(continued on next page)
Station mark was recovered in good condition. Although the old description states that 2 reference marks were established none could be found, so two new marks, No. 3 and No. 4, were established. A complete description follows:

Station is located about 4-1/2 miles west-northwest of Kamuela and 1400 feet south-southwest of State Highway 25, on the summit of Puu Kaawai, on the southeast one of the two similar hills about 500 feet apart, at about 1222 feet elevation. There is a cinder quarry at the base of the hill between station and the highway.

To reach station from the post office in Kamuela, go west on State Highway 25 for 2.4 miles to junction with State Highway 26. Take right fork, continuing on State Highway 25, for 2.7 miles to top of grade and side road left. Turn left and go 0.1 mile to locked chain gate, pass through gate and follow road up around right side of hill for 0.3 mile to end of road. Walk southeast about 150 yards up slope to top and station. (Key for locked gate may be obtained at the State Highway Dept. in Kamuela).

Station mark is a standard disk stamped "KAMAIWI 2 1948", cemented in a drill hole in a small boulder projecting 2 inches above ground. There is an 8-foot-square, wire fence surrounding the station.

Reference mark number three is a standard disk stamped "KAMAIWI 2 1948 NO 3 1967", cemented in a drill hole in the top of a 2-foot boulder projecting 1 foot above ground. It is 0.86 foot higher than station mark.

Reference mark number four is a standard disk stamped "KAMAIWI 2 1948 NO 4 1967", cemented in a drill hole in a 16-inch boulder that projects 4 inches above ground. It is 6 inches higher than station mark.

KAMAIWI (old) is a 12-inch, chiseled triangle, with a slight hole at the center, in the top of a 20-inch square boulder setting in the center and top of an 8-foot-diameter rock pile. It is 2 feet higher than station mark.
HORIZONTAL CONTROL DATA

by the National Ocean Survey
OLD HAWAIIAN DATUM

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KANELA
STATE: HAWAII
YEAR: 1877

SOURCE: G-SP156

GEODETIC LATITUDE: 20° 05' 58.6"N
GEODETIC LONGITUDE: 155° 30' 20.0"W
ELEVATION: 55.585.49
MEASURES:

STATE & ZONE CODE X Y S OR V. ANGLE
HI 1 5101 450,385.94 455,859.49 - 0°.0267

* PLANAZIMUTH HAS BEEN COMPUTED BY THE S OR V. FORMULA NEGLECTING THE SECOND TERN

<table>
<thead>
<tr>
<th>TO STATION OR OBJECT</th>
<th>GEODETIC AZIMUTH (FROM SOUTH)</th>
<th>PLANAR AZIMUTH (FROM SOUTH)</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

QQ 366
RECOVERY NOTE, TRIANGULATION STATION

MAINE
Established by: H.R.S. Year 1861 State: HAWAII
Recovered by: H. G. Wilder Year 1948 County: HAWAII

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

The original circular concrete block was found as described in H.R.S. records. An old U.S.G.S. disk is cemented in the middle of the concrete block but no records are available to indicate the date of the disk.

A cemented cairn of rocks about four feet in diameter and three feet high surrounds the concrete monument.

The station is located in the northern part of Hawaii about 2.5 miles west of Honokaa Village and about 1.2 miles inland from the sea.

To reach the station proceed westerly along the road from Honokaa Village to Waipio Valley a distance of about 2.3 miles. Turn right and proceed down the Kawela Camp Road a distance of 0.5 mile to the Lower Hamakua Ditch. Go west 800 feet along the ditch and down about 100 feet to the station which is located on a prominent rise that overlooks the seacoast.

RECOVERY NOTE, TRIANGULATION STATION

KAELE
Established by: H.R.S. Year 1861 State: HAWAII
Recovered by: J. M. Whipp Year 1966 County: HAWAII

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

Station was found destroyed. A triangular block of concrete, 3 feet on each side, with an unstamped U.S. Geological Survey disk in an 8-inch-diameter concrete block projecting from the center of it, was found laying on top of the ground on its side, apparently pushed out by machinery. Remains of the cemented cairn are laying in the vicinity.
HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

STATION KEALALEWA 2

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KEALALEWA
STATE: HAWAI'I
YEAR: 1940
SECOND ORDER

SOURCE: G-9276

NO OBSERVATION CHECK ON THIS POSITION

DESCRIPTIVE LATITUDE: 20° 16' 04.43" N
DESCRIPTIVE LONGITUDE: 155° 52' 13.36" W

ELEVATION: 16 FEET

STATE COORDINATES (FEMA)

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X (ft)</th>
<th>Y (ft)</th>
<th>ΔX &amp; ΔY (ft)</th>
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</thead>
<tbody>
<tr>
<td>HI 1</td>
<td>5101</td>
<td>377,844.49</td>
<td>921,103.44</td>
<td>-3.07'43&quot;</td>
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</tbody>
</table>

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

TO STATION OR OBJECT | GEOGRAPHIC AZIMUTH (From north) | PLANE AZIMUTH* (From north) | CODE |
|---------------------|---------------------------------|----------------------------|------|

POSITION DETERMINED BY TRAVERSE FROM STATION KEALALEWA 2

QE 288
This page contains the description and triangulation data for the station "KALAHINA 2" located in the state of Hawaii. The station is described as being located on the west side of the terminal building, within Upolu Airport, north of the Hawaiian Island, approximately 500 feet from the fence marking the westerly boundary of the same and about 125 feet south of the sea cliffs. The station mark is set in outcropping rock. The reference mark No. 1 in a rock about 3 feet square, which projects one foot above the ground. Reference mark No. 2 is set on top of a large solid rock projection about 25 feet above the ground and 2 feet higher than the station mark. The station was established due to the old station KHALABEA being on the edge of an eroding ledge near the sea cliffs. The old station mark is a circular 4-inch concrete monument set in the ground. The station mark is set in a rock about 3 feet square, which projects one foot above the ground. The reference mark is set on top of a large solid rock projection about 25 feet above the ground and 2 feet higher than the station mark. The station was established due to the old station KHALABEA being on the edge of an eroding ledge near the sea cliffs. The old station mark is a circular 4-inch concrete monument set in the ground.

The station, the two R.M.s, and the old Kehalalama mark were all recovered in good condition as described in 163A, except for the following:

Station is located 0.8 mile northeast of the Upolu Airport terminal; about 0.1 mile northwest of the westerly end of the runway; 370 feet west of the Kohala Sugar Co. pump house; about 55 feet west of an old stone fence, now barely visible, and about 65 feet south of the erosion line of the sea cliffs.

To reach, go 1.25 miles west along the highway from the road junction in Ha'wai; turn right and go north 2.0 miles to Upolu Airport; turn left and go 0.8 mile along dirt road to old pump house. Station is 370 feet eastward near erosion line along beach.

---

(continued on next page)
HORIZONTAL CONTROL DATA
by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 201553
STATION 1037

LATITUDE
0° 10' 00.0"

LONGITUDE
0° 10' 00.0"

DIAGRAM

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KEALAHENA 2
Established by: L.C. Wilder
Year: 1948
State: Hawaii
Recovereby: H.A. Gifford
Year: 1968
County: Hawaii

KEALAHENA 2

Station mark is a standard disk stamped "KEALAHENA 2 1948", cemented in a bedrock knob that projects 6 inches above a 1-foot bedrock outcrop. It is at an end of a group of bedrock outcrops, 42 feet south from edge of beach bank, 107 feet north of center line of track road, and about 150 yards east of a pump house at edge of cane-field. Reference mark number one is a standard disk stamped "KEALAHENA 2 1948", cemented in a drill hole in the top of a 6 x 9-foot bedrock outcrop that projects 30 inches above ground and is the highest and largest of the group. It is 2 feet higher than station mark. KEALAHENA (old station) is the center of a 5-inch-diameter, concrete cylinder 1 foot below ground level and 2 feet lower than station mark. It is on edge of grassy beach bank, at south edge of the pile of sugar canes rubble that has been dumped along bank to stop erosion. There are a few boulders piled on top of the mark.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KEALAHENA 2
Established by: L.C. Wilder
Year: 1948
State: Hawaii
Bench Mark also
Recoveredy: H.A. Gifford
Year: 1968
County: Hawaii

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3 miles northwest of Waikiki

Distances and directions to azimuths, reference marks and prominent objects which can be seen from the ground at this station:

<table>
<thead>
<tr>
<th>OBJECT</th>
<th>BEARING</th>
<th>DISTANCE</th>
<th>DIRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>KONIHI (NWS)</td>
<td>1946 DISTANCE</td>
<td>00   00</td>
<td>00.0</td>
</tr>
<tr>
<td>KEALAHENA 2</td>
<td></td>
<td>1948</td>
<td>00 00 00</td>
</tr>
<tr>
<td>R.M. No. 1</td>
<td>NW</td>
<td>04 660</td>
<td>19.710</td>
</tr>
<tr>
<td>R.M. No. 2</td>
<td>R</td>
<td>16 082</td>
<td>6 13</td>
</tr>
<tr>
<td>R.M. No. 3</td>
<td>SE</td>
<td>16 610</td>
<td>5 064</td>
</tr>
<tr>
<td>KONIHI (WES)</td>
<td>1967 DISTANCE</td>
<td>00   00</td>
<td>00.0</td>
</tr>
<tr>
<td>KEALAHENA 2</td>
<td></td>
<td>1948</td>
<td>00 00 00</td>
</tr>
<tr>
<td>R.M. No. 1</td>
<td>NS</td>
<td>16 082</td>
<td>4 902</td>
</tr>
<tr>
<td>R.M. No. 2</td>
<td>NS</td>
<td>16 605</td>
<td>5 062</td>
</tr>
</tbody>
</table>

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

Station is located about 3 miles northwest of Waikiki, 1 mile north-northeast of the U.S. Coast Guard Koko Station, 800 feet west-northwest of the west end of the Upolu Point Airport runway, and on a grassy area bordering the sea.

To reach station from the post office in Waikiki, go north on State Highway 25 for 0.1 mile to T-junction. Turn left and go west on State Highway 27 for 1.35 miles to T-road right. Turn right and go north on State Highway 171 for 2.0 miles to Upolu Point Airport. Turn left and go west along airport for 0.75 mile to fork after rounding end of airport. Take right fork and go 0.05 mile to station.

The station mark and reference marks 1 and 7 were recovered in good condition. The direction and distances to the reference marks measured on this sheet compare favorably with the 1949 and 1967 measurements. The 1967 recovery description is adequate, except the old station "KEALAHENA was found destroyed in 1967.

(R.B. Melby, 1972) The station and the reference marks were recovered in good condition.
NO ORIGINAL TEXT

Kesawanu (Hawaii Island, Hawaiian Government Survey, 1881; E. R. Hand, 1913).—On northwest coast of Hawaii, west coast of Kohala, on a rocky promontory just inside a prominent point (Maiaea Point) which is midway between Kawaihao Light and Mohukena Light, and at a place where the shore line runs north for almost 300 meters. Out on this point is a high rock pinnacle touched up with paint; the next point east to the southeast along the shore is the symbol, cross inside circle, and is 200 meters distant; 360 meters southeast of this symbol is a part of a cairn. The station is directly east 300 meters from pinnacle on point. Marked originally by three lines of bottles radiating from center and three coral blocks marked with triangles, over which was a large stone cairn inside a small stone enclosure. In 1913 bottles were found disarranged and mostly broken. The three coral stones were apparently undisturbed, forming a triangle a little less than 1 meter on a side.

RECOVERY NOTE: TRIANGULATION STATION

Kesawanu

NAME OF STATION: Kesawanu
STATE: Hawaii
COUNTY: Hawaii

Established by H.G.S. 1981
Locality: N. Kohala, Hawaii

Recovered by Chas. L. Murray 1988

Detailed statement as to the Stoner of the original description:

Location of station: On a rocky promontory about 0.2 mile inland from a prominent point of land called Maiaea Point which is about 0.5 miles from both Kawaihao and Mahuka Light houses.

Old Station found: U.S.G.S. bronze tablet set in center of A cut in rock. 101 feet elevation marked on tablet.

New Station mark: H.T.S. Type D monument; Triangular concrete monument 7 1/2 feet 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 standard metal target is set in the 8 1/4" pipe.

RECOVERY NOTE: TRIANGULATION STATION

Kesawanu

Established by H.G.S. 1981
Locality: N. Kohala, Hawaii

Recovered by Chas. L. Murray 1988

Detailed statement as to the Stoner of the original description:

On "Maiaea" Point which is six miles north of Kawaihao Light. On a small rise 101 feet in elevation, 400 to 500 yards from the end of the point. There is a slightly higher knoll about 200 yards eastward. There is a small rock wall around the station. Landing was made on the south side of the point in a light, the nearest place from the shoreline to the station. The head of this light is rock and gravel. There is another small light on the north side of the point. The station was recovered in 1938 and reinstalled with a concrete platform, metal pole and target. They recovered a USGS disk set in a triangle which was probably an old RN. Elevation 101 feet on the disk. This recovery was by the Hawaii Territory Survey. The USGS disk was recovered in 1948, surrounded by concrete. A reference mark stamped "H. M. No. 1" was set in ledge in a southerly direction, distant 30.65 feet (9,343 m).

<table>
<thead>
<tr>
<th>OBJECT</th>
<th>DISTANCE</th>
<th>DIRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BKUO NEW</td>
<td>00 00 00</td>
<td>00 00 00</td>
</tr>
<tr>
<td>RN. M. No. 1</td>
<td>9.543m</td>
<td>30.65 ft.</td>
</tr>
<tr>
<td>Kahama (metal target)</td>
<td>901 44 19.2</td>
<td></td>
</tr>
<tr>
<td>Pau Loa (metal target)</td>
<td>306 59 19.2</td>
<td></td>
</tr>
</tbody>
</table>

(continued on next page)
HORIZONTAL CONTROL DATA

by the NATIONAL GEODETIC SURVEY

OLD HAWAIIAN DATUM

KEAWANUI (continued)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KEAWANUI
ESTABLISHED BY: HGS
YEAR: 1881
STATE: Hawaii
RECOVERED BY: D.M. Whipp
YEAR: 1967
COUNTY: Hawaii
ISLAND: Hawaii
HEIGHT OF TELESCOPE ABOVE STATION MARK: 1.72 METERS
HEIGHT OF LIGHT ABOVE STATION MARK: METERS
DISTANCES AND DIRECTIONS TO AZIMUTH MARKS, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

<table>
<thead>
<tr>
<th>OBJECT</th>
<th>DISTANCE</th>
<th>DIRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUAKO NW</td>
<td>1948</td>
<td>00 00 00.0</td>
</tr>
<tr>
<td>R.M. No. 1</td>
<td>30.05</td>
<td>9.343 13 51 38</td>
</tr>
<tr>
<td>PUAKO NW 1948</td>
<td>1967</td>
<td>00 00 00.0</td>
</tr>
<tr>
<td>R.M. No. 1</td>
<td>10.011</td>
<td>9.330 13 52 02</td>
</tr>
<tr>
<td>R.M. No. 2</td>
<td>NE</td>
<td>11.42 11.16 233 31 03</td>
</tr>
</tbody>
</table>

Station was recovered and both marks found in good condition. A new reference mark was established. It is now possible to drive almost to station. A complete description follows:

Station is located about 6 miles northwest of Kawainui, about 0.4 mile southwest of the new Coast highway, 1100 feet east of Malae Point, and 4/5 mile northeast of an old jeep road along coast, on a small hill of about 100 feet elevation, in the north end of a stone-walled enclosure about 24 x 45 feet in size.

To reach station from the post office in Kawainui, go northwest on the highway towards Mahukona for 5.4 miles to a track crossing. Turn left and go downgrade for 0.35 mile; take road right, along coastline, for 0.25 mile to point of small cove in dip of road. Continue ahead for 0.15 mile to top of low grade and end of truck travel. Walk northeast up along ridge for about 75 feet to top of hill and station.

Station mark is a U.S. Geological Survey disk, stamped "108", set within a 4-inch-diameter, 6-inch-deep recess in the center of a triangular, concrete platform about 7 feet on each side. A 2-1/2-inch iron pipe 2 feet long is centered over the mark and supports a red and white metal target.

Reference mark number one is a standard disk stamped "1948", cemented in a drill hole in a 16-inch boulder that projects 3 inches from ground. It is 6 feet northeast from southeast end of the rock enclosure and 1.5 feet lower than station mark.

Reference mark number two is a standard disk stamped "KEAWANUI HOS 1881 No 2 1967", cemented in a drill hole in lava bedrock that projects 3 inches from ground. It is 0.2 foot higher than station mark.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KEAWANUI
ESTABLISHED BY: HGS
YEAR: 1881
STATE: Hawaii
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, changes made, and other pertinent facts:

Station and both reference marks recovered in good condition as previously described by D.M. Whipp. A 16' wooden tripod was constructed over the station in November, 1968.
HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

Kehena (Hawaii Island, Hawaiian Government Survey, 1881; E. R. Hand, 1913).—On northwest coast of Hawaii, west coast of Kohala District, in the land of Kaibolenia and Makahuna, and 6/2 mile from the sea. Point may be best found in the following manner: Identify the most prominent point, about 4 miles south of Makahuna south beacon, and here will be found a paint spot on an old house with domelike appearance; go north along the coast to another paint spot (white paint on round bowlder), immediately east of which is a small mound, from which the cairn over the station will be near. N. 60° E., 660 meters distant. Center marked by a rock with 4-inch drill hole in top. Three stones, each marked with cross, are each distant about 1 meter from station.

RECOVERY NOTE, TRIANGULATION STATION

R

Kehena

HAWAII

STATE: HAWAII

YEAR: 1881

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KEHENA

STATE: HAWAII

YEAR: 1881

SECOND ORDER

SOURCE: G-9275

DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

NO ORIGINAL TEXT

STATE AND COUNTY: Hawaii

LATITUDE: 20° 00' 20 570

LONGITUDE: 155° 53' 21.815

ELEVATION: 764.2

METERS

FEET

STATE COORDINATES (SINES)

STATE & ZONE: Hi 1

CODE: 5401

N: 366,429.22

T: 474,327.35

R: -9° 38' 03"

TO STATION OR OBJECT

GEODETIC AZIMUTH (FROM STATION)

PLAN AZIMUTH (FROM OBJECT)

CODE

RIDGE

171° 22' 16.1"

171° 30' 19"

5101
HORIZONTAL CONTROL DATA

by the
NATIONAL GEODIRIC SURVEY
OLD HAWAIIAN DATUM

KENENA (continued)

An early recovery note: Original station recovered by C.H. Birdseye in April 1911. Bases also relate to 4 feet high.

The station is the center of a 2 1/2 inch iron pipe which projects about 2 1/2 feet from the top of a triangular slab of concrete which is about 7 feet on each end and projects about 10 inches.

Reference mark number 1 is a standard disk, stamped 1946, set into a drill hole in a boulder which projects about 6 inches and is about 3 feet lower than the station.

Reference mark number 2 is a drill hole in the center of a chiseled triangle in flat rock which is flush with the surface of the rock and is about the same elevation as the station.

The U.S. Geological Survey disk is a standard bench mark, stamped 1911, set in a drill hole in a flat rock which is flush with the ground and is about the same elevation as the station.

Object Distance Direction
RIDGE (metal target) 1.265 m 4,080 ft. 00 00 00
R.M. No. 1 SE 7.185 m 23,566 ft 76 01 11
R.M. No. 2 1.076 m 3,550 ft 13 11 40
M. 0 NALNE 40 01 00 00 00 00

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KENENA
ESTABLISHED BY: HGS
RECOVERED BY: D.M. Whipp
YEAR: 1881
STATE: Hawaii
COUNTY: Kauai

HEIGHT OF TELESCOPE ABOVE STATION MARK: 1.7 meters
HEIGHT OF LIGHT ABOVE STATION MARK: 10.7 meters

DISTANCES AND DIRECTIONS TO AZIMUTH MARKS: Reference marks and permanent objects which can be seen from the ground at the station.

<table>
<thead>
<tr>
<th>OBJECT</th>
<th>MEASURING</th>
<th>DISTANCE</th>
<th>DIRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIDGE 1910---1946 DISTANCE and DIRECTION:</td>
<td>KNE 4,080 ft.</td>
<td>1,243 ft.</td>
<td>78 01 11</td>
</tr>
<tr>
<td>R.M. No. 1</td>
<td>SE 23,566 ft.</td>
<td>76 01 11</td>
<td></td>
</tr>
<tr>
<td>R.M. No. 2</td>
<td>1.076 m</td>
<td>3,550 ft.</td>
<td>13 11 40</td>
</tr>
<tr>
<td>RIDGE 1910---1967 DISTANCE and DIRECTION:</td>
<td>KNE 1,243 ft.</td>
<td>78 01 11</td>
<td></td>
</tr>
<tr>
<td>R.M. No. 1</td>
<td>SE 23,566 ft.</td>
<td>76 01 11</td>
<td></td>
</tr>
<tr>
<td>R.M. No. 2 (chiseled triangle)</td>
<td>SSE 3.524</td>
<td>1,074</td>
<td>182 51 00</td>
</tr>
</tbody>
</table>

Station was recovered and all marks found in good condition. The 1967 angles to EM 258 (USGS) and R.M. No. 2 are considered correct because with the type of instrument used (Wild T-2) it was possible to focus and obtain accurate pointings. It is now possible to drive to the station.

A complete description follows:

Station is located about 8 miles northwest of Kawaloe and 2000 feet east-northeast of the sea, on a rise along the southwest side of the sea.

Stated highway running between Kawaloe and Mahukona, and is at about 250 feet elevation.

To reach station from the post office at Kawaloe, go northwest on the highway for 8.2 miles to top of grade and station on left.

Station is marked by a 1/2-inch drill hole in a rock, at the bottom of a 5-inch-diameter, 7-inch-deep hole in the center of a triangular concrete platform about 7 feet on each side and projecting 6 inches above ground. It is 176 feet west-southwest of center line of highway.

Reference mark number one is a standard disk stamped "1946", cemented in a drill hole in a 2 x 3-foot rock outcrop projecting 4 inches from ground, and is 0.3 foot higher than station mark.
HORIZONTAL CONTROL DATA

by the National Ocean Survey
OLD HAWAIIAN DATUM

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

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

NAME OF STATION: KEHONI (H.T.S.)
STATE: HAWAII
COUNTY: HAWAII

CHIEF OF PARTY: L. C. WILDER
YEAR: 1945

NOTE: HEIGHT OF Triangulation station above NAVD 29 Mean Sea Level 1.07 Meters

OBJECT

Puu O'Kale (metal target)
Sta. Kahoe (metal target)
R. M. No. 1 1946

COORDINATES (feet)

Lat. 18.415
Long. 4.394

This station was established by the Hawaii Territory Survey. It was recovered by them in 1958 and documented with a concrete platform, metal pole and target. The old mark was a triangle cut in a cement block. Station exists in 1946 as it was recovered in 1958.

Located on a very prominent hill named Kahoe on topographic maps, 0.2 miles west of Hawi and about 1/4 mile north of the Hawi-Makukau road. Station is at the top of this hill, to which a truck can be driven by passing through a gate just before abreast of the station. This hill is about 1 mile northwest of Puu O'Kale.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KEHONI (H.T.S)
ESTABLISHED BY: L. C. W
RECOVERED BY: H. D. Y

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

The station was recovered in good condition as described with the following:

The steel legs have rusted off and the metal pole and target are gone. The R.B. was searched for but not found.

To reach go 2.1 miles west along the highway from the junction in Hawi; turn right on a blacktop road and continue northwest for 0.7 mile up and around to the west side of Kahoe Hill to the white clay arch bridge. The arch is directly underneath the boundary fence line and 157 ft. east of the VOR north-south fence line extended.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KEHONI (H.T.S)
ESTABLISHED BY: L. C. W
RECOVERED BY: H. D. Y

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

The station and the reference mark were recovered in good condition as described except that the metal target is gone. The station is in a fence line at the east edge of the property fence around the now abandoned VOR site at Upolu Point. The old building still stands. A paved road leads to the top and the station site.

(continued on next page)
HORIZONTAL CONTROL DATA
by the NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 201553
STATION 1040

LATITUDE 80 10.00
LONGITUDE 160 54.00

DIAGRAM

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KEOHONI (HTS)
ESTABLISHED BY: L. G. Wilder
YEAR: 1946
STATE: Hawaii
COUNTY: Kona
BENCH MARK also
RECOVERED BY: L. A. Crittlow
YEAR: 1977
COUNTY: Hawaii

NAME OF STATION: KEOHONI (HTS)
ESTABLISHED BY: L. G. Wilder
YEAR: 1946
STATE: Hawaii
COUNTY: Kona
RECOVERED BY: L. A. Crittlow
YEAR: 1977
COUNTY: Hawaii

AERIAL DISTANCE AND DIRECTION FROM NEAREST TOWN: 2 1/8 miles west of Hilo.
HEIGHT OF Telescope ABOVE STATION MARK: 17.5 FEET.
HEIGHT OF LIGHT ABOVE STATION MARK: 11 FEET.

DIRECTIONS AND DISTANCES TO ADJACENT MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION:

<table>
<thead>
<tr>
<th>OBJECT</th>
<th>MEASURING</th>
<th>DISTANCE</th>
<th>DIRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAFEX HTS 1940</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC 1</td>
<td>00 00 00.0</td>
<td>14.695  14.605</td>
<td>30 45 53</td>
</tr>
<tr>
<td>NC 2</td>
<td>00 00 00.0</td>
<td>13.737  13.627</td>
<td>36 25 03</td>
</tr>
<tr>
<td>LORAN C TOWER 1964</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LORAN A TOWER 1964</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hilo Airport DCS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1 1 to R1 2</td>
<td>04 00 00.0</td>
<td>24.547  24.757</td>
<td></td>
</tr>
</tbody>
</table>

The station mark and reference marks 1 and 2 were recovered in good condition. The angle between the reference marks was found smaller by 01 minute and 03 seconds. The distance to reference mark 1 was found longer by 0.010 meter and the distance to reference mark 2 was found longer by 0.003 meter. The to reach and write up of the 1977 recovery note in good.

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

Station is located about 2 1/2 miles west of Hilo and 1400 feet north of State Highway 27, at about 560 feet elevation, on the summit of a bare hill named Keohon, that has an old radio range station building on it.

To reach station, from the post office in Hilo, go north on State Highway 25 for 0.1 mile; turn left and go east on State Highway 27 for 1.23 miles to junction with State Highway 271 on right. Continue ahead on Highway 27 for 0.6 mile to macadam side road right, at telephone pole 42.

Turn right and follow the macadam road northwest for 0.6 mile to board gate. Pass through gate and continue for 0.1 mile to summit of hill and station.

Station is located in a northwest-southeast fence line, and is marked by a hole in the center of a chained triangle, in the top of 4-inch-diameter, concrete post set in the center of a triangular, concrete platform about 7 feet on each side and flush with the ground. It is 01 feet north of the old radio range building and is surrounded by boulders.

Reference mark number one is a standard disk stamped "KEOHONI 1946", set in the top of a 2-inch, iron pipe projecting 6 inches from the ground. It is 14 inches northeast of the fence and 0.5 foot lower than station.

Reference mark number two in a standard disk stamped "KEOHONI HTS NO 2 1967", cemented in a drill hole near the center of a 24-inch-diameter concrete block that has 4 large bolts projecting from the top. It is 34 feet northeast of the edge of the building, 10 feet northwest of a 1-inch pipe projecting 4 feet from the ground, and 0.7 foot lower than station.

*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 report.

U.S. DEPARTMENT OF COMMERCE, DEPT. IDENTIFICATION NUMBER:
NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION.
NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY.

KEOHONI (HTS) (continued)
HORIZONTAL CONTROL DATA

by the
National Ocean Survey
NAVD 1988 DATUM

Keaiula (Hawaii Island, E. R. Hand, 1913).—On north point of Hawaii, on Hona Point (Keaiula Point?) which is the headland seen to the westward from Kauhola Point Light; it is directly east from Hona Mill of the Hwa Mill & Plantation Co. Station is not on end of point which consists of a flat rock about 30 to 40 feet high, but is back from the outermost end about 50 meters, up a terrace of earth, showing a distinct bluff line behind the regular cliffs. From the station, Hona Mill stack bears S. 64° W. Station is about 6 meters southeast from the cliff edge and about 3 meters southwest from the terrace bluff. Mark is a cylinder of concrete about 5 inches in diameter, projecting 8 inches above the surface. Top of the cylinder is a triangle with small hole. This mark placed by the Territorial Survey; its position determined independently by the United States Coast and Geodetic Survey.

RECOVERY NOTE, TRIANGULATION STATION

Address: Keauula
State: Hawaii
Established by: E. R. Hand
Year: 1913
Location: North Kohala, Hawaii
Recovered by: L. G. Wilger
Year: 1940

Location of station: On the southeast about 3000-feet east of Hona Mill which is being dismantled. This station can be approached by taking the road leading from the Mill to the Hona Pumping station.

Old Mark: A on concrete-filled cylinder.

New 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 all legs over the station mark which is left exposed to view. A standard metal target is set over the steel bar).

ADJUSTED HORIZONTAL CONTROL DATA

STATE HAWAI
YEAR 1913
SECOND ORDER

SOURCE 6-920
NO OBSERVATION ON THIS POSITION

DEGREES LATITUDE 20° 16' 03" 176
DEGREES LONGITUDE 155° 50' 01" 115

ELEVATION: 62 Meters
SCALED: 42 FEET

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI 1</td>
<td>5101</td>
<td>385.648.79</td>
<td>520.955.67</td>
<td>- 0° 06' 56&quot;</td>
</tr>
</tbody>
</table>

FUNCTIONAL DISTANCE (METERS)

<table>
<thead>
<tr>
<th>STATION OR OBJECT</th>
<th>GEOGRAPHIC DEDUCTION (METERS)</th>
<th>PLANE DEDUCTION (METERS)</th>
<th>CODE</th>
</tr>
</thead>
</table>

POSITION DETERMINED BY TRAVERSE FROM STATION KEAIULA 2

This station was located by direction and distance from Keaiula 2.

(continued on next page)
HORIZONTAL CONTROL DATA
by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KEPUI
ESTABLISHED BY: E.R. Hand
YEAR: 1913
STATE: Hawaii
COUNTY: Hawaii
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 
Island: Hawaii

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KEPUI
RECOVERED BY: D.W. Whipp
YEAR: 1967
COUNTY: Hawaii

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

The mark was recovered as described in 1913, 1938 and 1948, except for the following corrections. The mark is on Kakahiki Point instead of Kepui Point. The steel bar and the standard metal target as mentioned in the 1936 description are now both gone. Although still being undermined, the station appears to be quite stable. See how to reach from Kepui 2 description.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KEPUI
RECOVERED BY: H.O.F.
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 is destroyed. The concrete platform has been undermined by erosion and is tilted and beginning to break up.
HORIZONTAL CONTROL DATA
by the National Ocean Survey

OLD HAWAIIAN DATUM

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KEPUHI 2
STATE: HAWAII
YEAR: 1948
SECOND ORDER

SOURCE: 6-9275

MAGNETIC LATITUDE: 20° 16' 02" N
MAGNETIC LONGITUDE: 155° 53' 01" W
ELEVATION: 21.9 Meters (72 ft)

STATE COORDINATES (EPS:

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X (ft)</th>
<th>Y (ft)</th>
<th>Z (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI 1</td>
<td>5101</td>
<td>385,635.82</td>
<td>520,897.38</td>
<td>-0'06.5'</td>
</tr>
</tbody>
</table>

TO STATION OR OBJECT

<table>
<thead>
<tr>
<th>DISTANCE ADJUSTMENT (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>267.45 47.7</td>
</tr>
<tr>
<td>287.52 44</td>
</tr>
</tbody>
</table>

*Plane azimuth has been computed by the 3N0-W formula neglecting the second term.

KAIHOLO

(continued on next page)
HORIZONTAL CONTROL DATA
by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 202453 STATION 1042
LATITUDE ° 10 °
LONGITUDE ° 10 °

NAME OF STATION: KEPHH 2
ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii
HEIGHT OF TELESCOPE ABOVE STATION MARK 1.55 METER
HEIGHT OF LIGHT ABOVE STATION MARK 2.75 METER
DISTANCES AND DIRECTIONS TO ALIGNED MARKS, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

<table>
<thead>
<tr>
<th>OBJECT</th>
<th>BEARING</th>
<th>DISTANCE</th>
<th>DIRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kauhola Point Light 1948</td>
<td>RSE</td>
<td>00' 00&quot; 00.0'</td>
<td>00' 02&quot; 12.2'</td>
</tr>
<tr>
<td>R.M. No. 2</td>
<td>SSW</td>
<td>30.601' 9.157'</td>
<td>99' 02&quot; 12'</td>
</tr>
<tr>
<td>R.M. No. 2</td>
<td>W</td>
<td>23.569' 7.184'</td>
<td>159' 35&quot; 20'</td>
</tr>
</tbody>
</table>

Station was recovered and all marks found in good condition. A complete description follows:
Station is located about 1-3/4 miles due north of Hawi and 1-1/4 miles southeast of Uolah Point, in pasture land on Alanahui Point, about 800 feet southeast from the extreme rocky tip of the point, and is 80 feet south from edge of grass area and beginning of wind-eroded area.
To reach station from the post office in Hawi, go north on State Highway 25 for 0.1 mile; turn left and go west on State Highway 27 for 0.2 mile to dirt side road right, across highway from the Catholic Church. Turn right and go north for 0.95 mile to the second main crossroad. Continue ahead for 0.15 mile to fork. Take left fork, straight ahead, and go 0.4 mile; turn sharp right on T-road and go 0.2 mile to wire gate on left at T-fence intersection. Pass through gate and go north down along fence for 0.2 mile to corral. Go left along fence for 0.1 mile to gate on right. Pass through gate and go north across pasture for 0.2 mile to station.
Station mark is a standard disk stamped "KEPHH 2 1948", set in the top of a 12-inch-square concrete monument projecting 2 inches above ground. Reference mark number one is a standard disk stamped "KEPHH 1 1948", set in the top of a 2-inch, iron pipe projecting 1 inch above ground. Reference mark number two is a standard disk stamped "KEPHH 2 2 1948" set in the top of a 2-inch, iron pipe projecting 1 inch above ground.

*Name of chief party should be inserted here. The officers 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.

USCOAU-GC 2/19/53
HORIZONTAL CONTROL DATA

by the
National Ocean Survey

OLD HAWAIIAN DATUM

SEE STATION KAUNOLA

RECOVERY NOTE, TRIANGULATION STATION

KOHALA LATITUDE STATION

ESTABLISHED BY H.O.S.
YEAR: 1881
STATE: HAWAII

RECOVERED BY L. G. Wilder
YEAR: 1946
COUNTY: HAWAII

Detailed statement as to the features of the original description:

This station is a brick and cement pier about 2 feet by 3 feet by 3 feet high, with a cross chiseled in the top. It is in good condition.

To reach the station pass the Kohala Sugar Co. mill and proceed to Keahole Pt. Lighthouse. Station is about 10 feet from the lighthouse and 14.77 feet from station Keahole. It was located by direction and distance from Station Keahole.

RECOVERY NOTE, TRIANGULATION STATION

KOHALA LATITUDE STATION

ESTABLISHED BY H.O.S.
YEAR: 1881
STATE: HAWAII BENCH MARK ALSO

RECOVERED BY R. B. MELBY YEAR: 1878
COUNTY: HAWAII

AERIAL DISTANCE AND DIRECTION FROM KAUAI TOWNS: 4 MILES ENE OF HAWAI

Detailed statement as to the features of the original description including marks listed, contours, changes made, and other pertinent facts:

THE STATION WAS RECOVERED AS DESCRIBED IN THE RECOVERY NOTE FOR STATION KAUNOLA (HGS), 1881 IN THE YEAR 1887.

---

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KOHALA LATITUDE STATION

STATE: HAWAII
YEAR: 1881
SECOND ORDER

SOURCE: G-9279
NO OBSERVATION CHECK ON THIS POSITION

| GEODETIC LATITUDE: | 20° 14' 57.875"
|-------------------|-------------------
| GEODETIC LONGITUDE: | 155° 46' 27.997"

| STATE & ZONE | CODE | X  | Y  | +  | 3 OR Q. AT ANGLE:
|--------------|------|----|----|----|---------------------
| HI 1         | 5101 | 406,011.78 | 514,330.35 | - 0' 05 42 |

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE 3 OR Q. A FORMULA NEGLECTING THE SECOND TERM.

<table>
<thead>
<tr>
<th>TO STATION OR OBJECT</th>
<th>GEODETIC AZIMUTH (From North)</th>
<th>PLANE AZIMUTH (From North)</th>
<th>CODE</th>
</tr>
</thead>
</table>

POSITION DETERMINED BY TRAVERSE FROM STATION KAUNOLA
KOHALA MILL STACK (Hawaii Island, L.C.W., 1948) -- Located near NW corner of Kohala Sugar Company's mill.

HORIZONTAL CONTROL DATA

by the National Ocean Survey
OLD HAWAIIAN DATUM

20° 00' TO 20° 30'
LONGITUDE 155° 30' TO 156° 00'
DIAGRAM NE-SW HAWAII

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KOHALA MILL STACK

STATE: HAWAII YEAR: 1948 THIRD ORDER

SOURCE: 9279

DEGREES LATITUDE: 20° 14' 13.643
DEGREES LONGITUDE: 155° 46' 55.121
ELEVATION METERS

STATE COORDINATES

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X (ft)</th>
<th>Y (ft)</th>
<th>Z (ft)</th>
<th>削減</th>
<th>ANGLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI 1</td>
<td>5101</td>
<td>403335.80</td>
<td>5095872.49</td>
<td>-</td>
<td>0° 05' 51&quot;</td>
<td></td>
</tr>
</tbody>
</table>

*PLANE AZIMUTH HAS BEEN COMPUTED BY THE 2ND ORDER FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT

<table>
<thead>
<tr>
<th>GEOGRAPHIC AZIMUTH</th>
<th>PLANE AZIMUTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>(From north)</td>
<td>(From north)</td>
</tr>
</tbody>
</table>

Code: QE 256

RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

NAME OF STATION: Kohala Mill, stack

ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii

RECOVERED BY: D.H. Whipp YEAR: 1967 COUNTY: Hawaii

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Island: Hawaii

Detailed statements as to the sources of the original description, including maps, field, camps, photographs, and other pertinent facts:

Station was recovered. Located about 3-1/2 miles east of Hawi, in Kahului village. Station is the large, prominent stack at the Kohala Sugar Mill, the only remaining sugar mill in the Kohala District.
ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KOHALA SUMMIT

STATE: HAWAII

YEAR: 1873

SOURCE: G-SP150

GEODETIC LATITUDE: 20° 05' 20.036
GEODETIC LONGITUDE: 155° 43' 11.716

ELEVATION: 210 METERS

<table>
<thead>
<tr>
<th>STATE CODE</th>
<th>CODE</th>
<th>X (METERS)</th>
<th>Y (METERS)</th>
<th>Z (FOOT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI 1</td>
<td>5101</td>
<td>424,538.34</td>
<td>456,068.65</td>
<td>-0°04'32&quot;</td>
</tr>
</tbody>
</table>

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE Z = X/R FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT | GEODETIC AZIMUTH (From north) | PLANE AZIMUTH (From north) | CODE |
|---------------------|-------------------------------|-----------------------------|------|

QQ 241
NO ORIGINAL TEXT

Kulei (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1913).—On the northern coast of Hawaii, in the northern part of Kamakua, land of Kawela, a little west of Kulei Gulch, and a short distance above the trail to Waimoa, on a not very pronounced hill directly inshore from Kamakama Point; the point, station Kamakama, and this station are about in line on bearing N. 6° W. Station is 3,140 meters from the point, about 3/4 mile above the government road, and about midway between the post offices of Honokaa and Kukuihele. From the station the inshore (left) tangent of the island off Kohala coast, about 15 miles distant, and the base of the cliffs between Waipio and Waimano are on range, and bear N. 70° W. Also Honokaa mill and plantation camp “New Shales” on main road west of Honokaa post office are on range, and bear N. 61° E. To reach station start at plantation camp and go west along government road a short distance, turning up hill at first road, a private plantation road, into “Field 10,” which name is marked on gate. Keep to this road for 200 meters, then turn to the right along the first trail branching off, following it for about 375 meters, or until the island range previously described is reached, then turn left into the cane field, 100 meters to top of hill. Station marked by an equilateral triangle of white concrete about 2.8 feet on side; in its center is a tablet of the United States Geological Survey, alongside of which a cast-iron pipe 5 inches in diameter and 2 feet high is set in the concrete. Station was covered by a large pile of stones. The old mark was a copper triangle underground and cylindrical block of concrete with drill hole in center, and the letters “H. G. S. 1881” in its top.

RECOVERY NOTE: TRIANGULATION STATION

Station not visited, but signal erected by Hawaiian Government survey plainly visible.

(continued on next page)
HORIZONTAL CONTROL DATA
by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION KUILEI
ELEVATED BY: Hawaiian Govt. Year: 1877 Country: HAWAII
RECORDED BY: W. G. Miller Year: 1846 COUNTY: HAWAII

Detailed statement as to the status of the original description: In 1861 the original station, consisting of a cylindrical concrete block, encased in corrugated iron, stamped H. S. B. 168, was established. The subsurface mark was a copper triangle. In 1889 J. B. Kerrison reset this post and made note that some uncertainty existed whether this post is in the exact spot it originally occupied. In 1913 H. R. Hand of the U. S. Geological Survey reported the station as being a U. S. Geological Survey disk set in the top of a concrete triangle which was 2.6 feet on each side. In 1929 the Hawaii Territory Survey documented this station with a square slab of concrete which is 2'1/2 feet on each side and projects about 18 inches above the soil. A 3 1/2 inch iron pipe was reported to have been centered over the Geological Disk. The center of this pipe was used as the 1948 station; A new description follows:

The station is located on the summit of a small knoll in a sugar cane field about 7 miles east southeast of the mouth of Waipio Canyon, about 1.5 miles west of Honokaa, about 1 mile southeast of the New Stables Camp, about 0.5 mile southeast of a line of trees and about 100 meters to the high ground and the station. The station is the center of a 3 1/2 inch iron pipe which projects about 18 inches from the top of a square concrete platform which is about 5 1/2 feet on each side and projects about 18 inches above the ground.

Object          Distance  Direction
Pauauau (metal target)  00     00
Honokaa Stack, Honokaa Sugar Co.  3 miles NW  312  17  37.2
Pauauau Stack, Pauauau Sugar Co.  5 miles ENE  336  14  20.7
Honokaa Steeple, Catholic Church 1.5 miles NE  350  31  34.6

An early recovery note reports: Original station recovered by A. O. Bartland in December 1911. Recovered by bronze centered over mark in original rock marking station. Stamped Elev. 168A.

In 1948 J. B. Kerrison set the concrete post and reset it in concrete. Some uncertainty existed as to whether it was set exactly at the position of the old station.
HORIZONTAL CONTROL DATA

BY THE
National Ocean Survey
OLD HAWAIIAN DATUM

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: LAHEKIOLA
STATE: HAWAII
YEAR: 1910
THIRD ORDER

SOURCE: G-SP156

GEODETIC LATITUDE: 20° 39' 03.726"
GEODETIC LONGITUDE: 155° 47' 59.017"
ELEVATION: 0.0 METERS

STATE COORDINATES (eters):

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X (ETERS)</th>
<th>Y (ETERS)</th>
<th>Z (ETERS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI 1</td>
<td>5101</td>
<td>397,118.63</td>
<td>478,617.54</td>
<td>0.0612</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>NO STATION OF OBJECT</th>
<th>GEOGRAPHIC AZIMUTH (True North)</th>
<th>PLANE AZIMUTH* (From South)</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

00 234
HORIZONTAL CONTROL DATA

by the National Ocean Survey
OLD HAWAIIAN DATUM

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: LAHIKIOLA EAST
STATE: HAWAII
YEAR: 1948
SECOND ORDER

SOURCE: G-9275

GEODETIC LATITUDE: 20° 09' 03.354''
ELEVATION: 1031.0 METERS
GEODETIC LONGITUDE: 155° 47' 59.790''
3383 FEET

STATE CODES (U.S.)

Hawaii

STATE & ZONE CODE X Y Z
MI 1 5101 397,121.13 478,580.01 - 0° 06' 12"

(continued on next page)
### HORIZONTAL CONTROL DATA

**by the NATIONAL GEODETIC SURVEY**

**OLD HAWAIIAN DATUM**

---

**LAHIKIOLA EAST**

(RECOVERY NOTE. TRIANGULATION STATION)

- **Name of Station:** LAHIKIOLA EAST
- **Established by:** L. G. Wilder
- **Recovered by:** D. M. Whipp
- **Year:**
  - 1948
  - 1967
- **State:** Hawaii
- **County:** Hawaii
- **Island:** Hawaii

**Height of Telescope above Station Mark:** 1.3 Meters

**Height of Light above Station Mark:**

**Distances and Directions to Alinement Mark, Reference Marks and Prominent Objects which can be seen from the ground at the Station:**

<table>
<thead>
<tr>
<th>OBJECT</th>
<th>HEADING</th>
<th>DISTANCE FEET</th>
<th>DISTANCE METERS</th>
<th>DIRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUNULO 2</td>
<td>N</td>
<td>18.321</td>
<td>5.575</td>
<td>00 00 00.0</td>
</tr>
<tr>
<td>R.M. No. 1</td>
<td></td>
<td>31 12 54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kohala Mill, stack</td>
<td>NNE</td>
<td>18.169</td>
<td>5.538</td>
<td>00 14 48.8</td>
</tr>
<tr>
<td>R.M. No. 2</td>
<td>ESE</td>
<td>139 42 23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MUNULO 2 1948</td>
<td></td>
<td>18.321</td>
<td>5.575</td>
<td>00 14 30</td>
</tr>
<tr>
<td>R.M. No. 1</td>
<td>NNE</td>
<td>31 14 49.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kohala Mill, stack, 1948</td>
<td></td>
<td>14.860</td>
<td>4.530</td>
<td>139 41 20</td>
</tr>
<tr>
<td>R.M. No. 2</td>
<td>ESE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LAHIKIOLA WEST (HTS) 1948</td>
<td>SW</td>
<td>260 12 20.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Station was recovered and all marks found in good condition, however a discrepancy of 1 meter was found in the distance to RM 2. A complete description follows:

Station is located about 12 miles northwest of Kamuela, 6-1/2 miles southwest of Hilo. 1-3/4 miles north of the Kohala Ranch Headquarters, 1/2-mile northeast of State Highway 25, and 1300 feet northwest of the boundary fence between Parker Ranch and Kahua Ranch property, on the northeast rim of Lahikiola, an old volcanic crater of about 3383 feet elevation.

To reach station from the post office in Kamuela, go west on State Highway 25 for 2.1 miles; take right fork, State Highway 25, and go 9.3 miles to the Kahua Ranch driveway on right. Continue on the highway for 1.4 miles to a pipe gate on right, just past corrals. Pass through gate and follow field road north for 0.5 mile; turn left and go across pasture for 0.1 mile to fence and end of truck truck travel. Pack north up steep hill to top and station. A 20-minute pack.

Station mark is the center of a 1-1/2-inch, iron pipe that projects 1 foot from the top of a 16-inch-diameter, concrete monument flush with ground. •LAHIKIOLA 2 BP is inscribed in the top of the concrete. Station is about 75 feet north from highest point of the flat, grassy top, and about 2 feet lower.

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

Reference mark number two is a standard disk stamped "2 1948", cemented in the top of a 2-inch iron pipe flush with ground and about 8 inches lower than top of station pipe.

Both reference marks are hidden by the heavy grass.

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

---

**NOTE:** One of these forms must be used for every station recovered.
HORIZONTAL CONTROL DATA

NAME OF STATION: LAKIKIOLA WEST JBM
STATE: HAWAII
YEAR: 1948
SECOND ORDER

DESCRIPTION OF TRIANGULATION STATION
NAME OF STATION: LAKIKIOLA WEST JBM
STATE: HAWAII
COUNTY: NORTH KONA DISTRICT
DISTANCE AND DIRECTIONS TO ADJUSTED MARKS, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE READ FROM THE GROUND AT THE STATION

<table>
<thead>
<tr>
<th>OBJECT</th>
<th>MEASUREMENT</th>
<th>DISTANCE</th>
<th>DIRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>RNW</td>
<td>41.085</td>
<td>12.523</td>
<td>00 00 00</td>
</tr>
<tr>
<td>NW</td>
<td>59 15 00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NNW</td>
<td>79 41 23.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NN</td>
<td>109 54 02.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The station is located on the summit and western rim of a prominent volcanic knob by the name of Lakikola, about 7 miles south southeast of Hawi, about 7 miles southeast of Mahukona, about 6 miles east of the west shore of the island and about 0.3 mile east of the road which runs between Waimea and Hawi.

To reach from the post office in Waimea, go north on the road which leads toward Hawi for 13.9 miles to the end of truck travel at the western base of the hill. From this point pass over the wire fence and pack eastward up the steep slope, for about 0.3 mile to the western summit and the station.

The station is the center of a 2 1/2 inch iron pipe which projects about 2 inches from the top of a triangular slab of concrete. The triangular slab of concrete is about 7 feet on each side and projects about 1 foot above the ground.

Reference mark number 1 is a standard disk, stamped 1945, set into a drill hole in a boulder which is about 2 feet in diameter and projects about 1 foot. It is located about 3 feet lower than the station.

This station was inscribed with a triangular concrete monument by H.T.S. in 1938. The mark found in 1938 was a 1-1/2-inch pipe put in by James A. Mann, a private surveyor. It was assumed in 1938 that the pipe replaced the original mark, a marked stone.

(continued on next page)
HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

LAHIKIOLA WEST (JBM) (continued)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: LAHIKIOLA WEST (JBM)
ESTABLISHED BY: L.C. Wilder YEAR: 1948 STATE: Hawaii
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:
Island: Hawaii

Station and reference mark were recovered in good condition. The distance to the reference mark was checked and found to be correct. A complete description follows:

Station is located about 12 miles northeast of Kamuela, 6-1/2 miles southeast of Hawi, 1-3/4 miles northeast of the Kahua Ranch Headquarters, and 0.3 mile northeast of State Highway 25, on the summit of the southwest rim of Lahikiola, an old volcanic crater, and is at about 3103 feet elevation. Station LAHIKIOLA EAST, on the east rim of the hill, is at 3183 feet elevation.

To reach station from the post office in Kamuela, go west on State Highway 25 for 2.1 miles to fork. Take right fork, State Highway 25, and go 9.3 miles to the Kahua Ranch driveway on right. Continue on the highway for 1.4 miles to a pipe gate on right, just past corrales. Pass through gate and go north on old road for 0.5 mile; leave road and go northerly across pasture for 0.1 mile to end of truck travel at fence. Park up steep hill to station on left rim. About a 20-minute pack.

Station mark is the center of a 1-1/4-inch iron pipe in the center of a triangular, concrete platform 7 feet on each side and projecting 4 inches above ground. The words "WEST LAHIKIOLA" are inscribed in the concrete platform. The station pipe has rusted off flush with the top of the platform.

Reference mark number one in a standard disk stamped "M 1948", cemented in a drill hole in the top of a 2-foot boulder projecting about 6 inches from ground, and is about 5-1/2 feet lower than station platform. It is 12.523 meters (41.085 feet) from the station, in azimuth 161° 55' 09".
HORIZONTAL CONTROL DATA
by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 201353
STATE 1050

HAWAI'I
LATITUDE 20°30' TO 20°40'
LONGITUDE 155°30' TO 156°40'
DIAGRAM NE 515 HAWAI'I

ADJUSTED HORIZONTAL CONTROL DATA
OBS BY NGS

NAME OF STATION: LORAN A TONER
STATE: HAWAI'I
YEAR: 1977

3rd ORDER

6-16-77
NO OBSERVATION CHECK ON THIS POSITION

GRID LATITUDE: 20°35'13.335'N
GRID LONGITUDE: 155°33'24.935'W
ELEVATION: 516.143.12 METERS

STATE COORDINATES (Foot)

<table>
<thead>
<tr>
<th>STATE &amp; ZONE</th>
<th>CODE</th>
<th>X</th>
<th>Y</th>
<th>θ (in °)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HI 1</td>
<td>5101</td>
<td>356.418.61</td>
<td>516.143.12</td>
<td>0°08'06&quot;</td>
</tr>
</tbody>
</table>

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

IN CHARGE, DATA OBTAINED FROM ADJUSTMENT OF JAN 1979


The station is located about 3 miles northwest of Hau, about 1 mile west of Upolu Airport, and near Upolu Point.
The station is the top end of a mast which belongs to the U.S. Coast Guard. The mast is painted red and white and is about 180 feet high.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: LORAN A TONER
ESTABLISHED BY: L.A. Critchlow YEAR: 1977 STATE: HAWAI'I BENCH MARKS ALSO:
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 4 MILES WNW OF HAU.

Detailed description of the station, including means found, readings taken, and other pertinent data:
RECOVERED.

The STATION IS LOCATED ABOUT 4 MILES WEST-NORTHWEST OF THE TOWN OF HAU, ON THE NORTHWEST SHORE OF THE ISLAND OF HAWAI'I AND AT THE U.S. COAST GUARD LORAN STATION.
The station is the north one of two skeleton steel towers.

RDAA FORM 76-165
(70-72)
(505-51373)
(510-505051)
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEANIC SURVEY
HORIZONTAL CONTROL DATA

NO ORIGINAL TEXT

OF TRIANGULATION INTERSECTION STATION

RECOVERY NOTE

NAME OF STATION: LORAN C TOWER

CHIEF OF PARTY: A. Critchlow Year: 1977 STATE: HAWAII COUNTY: HAWAII

Description, including sketch of sheet:

The station was recovered in good condition.

A new description follows:

The station is located about 3 miles northwest of Keawaiki, about 1 mile west of Upolu Airport, and near Upolu Point.

The station is the top of a mast which belongs to the U.S. Coast Guard. The mast is painted red and white and is 625 feet high.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: LORAN C TOWER

ESTABLISHED BY: — YEAR: 1964 STATE: HAWAII DENNIS MARCUS ALSO __

RECOVERED BY: R. B. Melby YEAR: 1978 COUNTY: HAWAII

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 4 MILES WNW OF HAITI

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

RECOVERED.

LOCATED ABOUT 4 MILES WEST-NORTHWEST OF THE TOWN OF HAIKI, ON THE NORTHWEST COAST OF THE ISLAND OF HAWAI AND AT THE U.S. COAST GUARD LORAN STATION.

THE STATION IS THE SOUTHERN ONE OF TWO SKELETON STEEL RADIO TOWERS.

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* PLANE ADJACENCY HAS BEEN COMPUTED BY THE Z FORMULA, INCLUDING THE SECOND TERM.