

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191551 STATION 1051
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1,5 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 532 D

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: HILO, HONGWANJI CHURCH, STEEPLE YEAR: 1949 STATE: Hawaii COUNTY: Hawaii
 CHIEF OF PARTY: C. T. Husemeyer

Description, including sketch of object: The station is the top and center of the steeple on the roof of the Hongwanji Church in the town of Hilo.
 The steeple is on the east end of the roof and is 73 feet in height. A large bell is hung under the roof.
 The church is located on Kilauea Avenue about 200 feet south of Kukuau Street.

Form 526
 (11-9-55)

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

NAME OF STATION: HILO, HONGWANJI CHURCH, STEEPLE
 ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: Hawaii
 RECOVERED BY: H.J.S. YEAR: 1962 COUNTY: Hawaii

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

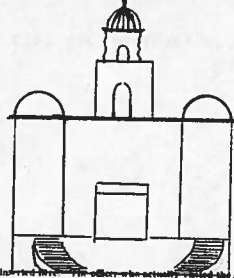
The station was recovered in good condition as described in 1949. The steeple is a square structure on the east end of the building, surmounted by a hemi spheric copper sheathed dome from which projects a small finial.

RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

NAME OF STATION: Hilo, Hongwanji Church, Steeple
 ESTABLISHED BY: C.T. Husemeyer YEAR: 1949 STATE: Hawaii
 RECOVERED BY: D.M. Whipp YEAR: 1966 COUNTY: Hawaii
 Island: Hawaii

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

Station was recovered. It is the center of the dome-shaped steeple on the east end of the Hongwanji Church, which sets in the south angle of the intersection of Kilauea Ave. and Kukuau St.



* Name of chief of party should be inserted here. If the station is to be recovered, the station should sign his name at the end of the recovery note.

RECOVERY NOTE OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: HILO HONGWANJI CHURCH STEEPLE 1949
 CHIEF OF PARTY: L.A. Critchlow YEAR: 1977 STATE: Hawaii COUNTY: Hawaii

Description, including sketch of object:

The station was recovered as described in 1966.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: HILO HONGWANJI CHURCH STEEPLE
 STATE: HAWAII YEAR: 1949 THIRD ORDER

SOURCE G- 9275

GEODETTIC LATITUDE: 19 43 22.196	ELEVATION: METERS
GEODETTIC LONGITUDE: 155 05 10.144	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ θ ANGLE
HI 1	5101	642,331.95	323,188.21	+ 0 08 23

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

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

QE 228

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1052
 HAWAII
 LATITUDE 19 °30' TO 20 °00'
 LONGITUDE 155 °00' TO 155 °30'
 DIAGRAM NE 5-1.5 HAWAII

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: HILO KHLO RADIO TOWER

CHIEF OF PARTY: L.A. Critchlow YEAR: 1977 STATE: Hawaii COUNTY: Hawaii

Description, including sketch of object: The station is located in the east part of Hilo and is the top and center of a 4-legged steel tower about 180 feet high that is painted orange and white, has a light mounted on the top, is about 250 feet southwest of a house at 1650 Kalaniana'ole Street, and is owned by the KHLO Radio Station.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: HILO KHLO RADIO TOWER

OBS BY NGS

STATE: HAWAII

YEAR: 1977

THIRO

ORDER

SOURCE: 6-16241

GEODETIC LATITUDE:	19 44 10.48043	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 02 07.82060		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR α ANGLE*
HI 1	5101	659,737.04	328,104.22	+ 0°09'25"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
THESE DATA OBTAINED FROM ADJUSTMENT OF JAN 1979			
3M 041			

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191551 STATION 1054
 HAWAII
 LATITUDE 19 ° 30' TO 20 ° 30'
 LONGITUDE 155 ° 00' TO 155 ° 30'
 DIAGRAM NE 5-1.5 HAWAII

SEE STATION HALAI (HGS)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION HILD LATITUDE STATION
 STATE HAWAII YEAR: 1887 SECOND ORDER

SOURCE: G- 9275
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	19 ° 43' 10.771	ELEVATION	91	METERS
GEODETIC LONGITUDE:	155 05 57.652	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE *
HI 1	5101	637,756.02	322,024.77	+ 0 08 07

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
POSITION DETERMINED BY TRAVERSE FROM STATION HALAI			
QE 271			

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191551 STATION 1056
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-15 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 532
 REV. AUG. 1968

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: HILO NORTH BASE STATE: Hawaii COUNTY: Hawaii

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK SURFACE-STATION MARK UNDERGROUND-STATION MARK	HEIGHT OF LIGHT ABOVE STATION MARK METERS.	DISTANCES TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
			BEARING	DISTANCE		DIRECTION!
	OBJECT		feet	meters	° ' "	
12c pipe	WAIAKEA NEW (USGS)				00 00 00	
	R. M. No. 1	E	93.032	28.358	234 34 21	
	HILO RAILROAD NORTH BASE	SSE	378.255	124.0995	313 51 10.3	

The station is located in the easterly section of the town of Hilo; about 200 yards west of the Veterans Housing Area; about 100 yards west of Kanoelehua Street; 18 feet west of the main railroad tracks and in a loose railroad fill.

To reach from the intersection of Kamehameha and Kanoelehua Streets in the town of Hilo; go southerly on Kanoelehua Street for 0.35 mile; turn right, into rock driveway and go west for about 100 yards to the railroad tracks and the station.

The station is a standard disk, stamped HILO N BASE 1949, set in the top of a circular concrete post which is about 1 foot in diameter and projects about 6 inches.

Reference mark number 1 is a standard disk, stamped HILO N BASE NO 1 1949, set into a drill hole in a boulder which is flush with the surface of the ground. It is located about 150 feet west of Kanoelehua Street, 74 feet east of the main railroad tracks and about the same elevation as the station.

Hilo Railroad NORTH BASE (HTS) is a 1 1/2 inch iron pipe which projects about 1 foot from the top of a square concrete post which is one foot on each side. It is located on the bank about 15 feet west of the railroad tracks and about 4 feet higher than the tracks.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 530
 (REV. FEB. 1968)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: HILO NORTH BASE
 ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: Hawaii
 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:

A search was made for both the station and R. M., but neither was recovered. According to the Territorial Survey Office this area had been bulldozed during recent years and the station mark was probably covered or destroyed; the R. M. probably was covered.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: HILO NORTH BASE
 ESTABLISHED BY: C.T. Husemeyer YEAR: 1949 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: D.M. Whipp YEAR: 1966 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Island: Hawaii

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

Station was not recovered. This section is now an industrial complex and there is a large lumber warehouse setting approximately on the point occupied by the station.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: HILO NORTH BASE
 STATE: HAWAII YEAR: 1949 SECOND ORDER

SOURCE G- 9279

GEODETIC LATITUDE	19 43 14.826	ELEVATION	4.1 METERS
GEODETIC LONGITUDE	155 04 03.660		13 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ θ ANGLE
HI 1	5101	648,685.46	322,460.55	+ 0 08 45

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
WAIAKEA NEW	28 17 51.1	28 09 06	5101

POSITION DETERMINED BY TRAVERSE FROM STATION HILO SOUTH BASE
 AND CHECKED BY ADDITIONAL OBSERVATIONS

QE 115

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191551 STATION 1057
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1.5 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 Form 535 D

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: HILO RADIO RANGE YEAR: 1949 STATE: Hawaii COUNTY: Hawaii

CHIEF OF PARTY: C. T. Husemeyer

Description, including sketch of object: The station is the top of the center tower of five towers which comprise the radio range for General Lyman Air Field in the town of Hilo.

The tower is constructed of steel, 135 feet in height, and rests on a concrete base about 5 feet square.

The station lies about 4.5 miles east of the mouth of the Wailuku River, about 1.9 miles east of the airport, about 1.3 miles west of Lelewi Point and 50 feet west of the radio transmission house.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: Hilo Radio Range
 ESTABLISHED BY: C.T. Husemeyer YEAR: 1949 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: D.M. Whipp YEAR: 1966 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Island: Hawaii

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

Recovered as described in 1949. The main runway has been lengthened and the station is now 3/4-mile northeast of the new runway end.

Station is the center tower of the 5 radio range towers, located about 4-1/2 miles east of Hilo.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: Hilo Radio Range
 ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: R. B. Melby YEAR: 1975 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 4 1/2 miles east of Hilo

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

The station was recovered in good condition as described in 1949. The station is the center one of five identical towers except the center tower has several horizontal antennae extending from its sides.

RECOVERY NOTE ~~DESCRIPTION~~ OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: HILO RADIO RANGE 1949
 CHIEF OF PARTY: L.A. Critchlow YEAR: 1977 STATE: Hawaii COUNTY: Hawaii

Description, including sketch of object: The station was recovered in good condition and the previous descriptions are adequate with the exceptions that the four towers that were around the center tower which marks the station have been torn down and the tower is now owned and operated by TV Station KHMT.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: HILO RADIO RANGE
 STATE: HAWAII YEAR: 1949 THIRD ORDER

SOURCE: G- 9279

GEODETIC LATITUDE	19° 43' 55.317	ELEVATION	METERS
GEODETIC LONGITUDE	155° 01' 32.190		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ θ ANGLE
HI 1	5101	663,145.03	326,583.54	+ 0° 09' 37"

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

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151551 STATION 1058
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1.5 HAWAII

DEPARTMENT OF COMMERCE
 U.S. COAST AND GEODETIC SURVEY
 FORM 525 b

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: HILO, RADIO STATION YEAR: 1949 STATE: Hawaii COUNTY: Hawaii
 KHEC, MAST
 CHIEF OF PARTY: C. T. Husemeyer

Description, including sketch of object: The station is the red light on the top of the radio mast of station KHBC.

It is constructed of steel about 3 feet in width and 267 feet in height and rests on a concrete base about 6 feet square.

The station is located about 3 miles west of the post office in Hilo, about 200 yards south of the Wailuku River and 196 feet east of the transmission house.

DEPARTMENT OF COMMERCE
 U.S. COAST AND GEODETIC SURVEY
 FORM 526
 (Rev. Feb. 1968)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: HILO RADIO STATION KHEC, MAST
 ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: Hawaii
 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 was recovered as described in 1949.

To reach from Hilo, go 1.1 miles S. W. on Waiānūenuē St., from the post office; at forks of road keep straight ahead on right fork past the Hilo Memorial Hospital on the right for 1.8 miles; at forks of road keep straight ahead on right fork for 0.6 mile, then turn right on gravel road and to station 0.1 mile on right.

FORM 52
 (11-8-55)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: HILO, RADIO STATION KHBC, MAST
 ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: Hawaii
 RECOVERED BY: H.J.S. YEAR: 1962 COUNTY: Hawaii

Detailed statement as to the fitness of the original description, including marks found, stampings, changes made, and other pertinent facts:
 The station was recovered in good condition as described and by following the directions given in the 1958 recovery note by H.O.F. The upper section of the mast, as it existed when the station was located, was removed in 1956 and another section of the same length was substituted for television broadcasting.

FORM 526
 (11-8-55)

RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

R

NAME OF STATION: Hilo, Radio Station KHBC, Mast
 ESTABLISHED BY: C.T.Husemeyer YEAR: 1949 STATE: Hawaii
 RECOVERED BY: D.M. Whipp YEAR: 1966 COUNTY: Hawaii
 Island: Hawaii

Detailed statement as to the fitness of the original description, including marks found, stampings, changes made, and other pertinent facts:
 Station was recovered. A tall, skeleton-steel mast, painted alternate red and white, with 2 sets of guy-cables; located about 3 miles west-southwest of Hilo, along the south side of Wailuku River, about 625 feet north of Waiānūenuē Rd. and 200 feet east of the radio station quonset building which sets at east side of Manaolana Place.

(L.A.Critchlow, 1977)--The station was recovered as described in the 1966 recovery note with the exception it is now used by KPUA Radio and KGMD TV.

ADJUSTED HORIZONTAL CONTROL DATA

ADJUSTMENT BY NGS

NAME OF STATION: HILO RADIO STATION KHBC MAST OBS BY CGS
 STATE: HAWAII YEAR: 1949 THIRD ORDER

SOURCE: 5-16241

GEODETIC LATITUDE	19 43 02.09168	ELEVATION	METERS
GEODETIC LONGITUDE	155 08 15.12393		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ or ANGLE *
HI 1	5101	624,855.32	321,120.10	+ 0° 07' 21"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
THESE DATA OBTAINED FROM ADJUSTMENT OF JAN 1979			

3M 043

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

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 191551 STATION 1059
HAWAII
LATITUDE 19°30' TO 20°00'
LONGITUDE 155°00' TO 155°30'
DIAGRAM NE 5-1.5 HAWAII

NO STATION ASSIGNED TO THIS NUMBER

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191551 STATION 1060
 HAWAII
 LATITUDE 19 ° 30' TO 20 ° 00'
 LONGITUDE 155 ° 00' TO 155 ° 30'
 DIAGRAM NE 5-1.5 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 525 D

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: **HILO, RADIO STATION KIPA, MAST** YEAR: 1949 STATE: **Hawaii** COUNTY: **Hawaii**

CHIEF OF PARTY: **C. T. Husemeyer**

Description, including sketch of object: **The station is the red light on top of the radio mast of station KIPA.**

The mast is constructed of steel about 3 feet in width and 226 feet in height and rests on a concrete base about 6 feet square.

The station is located in open pasture land about 9 miles southwest of Pepee Point, about 4 1/2 miles west of the Hilo Business District, about 200 yards south of the forest area, about 200 feet west of the transmission house and 20 feet west of a small corral.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 526
 (Rev. Feb. 1968)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **HILO, RADIO STATION KIPA, MAST**
 ESTABLISHED BY: **C.T.H.** YEAR: 1949 STATE: **Hawaii**
 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:
The station was recovered as described in 1949.

To reach, go 0.2 mile N.W. along Wainaku St., from the post office in Hilo, across the third bridge over the Wailuke River; turn left at Amsuulu Road, and go west for 4.4 miles to the station.

U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
 FORM 526
 (11-8-55)

RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

NAME OF STATION: **Hilo, Radio Station KIPA, Mast**
 ESTABLISHED BY: **C.T.Husemeyer** YEAR: 1949 STATE: **Hawaii**
 RECOVERED BY: **D.M. Whipp** YEAR: 1966 COUNTY: **Hawaii**

Detailed statement as to the fitness of the original description, including marks found, stampings, changes made, and other pertinent facts:
Station was recovered. A tall, skeleton-steel mast, painted alternate red and white, with red obstruction light on top, which was the point intersected; located about 4-1/2 miles west-northwest of Hilo, in pasture land just west of edge of the cane fields, at south side of Amsuulu Road and 200 feet west of an old red building.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **Hilo, Radio Station KIPA, Mast**
 ESTABLISHED BY: **C.T. Husemeyer** YEAR: 1949 STATE: **Hawaii** BENCH MARK(S) ALSO
 RECOVERED BY: **J.M. Collom** YEAR: 1969 COUNTY: **Hawaii**

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

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

Station recovered as described in 1966.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **HILO RADIO STATION KIPA MAST**

STATE: **HAWAII** YEAR: **1949** THIRD ORDER

SOURCE **G- 9279**

GEODETIC LATITUDE:	19 ° 44 ' 34.891	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 09 25.634		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE *
HI 1	5101	617,908.93	330,467.24	+ 0 06 57

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

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

QE 225

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191551 STATION 1061
 HAWAII
 LATITUDE 19 ° 30' TO 20 ° 00'
 LONGITUDE 155 ° 00' TO 155 ° 30'
 DIAGRAM NE 5-1.5 HAWAII

SEE STATION HILO NORTH BASE

ADJUSTED HORIZONTAL CONTROL DATA

DEPARTMENT OF COMMERCE RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: HILO RAILROAD NORTH BASE
 ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: Hawaii
 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:

According to the Territorial Survey Office the mark was destroyed when recent building development took place in this area.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: HILO RAILROAD NORTH BASE
 ESTABLISHED BY: C.T. Husemeyer YEAR: 1949 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: D.M. Whipp YEAR: 1966 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Island: Hawaii

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

Station is gone. The old railroad has been removed. This is now an industrial area.

R

R

NAME OF STATION: HILO RAILROAD NORTH BASE

STATE: HAWAII YEAR: 1949 SECOND ORDER

SOURCE: G- 9279
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	19 ° 43 ' 10.982	ELEVATION:	7.1 METERS
GEODETIC LONGITUDE:	155 04 02.352		23 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ θ: ANGLE *
HI 1	5101	648,811.41	322,073.08	+ 0 08 46

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE $\theta \text{ HOR } \Delta \theta$ FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
POSITION DETERMINED BY TRAVERSE FROM STATION HILO NORTH BASE			
QE 272			

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191551 STATION 1062
 HAWAII
 LATITUDE 19 ° 30' TO 20 ° 00'
 LONGITUDE 155 ° 00' TO 155 ° 30'
 DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 502
 (Rev. Feb. 1965)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **HILO RAILROAD SOUTH BASE**
 ESTABLISHED BY: **C.T.H.** YEAR: **1949** STATE: **Hawaii**
 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:

The Territorial Surveyors Office reported that the mark was destroyed in 1953 when a bulldozer in regrading the old railroad bed for a road pushed the station out of position.

R

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **HILO RAILROAD SOUTH BASE**
 ESTABLISHED BY: **C.T. Husemeyer** YEAR: **1949** STATE: **Hawaii** BENCH MARK(S) ALSO
 RECOVERED BY: **D.M. Whipp** YEAR: **1966** COUNTY: **Hawaii**
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: **Island: Hawaii**

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

Station is believed destroyed. A mark consisting of a 12-inch-square concrete block with a 1-1/2-inch iron pipe projecting 10 inches from the center was found at the approximate location of the station, however it is very loose and leaning about 3 inches out of plumb. It is 9 feet northeast of the center line of the track road which is the road-bed of the old railroad, and 36 feet northwest of a track side road running northeast. No other mark could be found in the vicinity. A check of the location by angle could not be made due to trees.

R

NAME OF STATION: **HILO RAILROAD SOUTH BASE**
 STATE: **HAWAII** YEAR: **1949** THIRD ORDER

SOURCE: **G- 9275**
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	19 ° 41 ' 50.354	ELEVATION:	52.3 METERS
GEODETIC LONGITUDE:	155 03 32.987		106 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ ϕ ANGLE *
HI 1	5101	651,637.97	313,946.54	+ 0 08 55 "

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
POSITION DETERMINED BY TRAVERSE FROM STATION HILO RR N BASE			
QE 275			

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191551 STATION 1063
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 534
 (Rev. Feb. 1945)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: HILO RAILROAD SOUTH BASE OFFSET
 ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: Hawaii
 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:

The Territorial Surveyors Office reported that the mark was destroyed in 1953 when a bulldozer in regrading the old railroad bed for a road pushed the station out of position.

* Name of chief of party should be inserted here. The officer who actually visited the station should sign his name at the end of the recovery note.
 U. S. GOVERNMENT PRINTING OFFICE NOTE—One of these forms must be used for every station recovered. 16-50488-9

NAME OF STATION: HILO RAILROAD S B OFFSET

STATE: HAWAII

YEAR: 1949

THIRD

ORDER

SOURCE: G- 9279

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	19° 41' 50.31"	ELEVATION:	31.7 METERS
GEODETIC LONGITUDE:	155° 03' 33.10"		104 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE *
HI 1	5101	651,627.19	313,942.08	+ 0° 08' 55"

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

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

POSITION DETERMINED BY TRAVERSE FROM STATION HILO RR S BASE

QE 274

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1064
 HAWAII
 LATITUDE 19 °30' TO 20 °00'
 LONGITUDE 155 °00' TO 155 °30'
 DIAGRAM NE 5-1.5 HAWAII

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: HILO ST JOSEPHS CATHOLIC CHURCH CROSS

CHIEF OF PARTY: L.A. Critchlow YEAR: 1977 STATE: Hawaii COUNTY: Hawaii

Description, including sketch of object: The station is located in Hilo, in the north quadrant of the intersection of Naili and Kapiolani Streets, and is the center and top of a cross on the top of the gold dome on the Saint Joseph's Catholic Church. It is about 75 feet high.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: HILO ST JOSEPHS CATH CH CROSS OBS BY NGS
 STATE: HAWAII YEAR: 1977 THIRD ORDER

SOURCE: G-10L41

GEODETIC LATITUDE	19 43 '31.76127	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 05 34.44518		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE *
HI 1	5101	640,008.06	324,147.54	+ 0°08'15"

Described by _____
 U. S. DEPARTMENT OF COMMERCE
 NOAA
© U.S. GPO: 1975-665-087/1178 Region 6

NOAA FORM 76-81
 (10-71)

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
THESE DATA OBTAINED FROM ADJUSTMENT OF JAN 1979			
SM 044			

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191551 STATION 1065
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1,5 HAWAII

U. S. DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 832
 Rev. Aug. 1968

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: HILO SOUTH BASE STATE: Hawaii COUNTY: Hawaii

CHIEF OF PARTY: C. T. Husemeyer YEAR: 1949 Described by: C. J. Hoepfel

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK	HEIGHT OF LIGHT ABOVE STATION MARK	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
			OBJECT	BEARING	DISTANCE	
				feet	meters	
	Surface-station mark					
	Underground-station mark					
	pipe		WAIAKEA MAUKA (USGS)			00 00 00
	pipe		R. M. No. 2	W	31.612	9.635
	pipe		Hilo, Radio Mast (Station KHBC)	NW	47 58	27.2
	pipe		R. M. No. 3	NNW	27.935	8.513
	pipe		R. M. No. 1	S	25.420	7.748
					284	53 53

The station is located on a brush covered, rocky ridge which forms the south tangent of the Hilo to Olaa railroad. (Tracks and ties are being removed at the time of this survey) Higher ground lies about 30 feet west of the station. The station is about 5 miles southwest of Lelewi Point, about 4 miles southeast of the business district of Hilo, 2.85 miles south-southeast of the railroad yards and triangulation station HILO NORTH BASE, about 1 mile east-southeast of Waiakea Waena School, 37 feet west of the center of the railroad tracks, about 15 feet west of the edge of the cut bank and about 15 feet higher than the road-bed.

The station is a standard disk, stamped HILO S BASE 1949, set in the top of a cylindrical concrete pier which is about 1 foot in diameter

and projects about 8 inches.

Reference mark number 1 is a standard disk, stamped HILO S BASE NO 1 1949, brazed to the top of a 2 inch pipe which projects about 2 feet. It is located 42 feet west of the center of the railroad tracks and about 3 feet higher than the station.

Reference mark number 2 is a standard disk, stamped HILO S BASE NO 2 1949, brazed to the top of a 2 inch pipe which projects about 1 foot. It is located on the crest of the low ridge about 10 feet higher than the station.

Reference mark number 3 is a standard disk, stamped HILO S BASE NO 3 1949, brazed to the top of a 2 inch pipe which projects about 16 inches. It is located 40 feet west of the center of the railroad tracks and about 3 feet higher than the station.

To reach from the intersection of Waiamuenue and Keawe streets, in the eastern section of the town of Hilo; go southerly on Keawe Street for 1.6 miles; turn left, onto Lanikaula Street and go 0.7 mile; turn right, on Kanaelehua Street and go 0.3 mile; turn left, onto a graded road, and go southerly for 1.7 miles to a sign reading ROW 16; turn left and go easterly for 0.2 mile to a T road intersection and the end of truck travel. From this point pack easterly, through the dense jungle, for about 0.4 mile to the railroad tracks and the station.

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

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION HILO SOUTH BASE

STATE: HAWAII YEAR: 1949 SECOND ORDER

SOURCE G- 9279

GEODETIC LATITUDE:	19° 40' 52.234	ELEVATION:	50.6 METERS
GEODETIC LONGITUDE:	155° 03' 12.115		166 FEET

STATE COORDINATES (feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OF ANGLE
HI 1	5101	653,647.90	308,088.61	+ 0 09 02

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
WAIAKEA MAUKA	66 31 36.3	66 22 34	5101

QE 114

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 191551 STATION 1065

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

HILO SOUTH BASE (continued)

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
FORM 526
(REV. FEB. 1963)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: HILO SOUTH BASE
ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: Hawaii
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:

The station was recovered in good condition as described in 1949, except that the tracks and ties of the railroad have now been removed and a roadway runs along the old railroad bed.

To reach from the junction of Kamehameha and Kanoelehua Avenues from the east side of the town of Hilo, go 3.85 miles along Kanoelehua Avenue to Makaleka St., turn left along Makaleka St., and go 1.0 mile to the old railroad bed (now a roadway); turn left along the old railroad bed for 0.4 mile to the station on left side about 15 feet away and 15 feet higher than the road bed. An old wooden tower about 30 feet high now stands over the mark.

FORM 526
(11-8-55)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: HILO SOUTH BASE
ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: Hawaii
RECOVERED BY: H.J.S. YEAR: 1962 COUNTY: Hawaii

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

The station and reference marks 1 and 3 were recovered. A search was made in the heavy underbrush for reference mark 2 but only a hole was found at the point located by angle and distance.

The 1949 description is adequate except for the directions for reaching the station. The directions in the 1958 recovery note by H.O.F. should be followed.

The wooden tower, built in 1949 and still over the station in 1958, has collapsed but remnants have fallen over the bank and are visible from the truck on the left hand side of the old railroad grade.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: HILO SOUTH BASE
ESTABLISHED BY: C.T. Husemeyer YEAR: 1949 STATE: Hawaii BENCH MARK(S) ALSO
RECOVERED BY: D.M. Whipp YEAR: 1966 COUNTY: Hawaii
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Island: Hawaii

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

Station mark, RM 1 and RM 3 were recovered in good condition. RM 2 has been removed; a hole was found where it was, and also a piece of concrete with the imprint of the pipe in it. The wooden tower mentioned in the 1958 recovery is now rotted and collapsed. The old railroad ties and rails have been removed and the roadbed is now used as a road. The distance to RM 1 and RM 3 was checked and found to be correct. A complete description follows:

Station is located about 4 miles southeast of Hilo, along the southwest side of a track road (old railroad bed) at the point where a T-road goes southwest upgrade and an old road forks southeast. It is on the northeast slope of a low ridge paralleling the road (highest point of the ridge is about 30 feet southwest of station and 10 feet higher); 100 feet southeast of the T-road, 80 feet south of the old road fork, 37 feet southwest of center line of road and about 25 feet higher, and just above a clump of 3 large ohia trees 8 inches in diameter and about 40 feet tall, which are the only large trees in the vicinity.

To reach station from the intersection of Waiuanueue St. and

FORM 526-526 (1-63)
USCOM-OC 18509-P8

U.S. DEPARTMENT OF COMMERCE
COAST AND GEO.

Kamehameha Ave. in Hilo, go east on Kamehameha Ave. for 1.65 miles; turn right and go south on Kanoelehua Ave. for 3.8 miles to Makalika St. on left (the highway is divided here and it is necessary to continue a short distance and make a U-turn). Go easterly on Makalika St. for 1.0 mile to T-junction; turn left and go northwest on track road, old railroad bed, for 0.4 mile to station on left.

Station mark is a standard disk stamped "HILO S BASE 1949", set in the top of a 12-inch-diameter, concrete monument that projects 6 inches. It is in dense brush up to 20 feet high.

Reference mark number one is a standard disk stamped "HILO S BASE 1 1949", brazed to the top of a 2-inch iron pipe that projects 14 inches and is about 3 feet higher than station mark.

Reference mark number three is a standard disk stamped "HILO S BASE 3 1949", brazed to the top of a 2-inch iron pipe that projects 1 foot and is about 1 foot higher than station mark.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191551 STATION 1066
 HAWAII
 LATITUDE 15 °30' TO 20 °00'
 LONGITUDE 155 °00' TO 155 °30'
 DIAGRAM NE 5-1.5 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 535 b

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: Hilo Sugar Co., Stack YEAR: 1949 STATE: Hawaii COUNTY: Hawaii
 CHIEF OF PARTY: C. T. Husemeyer

Description, including sketch of object: The station is located on property of the Hilo Sugar Company, which lies about 1 mile north of the Hilo business district. The Hilo Sugar Company Mill used to be known as the Wainaku Mill. It is not known if the present stack occupies the same position as the old Wainaku Mill stack.

The station is the top and center of a steel smoke stack which is about 10 feet in diameter and 132 feet in height. It is located on the north side of the boiler house 40 feet south of the sea wall. The stack rests on a square concrete base which is about 15 feet in height.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 536
 (REV. FEB. 1968)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: HILO SUGAR CO., STACK
 ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: Hawaii
 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:

The station is the top of the metal stack, painted grey, with a black top, located on the Hilo Sugar Plantation Co., grounds at Alealea Pt., about 0.8 mile north of the post office in Hilo. Stack is 165 feet above the water.

RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

NAME OF STATION: Hilo Sugar Co., Stack
 ESTABLISHED BY: C.T. Husemeyer YEAR: 1949 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: D.M. Whipp YEAR: 1966 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Island: Hawaii

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

Station was recovered. It is the tall, steel stack, painted silver, with the top black, located at the Hilo Sugar Company mill about 1 mile north of Hilo, on east side of State Highway 19, at Alealea Point.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: HILO SUGAR CO. STACK
 ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: HAWAII BENCH MARK(S) ALSO
 RECOVERED BY: R.B.M. YEAR: 1978 COUNTY: HAWAII
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1 MILE NORTH OF HILO

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:
 RECOVERED IN GOOD CONDITION AS DESCRIBED IN 1949.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: HILO SUGAR CO STACK

STATE: HAWAII YEAR: 1949 THIRD ORDER

SOURCE: G- 9279

GEODETIC LATITUDE: 19 44 27.677	ELEVATION: MEYERS FEET
GEODETIC LONGITUDE: 155 05 33.837	

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	B OR Δ B1 ANGLE *
HI 1	5101	640,052.62	329,788.45	+ 0 08 15 "

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE B OR Δ B1 FORMULA NEGLECTING THE SECOND TERM

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

QE 227

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

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 191551 STATION 1067
HAWAII
LATITUDE 19°30' TO 20°00'
LONGITUDE 155°00' TO 155°30'
DIAGRAM NE 5-1.5 HAWAII

NO STATION ASSIGNED TO THIS NUMBER

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151551 STATION 1069
 HAWAII
 LATITUDE 19 °30' TO 20 °00'
 LONGITUDE 155 °00' TO 155 °30'
 DIAGRAM NE 5-1,5 HAWAII

NO ORIGINAL TEXT

Honohina (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1912).—On east coast of Hawaii, in North Hilo, land of Opea, on a small hill called Kuula, and east of a gulch. Just south of Honohina there is a steady rise in the ground on the southwest side of the main road, terminating in a sharp tit some distance inland; this tit can not be seen from any place along the road. It is reached by taking the trail which leaves the main road at right angles at a point about 200 meters from the house of Mr. Lucas, employed on the Honohina plantation; Mr. Lucas's house is on the main road, about 1 mile out (south-east) of Honohina, and the trail branches off between his house and Honohina. Follow the trail up hill through cane till camp is on left, turn to right along trail, crossing a small brook (possibly a flume later) about 100 meters beyond which is a forked road, at which point turn to right to climb the tit above mentioned. The station is on this tit, and is marked by a copper tablet marked "U. S. G. S." set in concrete and covered with a cairn of stones. The old underground mark was a copper triangle buried 3 feet underground.

RECOVERY

DESCRIPTION OF TRIANGULATION STATION

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

NAME OF STATION: HONOHIINA STATE: Hawaii COUNTY: Hawaii

Established By: Hawaiian G.S., 1877
 CHIEF OF PARTY: G.T.H.usemeyer YEAR: 1949 Described by: G.B.G.

NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK 2.66 METERS. HEIGHT OF LIGHT ABOVE STATION MARK 2.36 METERS.

NOTE	OBJECT	BEARING	DISTANCE		DIRECTION
			feet	meters	
12a	ALALA H.G.S. R.M. No.1	WNW	18.100	5.517	0 00 00 142 57 50.2

Located on the east coast of Hawaii, in North Hilo, land of Opea, on a small hill in cane land called Kuula, and east of a gulch. Just south of Honohina there is a steady rise in the ground on the southwest side of the main road, terminating in a sharp tit some distance inland. This tit can not be seen from any place along the road.

Hawaii Territory Survey description is as follows: "An erroneous station has been used at this place since 1899. Original buried copper was recovered and true station restored by M.E.Lutz, Dec. 1913. Erroneous station is marked by U.S.G.S. tablet set in stone. Mark: station is marked by a one inch iron pipe set in concrete block, 3 feet below the surface and entirely separate is a bronze pin set in a concrete post. Tripod signal over station." The U.S.G.S. station occupied by E.R.Hand in in 1912 was recovered in 1949 in poor condition. The disk was removed and destroyed. In 1929 the Territory Survey placed a six foot square concrete platform with four foot high mason work supports over the station. The center of the one inch iron pipe was used as the station.

To reach from the post office at Hilo: go northerly on the coast highway for 15.1 miles to the Hakalau post office. Continue ahead for 2.9 miles turn onto a plantation dirt road and go westerly up steep grade for 0.6 mile to a point where the road turns left at foot of a low knoll. From here pack through cane for about 100 yards to top of knoll and station.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: HONOHIINA

STATE: HAWAII

YEAR: 1877

SECOND ORDER

SOURCE: G- 9279

GEODETIC LATITUDE:	19 54 58.197	ELEVATION:	215.4 METERS
GEODETIC LONGITUDE:	155 09 34.978		707 FEET

STATE COORDINATES (Feet)

STATE & ZONE	CODE	X	Y	δ OR Δ or ANGLE*
HI 1	5101	616,889.68	393,344.84	+ 0 06 57

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
ALALA	329 43 44.3	329 36 47	5101

QE 175

JUN 1978

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

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 191551

STATION 1069

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

HONOHINA (continued)

FORM 526a
(9-18-69)

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

R

NAME OF STATION: HONOHINA
ESTABLISHED BY: HGS YEAR: 1877 STATE: Hawaii
RECOVERED BY: D.M. Whipp YEAR: 1966 COUNTY: Hawaii
Island: Hawaii

HEIGHT OF TELESCOPE ABOVE STATION MARK 2.6 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
ALALA (HGS) 1877				00 00 00.0
Radio Mast	W	about 1	mile	117 57 04.2
RM No. 2	WNW	18.284	5.572	141 16 26

Station mark was recovered in good condition. The reference mark was recovered; the disk is slightly scarred from machinery, however, the rock in which it is set is solid and the arrow on the disk points to the station. A check of the distance and angle shows a considerable difference from the 1949 values, so since the number and date had not been previously stamped on the disk it was stamped NO 2 at this time. No additional reference marks were set as the sugar cane is planted up to the station on all sides. A complete description follows:

Station is located about 2 miles northwest of Hakalau and 0.8 mile southwest of State Highway 19, on a knoll in a cane field, at 704

feet elevation.

To reach station from the post office at Pepeekeo, go northerly on State Highway 19 for 5.2 miles to Hakalau; continue on the highway for 3.0 miles to side road left at sign "HONOHINA". Turn left and go 0.2 mile to Honohina Store; continue on paved road for 0.75 mile to paved T-road right. Turn right and go up steep hill for 0.4 mile to end of paving; continue ahead for 0.25 mile to end of a short, steep, paved strip at top of grade, 25 yards before a crossroad, and end of truck travel. Walk north through cane field about 75 yards to station.

Station mark is a 1-inch iron pipe, projecting 6 inches from the center of a 10-inch-square, concrete block that projects 2 inches above ground. A Type A signal is centered over the mark, with the 6-foot-square concrete platform 4 feet above ground. There is a raised concrete circle, with "HONOHINA 1929" inscribed in it, on the platform, around the center pipe.

Reference mark number two is a standard disk stamped "HONOHINA HGS NO 2 1949 1966", cemented in a drill hole in a 2-foot boulder that projects 1 foot above ground and is at about same elevation as station mark.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: HONOHINA
ESTABLISHED BY: H.G.S. YEAR: 1877 STATE: Hawaii BENCH MARK(S) ALSO
RECOVERED BY: R. B. Malby YEAR: 1978 COUNTY: Hawaii
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3/4 mile south of Honohina

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

The station was recovered in good condition. The reference mark was not searched for.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 151551 STATION 1071
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-15 HAWAII

Honomu (Hawaii Island, E. R. Hand, 1912).—On east coast of Hawaii, in the cane field about ¼ mile southeast of Honomu Sugar Mill, on the north side of Honomu Gulch, on a very slight knoll which is about 80 meters southwest from the railroad cut, and about 20 meters northwest from the steep side of the gulch, at edge of cane. Inshore or to the southwest the land is fairly level, and soon begins to rise. The following bearings are from the station: Mill stack, N. 41° W.; gable (cupola) of freight hoist at cliff edge, N. 32° W.; large isolated mango tree across gulch, S. 30° E.; flagstaff on Japanese school on public road, S. 67° W.; and railroad cut on other side of gulch, S. 59° E. Station is reached from Honomu store by proceeding towards Hilo on public road, passing at about ¼ mile a Japanese school and temple on the seaward side of the road, and a short distance beyond turning seaward through a gate and following trail to bridge which crosses railroad cut. Return 80 meters from edge of bridge back along trail, and follow along parallel to the railroad cut until the land begins to fall towards gulch, when the station knoll will be reached. Sub-surface mark is a soda water bottle, bottom up (neck cracked) 3 feet below surface of ground. Five inches above the bottle is the bottom of the surface mark, a conical mass of concrete in which is a 1½ inch galvanized-iron pipe, projecting three feet above surface of ground.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **HONOMU**
 ESTABLISHED BY: **E.R. Hand** YEAR: **1912** STATE: **Hawaii** BENCH MARK(S) ALSO
 RECOVERED BY: **D.M. Whipp** YEAR: **1967** COUNTY: **Hawaii**
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: **Island: Hawaii**

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

Station was searched for but not found. The surface mark was destroyed long ago by sugar cane operations.

A search was made for the underground mark described by distance and angle from a temporary point established in the vicinity by triangulation from KAUKU and HONOHINA, but it was not recovered.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **HONOMU**
 STATE: **HAWAII** YEAR: **1912** THIRD ORDER
 SOURCE: **G-52184**

GEODETIC LATITUDE	19 52 23.602	ELEVATION	67	METERS
GEODETIC LONGITUDE	155 06 35.094	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ Δ θ ANGLE
HI 1	5101	634,090.27	377,786.32	+ 0 07 58

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

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

QF 068

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1073

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

KAALIALI (continued)

FORM 526a
 (1-18-59)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

R

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **KAALIALI**
 ESTABLISHED BY: **C.T. Husemeyer** YEAR: **1949** STATE: **Hawaii**
 RECOVERED BY: **D.M. Whipp** YEAR: **1966** COUNTY: **Hawaii**
 Island: **Hawaii**

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

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KIHE (HGS) -----1949 DISTANCE and DIRECTION-----				00 00 00.0
RM No. 1	S	36.352	11.080	170 29 15
RM No. 2	W	20.423	6.226	269 48 33
KIHE (HGS) 1876 ---1966 DISTANCE and DIRECTION-----				00 00 00.0
RM No. 1	S	36.340	11.077	170 28 19
RM No. 2	W	20.412	6.222	269 50 15

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

Station is located about 14-1/2 miles southwest of Laupahoehoe, 23 miles northwest of Hilo, and 7 miles south-southwest of Umikoa village, on the south rim of a bare, red, volcanic cone of about 9080 feet elevation, that lies at the northeast side of a good, jeep road, just above timber-line.

To reach station from the post office in Hilo, go west on Waianuenu Ave., and continue on the Saddle Road, for 28.4 miles to sign "HUMUULA

SHEEP STATION EST. 1876". Turn right and follow gravel road 2.2 miles to fork. Take right fork and go 12.4 miles on Keanakolu Rd. to board gate at station KALOALOA. Pass through gate and continue for 0.5 mile to fork. Take left fork and go 1.2 miles; take right fork and go 0.4 mile to fork about 1/2-mile before reaching a cabin. Take left fork and go 0.1 mile. Here turn right, off of main road, and pick way along very dim old road westerly for 1.9 miles to the Kanakaleonui Ranger Station. Pass through locked gate and follow good cinder road upgrade for 0.9 mile to fence. Turn right and follow road along fence for 0.25 mile; turn left through gate and continue on road for 1.25 miles to saddle at south side of Puu Kanakaleonui. Continue on good road northerly, downgrade, for 1.5 miles to station hill on right. Go right, 0.05 mile across cinder area, to base of hill. Pack northwest about 200 yards to top and station.

Station mark is a standard disk stamped "KAALIALI 1949", cemented in a drill hole in a flat bedrock outcrop that projects 6 inches. It is 25 feet east of a large rock pile comprising highest point of hill.

Reference mark number one is a standard disk stamped "KAALIALI NO 1 1949", cemented in a drill hole in a flat, 3 x 4-foot lava rock outcrop that projects 1 foot and is 10 inches higher than station mark.

Reference mark number two is a standard disk stamped "KAALIALI NO 2 1949", cemented in a drill hole in a lava rock ledge 3 feet above ground. It is at the eastedge of the large rock pile and about 3 feet higher than station mark.

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

Key for locked gate was obtained at Forest Service Headquarters in Hilo.

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

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

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191551 STATION 1075
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1,5 HAWAII

NO TEXT

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAHUKU FLAG
 STATE: HAWAII YEAR: 1901 THIRD -ORDER

SOURCE: G-SP156

GEODETIC LATITUDE:	19 56 06.355	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 09 47.226		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ θ ANGLE*
HI 1	5101	615,707.21	400,218.37	+ 0 06 54

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From source)	PLANE AZIMUTH* (From source)	CODE
QD 361			

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 19155i STATION 1076
 HAWAII
 LATITUDE 19 ° 30' TO 20 ° 00'
 LONGITUDE 155 ° 00' TO 155 ° 30'
 DIAGRAM NE 5-1.5 HAWAII

NO TEXT

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAIKAKEA

STATE: HAWAII

YEAR: 1901

THIRD

ORDER

SOURCE: G-SP156

GEODETIC LATITUDE:	19 ° 50' 57.550	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 10 55.231		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	∠ OR Δ ANGLE *
HI 1	5101	609,209.22	405,370.36	+ 0° 06' 31"

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

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

QO 351

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151551 STATION 1077
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1, HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 555
 REV. AUG. 1963

DESCRIPTION OF TRIANGULATION STATION

(USGS)

NAME OF STATION: **KAIWIKI NEW** STATE: **Hawaii** COUNTY: **Hawaii**

CHIEF OF PARTY: C. T. Husemeyer	YEAR: 1949	Described by: C. J. Hoepfel			
HEIGHT OF TELESCOPE ABOVE STATION MARK 1.40 METERS	HEIGHT OF LIGHT ABOVE STATION MARK	METERS			
Surface-station mark, Underground-station mark	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION:	
		feet	meters	°	' "
ALALA (HGS)				00	00 00
Hilo, Stack (Hilo Sugar Co.)	ESE	3 miles		99	23 41.6
Olaa, Stack (Olaa Sugar Co.)	SSE	11 miles		127	32 19.9
pipe R. M. No. 2	WNW	15.025	4.580	231	23 09
pipe R. M. No. 1	N	20.331	6.198	344	22 57

The station is located on the easterly brow of a low knoll, planted in sugar cane, which lies about 4 miles northwest of Hilo, about 3 miles west of the sea, 15 feet east of a large stone pile and in a small cemetery.

To reach from the post office at Hilo; go northerly, on the road which leads toward Honokaa, for 1.1 miles; turn left, onto the Kaiwika homestead road, and go westerly, up grade, for 3.45 miles; turn right, onto a graded road and go northerly for 0.2 mile; turn right and go southeast for 0.1 mile to a point where the road turns north and the end of truck travel. From this point pack southeast, down the wooden flume, for about 200 yards; turn right and pack southwest for about 100 yards to the high ground and the station.

The station is a U. S. Geological Survey bronze disk, stamped 1210, set in the top of a concrete cylinder which projects about 2 inches above the top of a square concrete platform which is about 6 feet on each side.

Reference mark number 1 is a standard disk, stamped KAIWIKI NEW USGS NO 1 1949, set in the top of a 2 1/2 inch pipe which projects 8 inches. It is located at about the same elevation as the station.
 Reference mark number 2 is a standard disk, stamped KAIWIKI NEW USGS NO 2 1949, set in the top of a 2 1/2 inch iron pipe which projects about 6 inches and is located at about the same elevation as the station.

Form 526
 (11-8-55)

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

NAME OF STATION: **KAIWIKI NEW (USGS)**
 ESTABLISHED BY: **C.T.H.** YEAR: **1949** STATE: **Hawaii**
 RECOVERED BY: **H.J.S.** YEAR: **1962** COUNTY: **Hawaii**

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

The station and both reference marks were recovered in good condition as described in 1949. The directions for reaching the station given in the 1958 recovery note by H.O.F. are adequate.

The station is located on a grassy knoll south of a cane field and north of a deep gully.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **KAIWIKI NEW USGS**

OBS BY **CGS**

STATE: **HAWAII**

YEAR: **1949**

FIRST

-ORDER

SOURCE: **6- 9279**

GEODETIC LATITUDE: 19 45 32.48000	ELEVATION: 369.1
GEODETIC LONGITUDE: 155 08 04.16100	METERS 1211 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ or ANGLE °
HI 1	5101	625,678.93	336,293.06	+ 0°07'25"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
ALALA H.S	195°04'40.2	194°57'15"	5101

THESE DATA ARE OBTAINED FROM ADJUSTMENT OF 1951

3M 068

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1077

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

KAIWIKI NEW (USGS) (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

FORM 526a
 (9-18-69)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KAIWIKI NEW (USGS) STATE: Hawaii
 ESTABLISHED BY: C.T. Husemeyer YEAR: 1949
 RECOVERED BY: D.M. Whipp YEAR: 1966 COUNTY: Hawaii
 Island: Hawaii

NAME OF STATION: KAIWIKI NEW USGS BENCH MARK ALSO
 ESTABLISHED BY: C.T. Husemeyer YEAR: 1949 STATE: Hawaii
 RECOVERED BY: L.A. Critchlow YEAR: 1977 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3-1/2 miles northwest of Hilo
 HEIGHT OF TELESCOPE ABOVE STATION MARK 4 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 4 FEET.

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

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
ALALA (HGS) 1877-----1949 DISTANCE				00 00 00.0
RM No. 2	WNW	15.025	4.580	231 23 09
RM No. 1	N	20.331	6.198	344 22 57
ALALA (HGS) 1877-----1966 DISTANCE				00 00 00.0
Pepeekeo Point Light 1949	NNE			11 53 06.3
RM No. 2	SW	15.035	4.582	231 24 46
RM No. 1	N	20.343	6.201	344 22 59

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

Station is located about 3-1/2 miles northwest of Hilo, on a small, flat-topped knoll about 40 feet in diameter, with sheer, 8-foot sides, in canefields, at 1210 feet elevation.

To reach station from the post office in Hilo, go west on Wailuku Rd. for 0.05 mile; turn right, across large bridge, and follow Wainaku Rd. north for 0.9 mile to crossroad. Turn left and follow Kaiwika Rd. up canyon for 1.1 miles; take right fork and continue on Kaiwika Rd. for 2.25 miles to crossroad by house on right. Turn right and follow cinder road 0.2 mile to T-junction. Turn right and go east 0.1 mile to brow of hill and end of truck travel by trail through cane on right. Walk southerly through cane about 80 yards to knoll and station.

Station mark is a U.S. Geological Survey disk stamped "1210", set in the top of a 4-inch-diameter, cement-filled, concrete sewer pipe that projects 1 inch from the center of a 4-foot-square, concrete platform that is flush with the ground on 3 sides and projects 1 foot on the east side. A 2-1/2-inch, iron pipe, 2 feet long, is mounted vertically over the mark, supported by 3 iron legs embedded in the concrete floor, and supports a metal target that extends 10 feet above the platform.

Reference mark number one is a standard disk stamped "KAIWIKI NEW USGS NO 1 1949", set in the top of an 8-inch-square, concrete monument that projects 10 inches above ground and is at about same elevation as station.

Reference mark number two is a standard disk stamped "KAIWIKI NEW USGS NO 2 1949", set in the top of an 8-inch-square, concrete monument that projects 2 inches above ground. It is 2 feet north-northeast of south edge of knoll and at about same elevation as station.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KAIWIKI NEW (USGS) BENCH MARK(S) ALSO
 ESTABLISHED BY: C. T. Husemeyer YEAR: 1949 STATE: Hawaii
 RECOVERED BY: R. B. Melby YEAR: 1975 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 4 miles NW of Hilo

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

The station and reference marks were recovered in good condition as described in 1949 except the reference marks are set in 8 inch square, concrete monuments instead of 2 1/2 inch, iron pipes.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
ALALA HGS 1877				00 00 00.0
HILO HILO SUGAR CO STACK 1949	SE	About 3	miles	99 23 32.4
HILO RADIO STATION KHBC MAST 1949	S	About 3	miles	168 09 08.4
RM 2	SW	15.03	4.581	231 23 03
RM 1	N	20.36	6.204	344 25 56
RM 1 to RM 2		29.660	9.039	

The station mark & reference marks 1 and 2 were recovered in good condition. The distance and direction to reference marks 1 and 2 compared favorable to the 1966 data, the difference to reference mark 1 being 0.003 meters longer and 2 minutes, 57 seconds. The difference to reference mark 2 being 0.001 meter shorter and 1 minute 43 seconds. A measurement between reference marks 1 and 2 was made at this time. Due to changes a new description follows.

The station is located about 3-1/2 miles northwest of Hilo, on a small flat-topped knoll about 40 feet in diameter and projects about 10 feet above the cane field that surrounds it. It is on property of the Mouna Kea Sugar Company, Phone Number 964-1025.

To reach the station from the junction of Kinooles Street and Wailuku Road, just northwest of Hilo Post Office and Federal Building, go west on Wailuku Road for 0.05 mile to a side street right; turn right and go north on Wainaku Street, crossing a large bridge and go 0.9 mile to an angling crossroad. Turn left and go west on Kaiwika Road for 1.15 miles to a fork; take right fork and go north for 0.1 mile to a fork; take the left fork and go west on Kaiwika Road for 2.25 miles to a crossroad. Turn right and go north on a gravel road for 0.2 mile to a T-road; turn right and go east on a track road for 0.1 mile to a dim track road on the right, in cane field; turn right and go southeast on track road across cane field for 0.05 mile to the station on the left.

Station mark is a U.S. Geological Survey disk stamped 1210, set in the top of a 4-inch diameter, cement-filled, concrete sewer pipe that projects 1 inch from the center of a 4 foot square concrete platform that is flush with the ground on three sides and projects 1 foot on the east side. A 2-1/2 inch iron pipe, 2 feet long, is mounted vertically over the mark, supported by 3 iron legs embedded in the concrete platform that supports a metal target that extends 10 feet above the platform.

Reference mark 1 is a standard disk stamped KAIWIKI NEW USGS NO 1 1949. It is set in the top of an 8-inch square concrete monument that projects about 10 inches above the ground surface and is about the same elevation as the station. It is 10 feet south of the northeast edge of a cut bank.

Reference mark 2 is a standard disk stamped KAIWIKI NEW USGS NO 2 1949. It is set in the top of an 8-inch square concrete monument that projects about 3 inches above the ground surface. It is 2 feet north-east of the southwest edge of the cut bank and is about the same elevation as the station mark.

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191551 STATION 1080
 HAWAII
 LATITUDE 19 °30' TO 20 °00'
 LONGITUDE 155 °00' TO 155 °30'
 DIAGRAM NE 5-1,5 HAWAII

NO TEXT

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION KALAIIEHA

STATE HAWAII

YEAR 1892

SECOND

ORDER

SOURCE G-SP156

GEODETIC LATITUDE	19 °42' 14.62	ELEVATION	2346	METERS
GEODETIC LONGITUDE	155 27 51.68	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE *
HI 1	5101	512,260.28	316,199.10	+ 0 00 43

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

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

QD 406

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191551 STATION 1081
 HAWAII
 LATITUDE 19 ° 30' TO 20 ° 00'
 LONGITUDE 155 ° 00' TO 155 ° 30'
 DIAGRAM NE 5-1,5 HAWAII

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

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

R

NAME OF STATION: KALAIEHA PUU
 ESTABLISHED BY: HGS YEAR: 1841 STATE: Hawaii
 RECOVERED BY: Y Yamamoto YEAR: 1955 COUNTY: Hawaii

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

Station located on top of Kalaieha Hill (cinder).
 Station mark: Chiseled cross on rock.

NAME OF STATION: KALAIEHA PUU
 STATE: HAWAII YEAR: 1891 THIRD ORDER

SOURCE: G-SP156

GEODETIC LATITUDE:	19 ° 42' 26.272	ELEVATION	METERS
GEODETIC LONGITUDE:	155 26 26.786		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE*
HI 1	5101	520,371.03	317,376.79	+ 0 01 12

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

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

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

Comm-DC 34314

QD 377

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191551 STATION 1082
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-15 HAWAII

Kalepa (Hawaii Island, Hawaiian Government Survey, 1876).—In northern part of Hawaii, on the summit of Puu Kalepa, on the northeast slope of Mauna Kea. Marked by a piece of copper tubing buried about 1 foot below the surface of the ground, in the center of a triangle of stones set in the ground.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 Form 533

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KALEPA
 ESTABLISHED BY: Hawaiian Govt. YEAR: 1876 STATE: Hawaii
 RECOVERED BY: C. T. Husemeyer YEAR: 1949 COUNTRY: Hawaii

Detailed statement as to the fitness of the original description:

The station was recovered, as described, in good condition. A standard station disk was established over the original underground mark which was found to be about 0.2 meter southeast of the surface mark. The sub surface mark was selected as it was considered less subject to change. The following are the original description and recovery notes. " Station mark, a piece of copper tubing buried 1 foot beneath the surface in a triangle of stones set in the ground on the summit of Puu Kalepa by C.J. Lyons 1876. Recovery OF in 1897 (ABL) Pile of stones very similar to that on KIHE and in good form. In the center of this pile, found a good flag pole made in two sections connected by a brass or copper sleeve. (Walker and Howland 1900) Marked by a large alu about 5 feet high and 10 feet in diameter. Set up on alu, found portion of old flag and copper sleeves. Tied another flag to old portion remaining. (S. Wright 1915)" A new description follows---

The station is located on the summit of a brush covered hill, named Puu Kalepa, which lies about 21 miles northwest of Hilo, about 15.5 miles south southeast of Hanalei, about 11.5 miles southwest of Papaiaea, about 2 miles southeast of the Puu Kibe ranch house, about 0.1 mile south of a wire fence.

To reach from the post office at Hilo; go northerly, on the road which leads toward Hanalei for 26.3 miles; pass the Papaiaea Post Office and continue northerly for 12.2 miles; turn left and go south and west, toward the Kukaiiau Ranch, for 4.1 miles; pass through a board gate and continue westerly, on the paved road, for 3.2 miles. Pass through the Kukaiiau Ranch and continue westerly, on the graded road, for 0.2 mile; pass through the corral and continue westerly, up grade, for 1.2 miles; pass to the right hand side of two large water tanks and continue westerly, on the main traveled road, for 1.3 miles; turn left, as per the sign reading KEANKOLU, and go southerly for 0.3 mile; pass through a board gate and continue southerly for 0.2 mile; turn right, onto a dim track road, and go westerly for 0.6 mile; pass to the left hand side of a large tin water shed and continue westerly, on the main traveled road for 2.7 miles; turn left, just before reaching the gate into the ranch house yard, and go southerly, across country, for about 150 yards; pass through a board gate and continue southeasterly, across country, for 2.6 miles to the northwesterly foot of the hill and the end of truck travel. From this point cross over the wire fence and pack southeast for about 0.1 mile to the summit of the hill and the station.

The station is a standard disk, stamped KALEPA HGS 1949, set into a drill hole in a buried boulder which is about flush with the surface of the ground. Two copper sleeves were buried under this disk at depths of 2 and 3 feet.

Reference mark number 1 is a standard disk, stamped KALEPA HGS NO 1 1949, set into a drill hole in a boulder which is about flush with the surface of the ground and is about 1 foot lower than the station.

Reference mark number 2 is a standard disk, stamped KALEPA HGS NO 2 1949, set into a drill hole in a boulder which is about 3 feet in diameter and projects about 1 foot. It is located about 1 foot lower than the station.

NOTE	OBJECT	BEARING	FEET	METERS	DIRECTION
	RED HILL(HGS)				00 00 00
12c	R. L. No. 2	W	33.899	10.332	33 35 49
	KIHE (HGS)	NW	2 miles		66 26 17.10
	OLD SURFACE STATION	NW		0.247	91 11
12c	R. L. No. 1	SE	24.968	7.610	246 52 35

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION KALEPA
 STATE HAWAII YEAR 1876 SECOND ORDER

SOURCE G- 9279

GEODETIC LATITUDE:	19 53 07.930	ELEVATION	2538.1 METERS
GEODETIC LONGITUDE:	155 22 04.519		7671 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	# OR Δ # ANGLE
HI 1	5101	545,378.20	382,120.66	+ 0 02 42

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
RED HILL HGS	57 21 20.4	57 18 38	5101

QE 121

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191551 STATION 1083
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1.5 HAWAII

See Station KALEPA

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KALEPA OLD SURFACE STA
 STATE: HAWAII YEAR: 1876 SECOND ORDER

SOURCE: G- 9275
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	19° 53' 07.937	ELEVATION:	2338	METERS
GEODETIC LONGITUDE:	155° 22' 04.523	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE *
HI 1	5101	545,377.82	382,121.37	+ 0 02' 42"

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

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

POSITION DETERMINED BY TRAVERSE FROM STATION KALEPA

QE 278

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191551 STATION 1084
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5:15 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 525
 Rev. Aug. 1968

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: KALOALOA (HGS). STATE: Hawaii COUNTY: Hawaii

CHIEF OF PARTY: C.T. Husemeyer YEAR: 1949 Described by: G.B.G.

NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK 1.548 METERS. HEIGHT OF LIGHT ABOVE STATION MARK 1.219 METERS.

OBJECT	BEARING	DISTANCE		DIRECTION
		feet	meters	
KALEPA H.G.S.				0 00' 00"
R.M. No. 2	NNW	27.529	8.392	16 19' 18"
R.M. No 1	SSW	547.903	167.001	280m 12 14"

Station is located about 18 miles, airline, west of Hilo, on the east slope of Mauna Kea, on a low east and west ridge in pasture land, about 200 yards southeast of a wire fence and about 300 yards southeast of a graded road and dirt tank.

Original station was marked by the Hawaii Govt. Survey in 1879 by a buried copper triangle with a mamane post set over it. Station recovered in 1949 was a square topped concrete block with a glass bottle neck up, set in center of block. This was replaced with a standard station disk set at exact location of bottle neck. Mark is set in a square topped concrete post projecting 3 inches above the ground. Stamped KALOALOA 1949.

Underground mark is a standard station disk set in concrete 40 inches below the surface. Stamped KALOALOA 1949.

Reference mark No. 1 is set in a large lava boulder at the fence line, projecting about 5 feet above the ground. A standard disk stamped KALOALOA NO 1 1949.

Reference mark No. 2 is set in a square topped concrete post projecting 5 inches above the ground and is one foot below the level of the station. A standard disk stamped KALOALOA NO 2 1949.

To reach from the Post Office at Hilo: go westerly on Saddle Road toward Waimea for 29.2 miles. Turn right, onto a graded road, as per sign HALEPOHAKU and go northerly past Hamula Sheep Station for 2.2 miles. Take right fork and continue northerly on main traveled road for 12.5 miles to a dirt tank on right. From here station lies about 300 yards southeast and reference mark No. 1 is plainly visible.

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

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KALOALOA HGS

OBS BY CGS

STATE: HAWAII

YEAR: 1949

FIRST

ORDER

SOURCE: G- 9279

GEODETTIC LATITUDE	19 49 00.09200	ELEVATION	2023.4 METERS
GEODETTIC LONGITUDE	155 20 10.57000		6638 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	∠ OR Δ OR ∠ ANGLE °
HI 1	5101	556,277.37	357,128.40	+ 0° 03' 20"

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

TO STATION OR OBJECT	GEODETTIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
AAHUWELA HGS	44° 52' 19.2	44° 48' 59"	5101

THESE DATA ARE OBTAINED FROM ADJUSTMENT OF 1951

SM 071

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1084
 LATITUDE ° ' TO ° '
 LONGITUDE ° ' TO ° '
 DIAGRAM

KALOALOA (continued)

FORM 526a
 (5-15-69)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KALOALOA (HGS)
 ESTABLISHED BY: C.T. Husemeyer YEAR: 1949 STATE: Hawaii
 RECOVERED BY: D.M. Whipp YEAR: 1966 COUNTY: Hawaii
 Island: Hawaii

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.54 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.
 DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
AAHUWELA (HGS) 1891-----1949 DISTANCE and DIRECTION				00 00 00.0
RM No. 1	SSW	547.903	167.001	31 49 31
RM No. 2	NNW	27.529	8.392	127 56 35
AAHUWELA (HGS) 1891-----1966 DISTANCE and DIRECTION				00 00 00.0
RM 3	SW	19.505	5.946	19 19 09
RM 1	WSW	547.693 (166.937)	31 49 26.4	
RM 2	NNW	27.474	8.375	127 58 29

Station was recovered and all marks found in good condition. Because of the extreme distance to RM 1 a new reference mark was established. A slight discrepancy was noted in the distance to RM 2 and was double-checked in the field; the 1966 distance is correct. A complete description follows:
 Station is located about 18 miles west-northwest of Hilo and 11 miles northeast of Humuula Sheep Station, at about 6640 feet elevation, on a rise in rolling pastureland, 900 feet east of Keanakolu Road.

To reach station from the post office in Hilo, go west on Waianuenue St. and the Saddle Road for 28.5 miles to sign "HUMUULA SHEEP STATION EST. 1876". Turn right and follow gravel road north 2.2 miles, passing the sheep station, to a fork. Take right fork and go 12.2 miles to board gate and small pond. Pass through gate and continue for 0.2 mile to another small pond on right and board gate ahead. Go right, along fence, for 100 yards to a board gate in fence corner. Pass through gate and go cross country, keeping to right of another pond, for 0.1 mile to station on rise.

Station mark is a standard disk stamped "KALOALOA 1949", set in the top of an 8-inch-square, concrete monument that projects 3 inches. It is about 200 feet south of east end of pond, 560 feet east of fence line, and 575 feet east-southeast of the board gate.

Reference mark number one is a standard disk stamped "KALOALOA NO 1 1949", cemented in a drill hole in the top of a prominent, large rock about 8 feet in diameter and projecting about 5 feet above ground. It is 13.5 feet east of fence line, on high point above pond and is 27.9 feet higher than station mark.

Reference mark number two is a standard disk stamped "KALOALOA NO 2 1949", set in the top of an 8-inch-square, concrete monument that projects 5 inches. It is about 2 feet lower than station mark.

Reference mark number three is a standard disk stamped "KALOALOA HGS 1949 NO 3 1966", set in the top of a 10-inch-diameter, concrete and stone monument flush with the ground. It is about 1 foot higher than station mark.

NOTE: Distance between RM 2 and RM3 is 38.44 feet.

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

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

USCOMM-DC 87178-P99

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KALOALOA HGS
 ESTABLISHED BY: C.T. Husemeyer YEAR: 1949 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: L.A. Critchlow YEAR: 1977 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:
 HEIGHT OF TELESCOPE ABOVE STATION MARK 4 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 4 FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
AAHUWELA HGS 1891				00 00 00.0
RM 3	SW	19.53	5.952	19 18 48
RM 1	WSW	547.69	166.936	31 49 30
RM 2	NNW	27.46	8.372	127 58 04
RM 3 to RM 2		38.43	11.714	

The station and reference marks were recovered in good condition. The directions and distances measured on this date compare favorably with the 1967 measurements. Reference mark 3 was found to differ by .006 meters from the 1967 distance. The measurements on this date differed by a small amount from the 1949 measurements. The 1967 recovery note is adequate with the addition of the following new to reach description.

To reach the station from the Hilo Post Office, go west on State Highway 20 for 27.7 miles to side road right. Turn right and go north along paved road leading to Mauna Kea for 2.1 miles to side road right. Turn right and follow dirt road 10.6 miles to Y-rd, continue north along main road 1.35 miles to gate, continue through gate and go 0.2 miles to wooden gate. Turn right and follow along south side of fence 0.1 mile to gate, pass through gate and continue east-southeast 0.1 mile to top of ridge and station site.

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

NOAA FORM 76-96 SUPERSEDES CGS FORM 926A WHICH MAY BE USED. (1-72)

U.S. DEPARTMENT OF COMMERCE
 NOAA
 U.S. GPO: 1976-645-641/1220 Naylor 4

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 151551 STATION 1085
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1.5 HAWAII

Kaluamakani (Hawaii Island, Hawaiian Government Survey, 1876).—In the northern part of Hawaii, on a hill of the same name, on the northern slope of Mauna Kea. Station is on northern brow of the hill. Marked by a copper tube buried in an ancient graveyard, and covered with cairn of stones. Three triangular holes were drilled in the lava, 7 feet north, 7 feet south, and 6 feet east of the station. A circular wall surrounds the station.

RECOVERY NOTE, TRIANGULATION STATION

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 1088

NAME OF STATION: **Kaluamakani** STATE: **Hawaii** COUNTY: **Hawaii**
 ESTABLISHED BY: **H.G.S.** YEAR: **1876** LOCALITY: **Mauna Kea Slope, Hamakua, Hawaii**
 RECOVERED BY: **Chas.L.Murray** YEAR: **1938**

Detailed statement as to the fitness of the original description:

Location of station: On the easterly crater rim of a hill named Kaluamakani and situated near the foot of the Mauna Kea north slope.

Old station mark found: 1 1/4" pipe in pile of stones. The two original triangular pit ties cut in rock found but the pit 6 feet east could not be found.

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

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 1088

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **KALUAMAKANI**
 ESTABLISHED BY: **Haw.Govt.Survey** YEAR: **1876** STATE: **HAWAII**
 RECOVERED BY: **L. G. Wilder** YEAR: **1948** COUNTY: **HAWAII**

Detailed statement as to the fitness of the original description:

This station has a concrete platform, metal pole and target established in 1938 by the Hawaii Territory Survey, which at that time recovered a 1 1/4" pipe in a pile of stones. Their recovery note states "The two original triangular pit ties out in rock found but the pit 6 feet east could not be found". The metal pole was established over the old pipe marker.

On the easterly crater rim of a hill named Kaluamakani and situated on the north slope of Mauna Kea. The target and hill are prominent.

Four wheel drive vehicles can be driven to the foot of the hill where there is a small building. Inquire of Parker Ranch.

***** 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.

H-2510-2

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **KALUAMAKANI**

STATE: **HAWAII**

YEAR: **1876**

THIRD

ORDER

SOURCE: **G-SP156**

GEODETIC LATITUDE:	19° 54' 31.383	ELEVATION:	2510	METERS
GEODETIC LONGITUDE:	155° 29' 31.227	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (R Δ G) ANGLE
HI 1	5101	502,745.59	390,521.67	+ 0 00 10

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ (R Δ G) FORMULA NEGLECTING THE SECOND TERM.

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191551 STATION 1086
 HAWAII
 LATITUDE 15° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

Kauku (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1912).—On east coast of Hawaii, on the conspicuous isolated mountain which lies directly inshore (S. 35° W.) from the town of Hakalau. This mountain is heavily wooded at top, its lower slopes are covered with cane; it is unmistakable, showing up prominently along coast. Station is on highest point of mountain, a perfectly flat area covered with ferns, and commanding a view of the coast from northwest to east. Reached by taking the road going inland at Pepeekeo store, passing two plantation camps; road goes directly to foot of mountain. The highest tree on the summit is 30 meters from the station, bearing S. 47° W. Station marked by tablet marked "U. S. G. S." set in concrete. A cairn of smooth stones was erected over the station.

RECOVERY NOTE, TRIANGULATION STATION

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 PHOTO 036

NAME OF STATION: KAUKU
 ESTABLISHED BY: H.G.S. YEAR: 1877 STATE: Hawaii
 RECOVERED BY: C.T. Husemeyer YEAR: 1949 COUNTY: Hawaii

Detailed statement as to the fitness of the original description: Original station was described as, a heavy rock marked with a circle and cross, set with concrete in a three foot hole filled with smooth hand stone. Station was recovered in 1912 by the U.S. Geological Survey and remarked with a bronze tablet set in top of the original stone. In 1929 the Hawaii Territory Survey placed a six foot square concrete platform over the station, projecting six inches above the ground, with a three inch iron pipe in the center directly over the mark. The center of this pipe was used as the station.

Station is located about nine miles, airline northeast of Hilo and about four miles west of Pepeekeo, on the east brow of a prominent heavily wooded hill, at the east edge of the highest trees on the hill.
 To reach from the post office in Hilo: go northerly on coast highway for 8.6 miles, turn left and go west on graded road for 0.5 mile, take right fork in small village and go 0.4 mile, turn left at crossroad and go westerly on main traveled road for 2.6 miles to an old ranger house at foot of mountain. From here pack westerly to top of mountain and station.

OBJECT	DISTANCE	DIRECTION
TOLEDO ✓		00 00 00.00 ✓
Honomu stack ✓	4 miles ✓	64 38 11.40 ✓
Pepeekeo light house ✓	5 miles ✓	98 37 44.90 ✓
Pepeekeo stack ✓	5 miles ✓	102 02 26.07 ✓

Name of chief of party should be inserted here. The officer who actually visited the station should sign the name of the east of all recovery notes.
 Note.—One of these forms must be used for every station recovered.

N-2518-2

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAUKU
 STATE: HAWAII YEAR: 1877 SECOND ORDER
 SOURCE: G- 9279

GEODETIC LATITUDE:	19 50 10.303	ELEVATION	598.6 METERS
GEODETIC LONGITUDE:	155 09 30.321		1964 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ θ ANGLE *
HI 1	5101	617,392.92	364,302.70	+ 0° 06' 57"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
TOLEDO	159 49 35.1	159 42 38	5101

QE 174

(continued on next page)

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

KAUKU (continued)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 191551 STATION 1086

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

F 18 526
(11-8-88)

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

R

NAME OF STATION: KAUKU
ESTABLISHED BY: HGS YEAR: 1877 STATE: Hawaii
RECOVERED BY: D.M. Whipp YEAR: 1966 COUNTY: Hawaii
Island: Hawaii

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

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

Station is located about 8 miles northwest of Hilo and 4 miles west-northwest of Pepeekeo, on the heavily-timbered north rim of an old crater, at 1964 feet elevation. The ridge top just southwest of the station is flat and free of underbrush among the large banyan trees, and there are 2 piles of unusual, rounded, smooth stones, averaging 4 inches in size in this area, and also a round hole about 7 feet deep and 14 inches in diameter.

To reach station from the post office at Pepeekeo, go north on State Highway 19 for 0.7 mile to paved crossroad. Turn left and go 0.5 mile to fork in plantation village; take right fork and go 0.4 mile to crossroad. Turn left and go 1.7 miles to fork; take left fork and go 0.15 mile to fork; take right fork and go 0.75 mile to end of road and end of cane field at fence, below an old house in meadow. Pack to upper right corner of meadow, enter timber, and pick trail southwest up gradual slope to south rim of crater. Follow trail around the rim through heavy timber, to the east end of the north rim and station. About a 45 minute pack.

Station mark is a U.S. Geological Survey disk (no stamping is visible) cemented in a drill hole in rock. A Type B-1 signal is centered over the mark and the concrete platform is about flush with ground. Station is 50 feet northeast of the largest, scattered pile of stones and 43 feet northeast of the deep hole.

NOTE: Station site soon becomes overgrown with ginger and ferns and can be difficult to find. Sight to most directions from the station is blocked by trees.

AUG 1979

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 191551 STATION 1087
HAWAII
LATITUDE 19 °36' TO 20 °00'
LONGITUDE 155 °00' TO 155 °30'
DIAGRAM NE 5-1,5 HAWAII

DESCRIPTION TRIANGULATION STATION

NAME OF STATION: KEA
ESTABLISHED BY: L.A. Critchlow YEAR: 1977 STATE: Hawaii COUNTY: Hawaii BENCH MARK ALSO
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 28 miles northwest of Hilo.
HEIGHT OF TELESCOPE ABOVE STATION MARK 4 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 4 FEET.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KALOALOA HGS 1949				° 00 00 00.0
SURFIT USGS EDM	SE	853.65	260.193	61 41 25.5
RM T	W	77.17	23.525	170 12 23.8
KEA RM A trav. dist.	W	(74.03)	22.5637	254 28 23.6
RED HILL USGS	NE		about 3 miles	326 21 17.0
KEA RM A to RM T		101.48	30.932	

Station is located near the summit of Mauna Kea Mountain and about 100 feet southeast of the entrance to the Mauna Kea University of Hawaii Observatory.

To reach the station from the post office in Hilo, go westerly on State Highway 20 for 27.3 miles to a surfaced road right. Turn right and go northerly on the surfaced road (which turns into gravel at about the 9000 foot level) to the summit, University of Hawaii Observatory and the station as described.

The station marks are standard disks stamped KEA 1977. The surface disk is set in a round concrete post flush with the ground surface and the underground disk is set in an irregular mass of concrete about 36 inches below the ground surface. They are 98 feet southeast of the entrance to the observatory, 98 feet east of the southeast corner of the observatory and 7 feet northwest of the southeast edge of the hill. (Note 1b,7a)

Reference mark A, are standard disks stamped KEA RM A 1977. The surface disk is set in a round concrete post flush with the ground surface and the underground disk is set in an irregular mass of concrete about 36 inches below the ground surface. They are 110 feet northeast of the southeast corner of the observatory, 62 feet east of the entrance to the observatory and 23 feet west of the east edge of the hill. (Note 11b,desc.)

Reference mark T, is a plain bronze disk with no stamping and organization unknown. It is set in a square concrete post flush with the ground surface and the concrete is inscribed RM T 1971. It is 69.4 feet south of the entrance to the observatory, 22.4 feet east of the southeast corner of the observatory, 2.3 feet west of center of a concrete sidewalk and 2.3 feet north of center of a concrete sidewalk. (Note desc.)

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

NOAA FORM 76-96 SUPERSEDES CGS FORM 528A WHICH MAY BE USED.
(1-72)

NOAA
U. S. GPO: 1976-645-647/1220 Reprint 6

NOAA FORM 76-31
(11-76)

ADJUSTED HORIZONTAL CONTROL DATA

ADJUSTMENT BY NGS

NAME OF STATION: KEA OBS BY NGS
STATE: HAWAII YEAR: 1977 SECOND ORDER

SOURCE: G-15241

GEODETIC LATITUDE: 19 49 33.04940	ELEVATION: 4201.2 METERS
GEODETIC LONGITUDE: 155 28 19.73682	13783 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE
HI 1	5104	1,885,376.17	712,606.04	+ 1°22'06"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
KALOALOA HGS	274 °03 '26.0	272 °41 '21 "	5104

THESE DATA OBTAINED FROM ADJUSTMENT OF JAN 1979

3M 084

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1088
 HAWAII
 LATITUDE 19 °30' TO 20 °00'
 LONGITUDE 155 °00' TO 155 °30'
 DIAGRAM NE 5-1.5 HAWAII

DESCRIPTION TRIANGULATION STATION

NAME OF STATION: KEA RM A
 ESTABLISHED BY: L.A. Critchlow YEAR: 1977 STATE: Hawaii BENCH MARK ALSO
 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 28 miles northwest of Hilo.
 HEIGHT OF TELESCOPE ABOVE STATION MARK 4 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 4 FEET.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KALOALOA HGS 1949				00 00' 00.0"
KEA T	S	(74.03)	22.5637	74 22 55.8
RM T	SW	101.48	30.932	123 32 37
MAUNA KEA UNIV OF HAWAII OBS DOME	W			174 28 37.9
51209 RM 1	NW	(120.34)	36.6789	223 35 27.8
51209	N	(271.78)	82.8371	270 02 53.4
KEA to RM T		77.17	23.525	
51209 to 51209 RM 1		(208.04)	63.4106	

Station is located near the summit of Mauna Kea Mountain and about 60 feet west of the entrance to the University of Hawaii Observatory. To reach the station from the post office in Hilo, go westerly on State Highway 20 for 27.3 miles to paved side road right. Turn right and go northerly on the paved road (which turns into gravel at about the 9000 foot level) to the summit, University of Hawaii Observatory and the station as described.

The station marks are standard reference mark disks stamped KEA RM A 1977. The surface disk is set in a round concrete post flush with the ground surface and the underground disk is set in an irregular mass of concrete about 36 inches below the ground surface. They are 110 feet northeast of the southeast corner of the observatory, 62 feet east of the entrance to the observatory and 23 feet west of the east edge of the hill. (Note 11b, desc.)

KEA, stamped KEA 1977, are standard station mark disks. The surface disk is set in a round concrete post flush with the ground surface and the underground disk is set in an irregular mass of concrete about 36 inches below the ground surface. They are 98 feet southeast of the entrance to the observatory, 98 feet east of the southeast corner of the observatory and 7 feet northwest of the southeast edge of the hill. (Note 1b, 7a)

Reference mark T, is a plain bronze disk with no stamping and organization unknown. It is set in a 6-inch square concrete post flush with the ground surface and the concrete is inscribed RM T 1971. It is 59.4 feet south of the entrance to the observatory, 2.3 feet west of center of a concrete sidewalk and 2.3 feet north of center of a concrete sidewalk. (Note desc.)

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

NOAA FORM 76-96 SUPERSEDES CGCS FORM 526A WHICH MAY BE USED.
 (1-72)

NOAA

U.S. GPO: 1976-565-661/1220 Region 6

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KEA RM A OBS BY NGS
 STATE: HAWAII YEAR: 1977 SECOND ORDER

SOURCE: G-16241

GEODETIC LATITUDE:	19 49 33.76859	ELEVATION:	4201.4 METERS
GEODETIC LONGITUDE:	155 28 18.89107		13784 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S ¹ OR Δ ² ANGLE ³
HI 1	5101	509,653.06	360,499.20	+ 0 00' 34"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE S ¹ OR Δ ² FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH ³ (From south)	CODE
KALOALOA HGS	274 08 40.7	274 08 06 "	5101

THESE DATA OBTAINED FROM ADJUSTMENT OF JAN 1979

3M 083

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191551 STATION 1089
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1.5 HAWAII

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

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: KEAAU STATE: Hawaii COUNTY: Hawaii

CHIEF OF PARTY: C. T. Husemeyer YEAR: 1949 Described by: C. J. Hoepfel
 NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK 1.68 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.

NOTE	Surface-station mark Underground-station mark	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	DISTANCE		DIRECTION	
			feet	meters	°	'
	KEAUKAHA =				00 00	00 "
	Olaa, Tank =	NE = 2.5 miles =			19 29	46.2 "
11a	R M No. 1 =	NE = 15.375 = 4.687 =			21 32	44 "
	OLAA (HGS)	SW = 0.85 miles =			187 24	27.2 "
11a	R M No. 2 =	WNW = 18.890 = 5.758 =			278 17	05 "

The station is located on the summit of a low grassy knoll which lies about 1.0 miles southwest of the village of Olaa, about 0.2 mile north of the Olaa Hospital and 0.1 mile west of the road which runs between Olaa and the Hawaiian National Park. Several small knolls of equal height lie about 0.1 mile south of the station hill.

To reach from the Hongwanji Church in the village of Olaa; go west, on the road which leads toward the Hawaiian National Park, for 1.15 miles; turn right, onto a graveled road, and go westerly for 0.1 mile to the summit of a low knoll and the station.

The station is a standard disk, stamped KEAAU 1949, set in the top of a square concrete post which projects about 3 inches.

Reference mark number 1 is a standard disk, stamped KEAAU NO 1 1949, set in the top of a square concrete post which projects 6 inches and is about the same elevation as the station.

Reference mark number 2 is a standard disk, stamped KEAAU NO 2 1949, set in the top of a square concrete post which projects about 4 inches and is about the same elevation as the station.

* Refers to notes in manuals of triangulation and state publications of triangulation. † Direction-angle measured clockwise, referred to initial station.
 ‡ To nearest meter only, when no trigonometric leveling is being done. 16-54892-1 U. S. GOVERNMENT PRINTING OFFICE

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KEAAU OBS BY CGS
 STATE: HAWAII YEAR: 1949 FIRST ORDER

SOURCE: G- 9.79

GEODETIC LATITUDE:	19 36 48.71200	ELEVATION:	184.38 METERS
GEODETIC LONGITUDE:	155 03 07.11100		604.9 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ HOR Δ §1 ANGLE
HI 1	5101	653,999.28	284,524.01	+ 0 09 01 "

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE § HOR Δ §1 FORMULA NEGLECTING THE SECOND TERM

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
KALOLO I	263 23 52.5	263 14 52 "	5101

THESE DATA ARE OBTAINED FROM ADJUSTMENT OF 1951

LEVELING BY CGS

JM 085

(continued on next page)

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1089

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

KEAAU (continued)

FORM 526a
 (6-16-66)

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

R

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: **KEAAU**
 ESTABLISHED BY: **C.T. Husemeyer** YEAR: **1949** STATE: **Hawaii**
 RECOVERED BY: **D.M. Whipp** YEAR: **1966** COUNTY: **Hawaii**
 Island: **Hawaii**

NAME OF STATION: **KEAAU**
 ESTABLISHED BY: **C.T.H.** YEAR: **1949** STATE: **Hawaii** BENCH MARK ALSO
 RECOVERED BY: **L.A. Critchlow** YEAR: **1977** COUNTY: **Hawaii**
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: **1 mile southwest of Keaaau.**
 HEIGHT OF TELESCOPE ABOVE STATION MARK **6** FEET. HEIGHT OF LIGHT ABOVE STATION MARK **6** FEET.

HEIGHT OF TELESCOPE ABOVE STATION MARK **1.56** METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.
 DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
OLAA (HGS) -----1949 DISTANCE and DIRECTION				00 00 00.0
RM No. 2	WNW	18.890	5.758	90 52 38
RM No. 1	NE	15.375	4.687	194 08 17
OLAA (HGS) 1896 -----1966 DISTANCE and DIRECTION				00 00 00.0
RM No. 2	WNW	18.878	5.755	90 53 02
RM No. 1	NNE	15.359	4.682	194 09 54
Olaa, Olaa Sugar Co., stack, 1949	NNE			194 11 25.1

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

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KALOLI 2 1949				00 00 00.0
RI 3	NW	18.64	5.683	214 30 20
RI 1	NE	15.37	4.686	317 27 32
OLAA OLAA SUGAR CO STACK 1949	NE	about 2 3/4 miles		317 29 49.0
RI 1 to RI 3		26.675	8.130	

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

Station is located about 1 mile southwest of Olaa and 1 mile northeast of Kurtistown, along the northwest side of State Highway 11, on the summit of a low, rounded, brush-covered hill of about 605 feet elevation which has a tall, wooden antenna pole and small green house on it.

To reach station from the post office in Olaa, go northeast on the main street for 0.1 mile to crossroad. Turn left and go 0.1 mile to

State Highway 11. Turn left and go southwest on the highway for 1.1 miles to gravelled side road right, at telephone pole #123. Turn right and go 0.2 mile; turn sharp right and go 0.05 mile on track road to summit of hill and station.

Station mark is a standard disk stamped "KEAAU 1949", set in the top of an 8-inch-square, concrete monument that projects 2 inches above ground. It is 13.5 feet east-northeast of the antenna pole and 18.5 feet northeast of the northeast corner of the small house.

Reference mark number one is a standard disk stamped "KEAAU NO 1 1949" set in the top of an 8-inch-square, concrete monument that projects 4 inches above ground. It is 27.5 feet northeast of the antenna pole and 0.31 foot lower than station mark.

Reference mark number two is a standard disk stamped "KEAAU NO 2 1949" set in the top of an 8-inch-square, concrete monument that projects 3 inches above ground. It is 11.4 feet north of the antenna pole, 19.0 feet north-northeast of the door of the house and about 6 inches lower than station mark.

Distance between reference marks is 27.0 feet.

NOTE: All marks are usually hidden by tall, dense grass.

The station mark and reference mark 1 were recovered in good condition. Reference mark 2 was found lying on its side. It was reset in its original cement and restamped. The distance to reference mark 1 was found longer by 0.004 meter and the direction was found smaller by 58 seconds. A complete new description follows.

The station is about 1 mile southwest of Keaaau, 1 mile northeast of Kurtistown, along the northwest side of State Highway 11, on a small knoll that is surrounded by sugar cane and has a small building and a wooden antenna pole on top of it and on property owned by the U.H. Shipman Corporation.

To reach the station from the junction of State Highway 11 and 13 in Keaaau, go southwest on highway 11 for 1.05 miles to a field road left and right. Turn right and go west on the field road for 0.15 mile to a reverse fork just before reaching a T-junction. Turn sharp right and go east-northeast uphill for 0.1 mile to the top of the hill and the station as described.

Station mark, stamped KEAAU 1949, is a C&GS disk set in a square concrete monument which projects about 2 inches above the ground surface. It is 18.5 feet northeast of the northeast corner of a small building and 13.5 feet east-northeast of a wooden antenna pole. The 1949 description does not mention an underground mark. (Note 1a)

Reference mark 1, stamped KEAAU NO 1 1949, is a C&GS disk set in a square concrete monument which projects about 4 inches above the ground surface. It is 27 feet northeast of the antenna pole, 23.5 feet east of a guy wire anchor and about 2 inches lower than the station. (Note 11a)

Reference mark 2, stamped KEAAU NO 2 1949 1977, is a C&GS disk set in a square concrete monument which projects about 5 inches above the ground surface. It is 11.5 feet northwest of the antenna pole, 11.5 feet south-southwest of a guy wire anchor and about 6 inches lower than the station. (Note 11a)

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

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

USCGM-DC 27173-P88

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

NOAA FORM 76-96 SUPERSEDES CGS FORM 526A WHICH MAY BE USED (1-72)

NOAA
 U.S. GOV. 1976-645-641/1220 Region 6

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

191551 STATION 1090
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1,5 HAWAII

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 535
 (Rev. Aug. 1962)

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **KEAUKAHA** STATE: **Hawaii** COUNTY: **Hawaii**

CHIEF OF PARTY: **C. T. Husemeyer** YEAR: **1949** Described by: **G. J. Hoepfel**

NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK **7.37** METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.

NOTE	Surface-station mark, Underground-station mark	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
		BEARING	DISTANCE		DIRECTION
	OBJECT		feet	meters	
12a	KAIWIKI NEW (USGS)	NNW	201.80	61.510	00 00 00
	R M No. 2	NNE	753		65 32 39
	LELEIWI (USGS)	NE	83.860	13.368	89 10 18.2
12a	R M No. 1	NW			113 27 02
	Pepeekeo Lighthouse				46 25 50.7

The station is located on Lelelwi Point about 5 miles east of Hilo, 753 feet south southwest of the eastern end of Lelelwi Point, about 0.4 mile east of the Puumaille Hospital, about 250 feet south of a small shack and 31 feet northwest of the center of a track road.

To reach from the bridge which spans the Waioa River in the town of Hilo; go easterly on the main traveled road for 4.3 miles; pass through the gate, into the Puumaille Hospital grounds; and go southerly, passing to the left hand side of the main building, for 0.3 mile to a turn around at the end of the paved road. From this point go south and east on a track road for 0.4 mile to the station on the left hand side of the road.

The station is a standard disk, stamped KEAUKAHA 1949, set in the top of a square concrete post which projects about 6 inches.

Reference mark number 1 is a standard disk, stamped KEAUKAHA NO 1 1949, set into a drill hole in bed rock which is flush with the surrounding rock. It is located 12 feet west of the center of a track road and about 3 feet higher than the station.

Reference mark number 2 is a standard disk, stamped KEAUKAHA NO 2 1949, set into a drill hole in bedrock which is flush with the surrounding rock. It is located 7 feet east of the southeast corner of an old shack and at about the same elevation as the station.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 536
 (Rev. Feb. 1962)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **KEAUKAHA** YEAR: **1949** STATE: **Hawaii**

ESTABLISHED BY: **C.T.H.** YEAR: **1958** COUNTY: **Hawaii**

RECOVERED BY: **H.O.F.**

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

The station and R. Ms. No. 1 and 2 were recovered as described in 1949 in good condition, except for the following additions and corrections:

The main traveled road is Kamahamaha Ave., and Kalaniana'ole St.

The Puumaille Hospital is now abandoned. The old shack mentioned in R.M. No. 2 has been moved and the mark is now 20.7 feet N.E. of the N.E. corner of the shack.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **KEAUKAHA** OBS BY **CGS**

STATE: **HAWAII** YEAR: **1949** **FIRST** ORDER

SOURCE: **G- 9279**

GEODETIC LATITUDE: 19 44 14.47300	ELEVATION: 8.9 METERS
GEODETIC LONGITUDE: 155 00 24.24900	29 FEET

STATE COORDINATES (Fvt)				
STATE & ZONE	CODE	X	Y	ϕ (OR Δ) ANGLE
HI 1	5101	669,629.86	328,534.92	+ 0°10'00"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
KAIWIKI NEW USGS	100 10 38.2	100 00 38	5101

THESE DATA ARE OBTAINED FROM ADJUSTMENT OF 1951

3M 089

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1090
 LATITUDE ° ' TO ° '
 LONGITUDE ° ' TO ° '
 DIAGRAM

KEAUKAHA (continued)

Form 526
 (11-8-85)

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

R

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KEAUKAHA
 ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: Hawaii
 RECOVERED BY: H.J.S. YEAR: 1962 COUNTY: Hawaii

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

The station and both reference marks were recovered in good condition as described in 1949 and as recovered by H.O.F. in 1958. The station and reference mark 1 are covered in heavy brush and reference mark 2 provides the principal clue to the station location.

The description, as amended by the 1958 recovery note, is adequate.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KEAUKAHA
 ESTABLISHED BY: C.T. Husemeyer YEAR: 1949 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: D.M. Whipp YEAR: 1966 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Island: Hawaii

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

Station was recovered and all marks found in good condition. The distance to the reference marks was measured and found to agree closely with the original. The hospital mentioned in 1949 description is gone. Station is in an area covered with high brush and trees and a tower about 20 feet high would be necessary to see out. A complete description follows:

Station is located about 5-1/2 miles east of Hilo and 753 feet south of the extreme tip of Lelewi Point (and station LELEWI USGS), inside the curve of a 90° left turn of a track road, about 200 feet before reaching end of road and old house.

To reach station from the intersection of Waiuanuenue St. and Kamehameha Ave. in Hilo, go east on Kamehameha Ave. for 1.7 miles; take left fork and follow Kalaniana'ole St. for 3.7 miles to end of paved street; continue ahead on gravel road for 0.1 mile; turn right, on narrow madadam road, and go 0.1 mile; take side road left, 50 yards before radio tower, and follow track road east for 0.35 mile; take left fork and go 0.1 mile to top of very slight rise and 90° left turn. RM 1 is by side of road at this point and station is 50 feet southwest.

Station mark is a standard disk stamped KEAUKAHA 1949", set in the top of a 10-inch-square, concrete monument that projects 6 inches. It is in dense brush, 32 feet northwest of track road, on small lava ridge, or rise, separated from road by small gully, and about 200 feet south-southeast of old house.

Reference mark number one is a standard disk stamped "KEAUKAHA NO 1 1949", cemented in a drill hole in lava bedrock, flush with surrounding area, 12 feet west-southwest of center line of road, on the slight rise over which road passes on the curve, and about 1 foot higher than station mark.

Reference mark number two is a standard disk stamped "KEAUKAHA NO 2 1949", cemented in a drill hole in lava bedrock flush with ground and hidden by grass. It is 17.7 feet northeast of the front steps of the old house and 10.2 feet northwest of a large palm tree, the northernmost one in the yard.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KEAUKAHA
 ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: R. B. Melby YEAR: 1975 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 5 miles east of Hilo

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

The station and reference marks were recovered in good condition. The station is in heavy brush and would require a tower or extensive clearing to even see the reference marks.

NAME OF STATION: KEAUKAHA
 ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: L. A. Critchlow YEAR: 1977 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 5-1/2 miles east of Hilo
 HEIGHT OF TELESCOPE ABOVE STATION MARK FEET. HEIGHT OF LIGHT ABOVE STATION MARK FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
RM 2	NNW	(201.79)	*61.505	00 00 00
RM 1	NE	43.85	13.367	*47 53 44
RM 1 to RM 2		(175.43)	*53.471	

*Computed from traverse

The station mark and reference marks 1 and 2 were recovered in good condition. Due to heavy brush and growth around the station site no observations could be made from the ground at the station and no direct measurement could be made to reference mark 2. A 50-foot-high G-mast was used in order to clear the nearby trees. A traverse was made from the station mark through reference mark 1 to reference mark 2 and the measured distance to reference mark 1 and the distance to reference mark 2 and the angle between the reference marks computed from the traverse compared favorably with the 1949 measurements. Due to changes a new description follows:

The station is located about 5-1/2 miles east of Hilo and about 750 feet south of the extreme tip of Lelewi Point, on the inside of a 90 degree curve in a track road, and about 200 feet before reaching the end of the road at an old house. Permission was obtained from Mrs. Lilian Puana who lives just north of the station site.

To reach the station from the junction of State Highways 11 and 19 in the east part of Hilo go east on State Highway 19 (Kalaniana'ole St.) 3.9 miles to the end of the pavement. Continue east on a graveled road 0.15 mile to a track road on the right. Turn right and go southerly on the track road 0.05 mile to a track road on the left. Turn left onto the track road and go east 0.25 mile to a track road on the left. Turn left onto the track road and go northeast and east 0.1 mile to a curve in the road and the station site on the left.

The station mark is a C&GS triangulation station disk stamped KEAUKAHA 1949 set in the top of a 10-inch-square concrete monument projecting 6 inches above the ground and is about 200 feet south-southeast of an old house, 35 feet north of the track road, and on a small rise separated from the road by a small gully.

Reference mark 1 is a C&GS reference mark disk stamped KEAUKAHA NO 1 1949 cemented in a drill hole in lava rock flush with the surrounding rock and is 12 feet west of the track road and 4 inches south of a 1/2-inch steel rod that has been driven into a crack in the rock.

Reference mark 2 is a C&GS reference mark disk stamped KEAUKAHA NO 2 1949 cemented in a drill hole in lava rock flush with the surrounding rock and is 16.2 feet south of the southwest corner of a garage and 14.8 feet north-northeast of the north corner of a house.

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

NOAA FORM 76-96 SUPERSEDES C&GS FORM 526A WHICH MAY BE USED (1-72)

DEPARTMENT OF COMMERCE
 NOAA
 U.S. GPO: 1976-645-66/1120 Rep/Jan 6

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 151551 STATION 1091
 HAWAII
 LATITUDE 15° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 3-1.5 HAWAII

Keokea (Hawaii Island, Hawaiian Government Survey, 1878).—On eastern shore of Hawaii, at Keokea Point, east of Hilo Bay, on a grassy islet. The surf breaks all around it. Marked by an iron pin let into the rock.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION KEOKEA
 STATE HAWAII YEAR 1878 THIRD ORDER

SOURCE G-SP156

GEODETIC LATITUDE	19 44 30.989	ELEVATION	1	METERS
GEODETIC LONGITUDE	155 02 34.290	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE*
HI 1	5101	657,202.90	330,166.27	+ 0 05 16*

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

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

QD 315

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191551 STATION 1092
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: Keokea 2
 ESTABLISHED BY: C.T. Husemeyer YEAR: 1951 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: C.K. Townsend YEAR: 1976 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3.0 miles west of Hilo
 HEIGHT OF TELESCOPE ABOVE STATION MARK FEET. HEIGHT OF LIGHT ABOVE STATION MARK FEET.

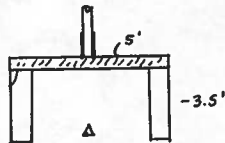
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
COCOANUT POINT LIGHT MOKUOLA 2			2846.531	00 00 00.0 358 22 32.6

Station was recovered in good condition.

A discrepancy was noted in the name of the station. The published name is Keokea 2 1951, the markings on the station read Keokea 2 Aug. 1924. All directions and distances observed to the station indicated the published position to be correct.

The station can be reached from the post office in Hilo by proceeding north-easterly on Walluku St. for 0.15 miles, bear right onto Kamehameha Ave. for 1.75 miles, bear left onto Kalaniani'ole St. for 1.6 miles, turn left onto Andrews Ave. for 80 yards, turn right onto Apapane Rd. for 40 yards, then turn left onto Lihikai St. for 0.1 miles, turn right into a clearing containing old building foundations. Walk westerly along beach for 100 yards.

Station is a rock with a triangle inscribed. Plumbed over the station is a 6 ft. red and white metal crossbanner built on a 5 ft. by 5 ft. concrete platform 3.5 ft. in height. No reference marks were found.



RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KEOKEA 2
 ESTABLISHED BY: C.T. Husemeyer YEAR: 1951 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: R.B.M. YEAR: 1978 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3 miles west of Hilo

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

The station was recovered as described in 1976 except in the 'to reach' description, turn left on Keokea Loop Road instead of Andrews Avenue.

NAME OF STATION: KEOKEA 2 OBS BY CGS
 STATE: HAWAII YEAR: 1951 THIRD ORDER

SOURCE: G-9-23

GEODETIC LATITUDE: 19 34 25.39:00	ELEVATION: 3.0 METERS
GEODETIC LONGITUDE: 155 02 42.67:00	10 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE*
HI 1	5101	656,403.34	329,600.09	+ 0° 09' 13"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
COCOANUT POINT LIGHT	75° 51' 01.1	75° 41' 48"	5101

THESE DATA ARE OBTAINED FROM ADJUSTMENT OF 1967

SM 091

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

191551 STATION 1093
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1,5 HAWAII

Kihe (Hawaii Island, Hawaiian Government Survey, 1876).—In northern part of Hawaii, on northeast slope of Mauna Kea, on northwest side of Kihe crater. Marked by a mamane post in the center of a platform of stone, 5 feet high and 8 feet square. A cross cut on a stone *in situ* bears 38° (magnetic), distant 96 feet.

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

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: Kihe STATE: Hawaii COUNTY: Hawaii
 ESTABLISHED BY: H.G.S. YEAR: 1876 LOCALITY: Hamakua, Hawaii
 RECOVERED BY: Ohas.I. Murray YEAR: 1938

Detailed statement as to the fitness of the original description:

Location of Station: In the northern part of Hawaii on the northwest crater rim of the hill called Puu Kihe. This hill is situated on the northeast slope of Mauna Kea at the upper limits of Kukaiau Ranch.

Old mark found: The original Mamane post marking the station could not be found but a 1 1/2" pipe in concrete set in the middle of the large rock pile which covered the original station was found. This mark was set by Jas. B. Mann private surveyor, and has been adopted since the only tie mark established in 1876 has been destroyed presumably by wild pigs which have uprooted the grounds surrounding the station.

New Station Mark: H.T.S. Type D monument.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 538
 (REV. FEB. 1958)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KIHE STATE: Hawaii COUNTY: Hawaii
 ESTABLISHED BY: Hawaiian Govt. YEAR: 1876
 RECOVERED BY: C. T. Husemeyer YEAR: 1949

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:
 The original station, "A mamane post in the center of a platform of stone, 5 feet high and 8 feet square." was not recovered. In 1938 the Hawaii Territory Survey wrote the following notes on this station. "The original Mamane post marking the station could not be found but a 1 1/2 inch iron pipe in concrete set in the middle of a large rock pile which covered the original station was found. This mark was set by Jas. B. Mann private surveyor, and has been adopted since the only tie mark established in 1876 has been destroyed presumably by wild pigs which have uprooted the grounds surrounding the station." In 1938 the Territory Survey surrounded this station with a triangular slab of concrete, 6 feet on each side, leaving the 1 1/2 inch pipe exposed to view. This mark was recovered in good condition. The reference mark was not recovered. Two reference marks were established. A new description follows--

The station is located on the northeast slope of Mauna Kea, on the northwest rim of Kihe Crater, about 10 miles south southwest of Paaulo, about 6 miles south south of the Kukaiau Ranch Headquarters, about 0.2 mile north of the Puu Kihe ranch house and about 0.1 mile northwest of a track road. Higher ground is about 200 feet southwest of the station.

To reach from the post office at Hilo, go northerly, on the road toward Honokaa, for 26.3 miles; pass the Papaloa Post Office and continue northerly, toward Honokaa, for 12.2 miles to telephone pole number 176.

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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KIHE
 STATE: HAWAII YEAR: 1876 SECOND ORDER

SOURCE G- 9279

GEODETIC LATITUDE	19 54 10.086	ELEVATION	2365.7 METERS
GEODETIC LONGITUDE	155 23 42.715		7820 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	H ON Δ ° ANGLE
HI 1	5101	536,003.01	388,384.37	+ 0 02 08

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (from south)	PLANE AZIMUTH* (from south)	CODE
KALEPA	303 46 59.9	303 44 52	5101

QE 123

(continued on next page)

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1093

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

KIHE (continued)

Turn left, and go south and west, toward the Kukaiau Ranch for 4.1 miles; pass through a board gate and continue westerly for 3.2 miles; pass to the right hand side of the ranch garage and continue westerly for 0.2 mile; pass through the corral and continue westerly, on a poor track road, for 1.2 miles; pass to the right hand side of two large water tanks and continue southwest for 2.7 miles; turn left, as per the sign reading Keankolu, and go southerly for 0.35 mile; pass through a board gate and continue south for 0.2 mile; turn right and go southwesterly for 0.55 mile; pass to the right hand side of a large rain shed and follow the dim track road, southwesterly, for 2.6 miles to a board gate and the end of truck travel. From this point pack northerly for about 0.1 mile to the summit of the northwestern rim of the crater and the station. Water can be obtained from the ranch house 0.2 mile south of the station.

The station is the center of a 1 1/2 inch iron pipe which projects about 2 inches above an irregular mass of concrete which is flush with the surface of the ground.

Reference mark number 1 is a standard disk, stamped PUU KIHE 02 1949, set in a drill hole in a boulder which is about 1 foot in diameter and 2.9 meters lower than the station.

Reference mark number 2 is a standard disk, stamped 01 1949, set in a drill hole in a boulder which is about 4 feet in diameter and projects about 3 feet. It is located 1.37 meters higher than the station.

NOTE	OBJECT	BEARING	FEET	METERS	DIRECTION
12c	KOHOLAILELE (HGS) R. M. No. 1	E	39.940	12.174	00 00 00 73 29 41
12c	KALEPA (HGS) R. M. No. 2	SE	2 miles		108 24 55.08 167 50 08
		SSE	26.948	8.214	

FORM 524a
 (6-18-69)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

R

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KIHE
 ESTABLISHED BY: HGS
 RECOVERED BY: D.M. Whipp
 YEAR: 1876
 YEAR: 1966
 STATE: Hawaii
 COUNTY: Hawaii
 Island: Hawaii

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.7 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KALEPA (HGS) 1876-----1949	DISTANCE and DIRECTION			00 00 00.0
RM No. 2	SSE	26.948	8.214	59 25 10
RM No. 1	E	39.940	12.174	325 04 43
KALEPA (HGS) 1876-----1966	DISTANCE and DIRECTION			00 00 00.0
RM No. 2	S	26.939	8.212	59 25 27
RM No. 1	E	39.935	12.173	325 03 58

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

Station is located about 12 miles southwest of Laupahoehoe, 5-1/2 miles south of the Kukaiau Ranch Headquarters in Umikoa Village, and 0.2 mile north of the old Puu Kihe Ranch buildings, on the northwest rim of Kihe Crater, a bare, grassy hill of about 7821 feet elevation.

To reach station from the post office at Laupahoehoe, go northwest for 0.1 mile; turn left, and continue northwest, on State Highway 19, for 9.3 miles to telephone pole #176 on left. Turn sharp left and go 6.5

miles to Kukaiau Ranch buildings. Continue west for 0.1 mile; pass through board gate and continue on track road, towards mountain, for 0.8 mile to board gate. Pass through gate and continue for 1.1 miles; pass through a board gate and continue for 0.65 mile to board gate by wooden tank. Pass through gate and continue for 1.2 miles to gate at a T-fence intersection. Pass through gate and go 0.05 mile to side road right and sign "HANA IPOE 5 MI. KEANAHOLU 5.5". Continue ahead for 0.7 mile to fork. Take right fork and go south 0.75 mile to board gate above large rain shed and tanks. Pass through gate and continue for 2.2 miles to fork near large tank and catchment basins at southwest base of station hill. Take left fork and go east 0.15 mile to end of truck travel by cinder quarry. Pack north up and along hill about 200 yards to station. NOTE: A 4-wheel-drive truck is required after leaving ranch headquarters.

Station mark is the center of a 1-1/2-inch iron pipe that projects 1 inch from the center of a triangular concrete platform 7 feet on each side and flush with ground. A 2-1/2-inch iron pipe is mounted vertically over the mark, supported by 3 iron legs embedded in the concrete platform, and holds a metal target 7 feet tall. Station is about 280 feet north of highest point of the hill.

Reference mark number one is a standard disk stamped "PUU KIHE HGS NO 1 1949", cemented in a drill hole in an 18-inch, pointed, triangular rock outcrop that projects 1 foot above ground. It is about 4-1/2 feet lower than station mark.

Reference mark number two is a standard disk cemented in a drill hole in a large, red, lava outcrop 7 feet in diameter and projecting 3 feet. It is about 4-1/2 feet higher than station mark. Stamped KIHE HGS NO 2 1949.

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

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

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

0 191551 STATION 1095
 HAWAII
 LATITUDE 19 ° 30' TO 20 ° 00'
 LONGITUDE 155 ° 00' TO 155 ° 30'
 DIAGRAM NE 5-1.5 HAWAII

NO TEXT

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KOLE-N

STATE: HAWAII

YEAR 1877

THIRD ORDER

SOURCE G-SP156

GEODETIC LATITUDE: 19 53 15.239	ELEVATION: METERS
GEODETIC LONGITUDE: 155 27 06.914	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (DIR Δ θ) ANGLE *
HI 1	5101	516,518.49	382,842.56	+ 0 00 55

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ (DIR Δ θ) FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From station)	PLANE AZIMUTH (From station)	CODE
QD 352			

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1096
 HAWAII
 LATITUDE 19 °30' TO 20 °00'
 LONGITUDE 155 °00' TO 155 °30'
 DIAGRAM NE 5-1,5 HAWAII

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: Kuhio Bay, Range Front Light

CHIEF OF PARTY: C.K. Townsend YEAR: 1976 STATE: Hawaii COUNTY: Hawaii

Description, including sketch of object:

Located in the city of Hilo, at Kuhio Wharf Pier #1 on the western shore of Kuhio Bay. Station is located in an unloading area for container ships.

The station is the metal pole that supports a green directional navigation light 70 feet above the ground. A daymark is displayed in front of the light.

Station Kuhio Bay Range Front Light 1975 as described in 1975 by R.B.M. has been relocated 80 meters east. It should be noted that this description is for the 1976 position, and a recovery note for the 1975 position has been submitted stating Kuhio Bay Range Front Light has been destroyed. It should be noted that this station is listed as Hilo Harbor Range Front Light in the 1976 Coast Guard Light List Vol. III.

FORM CGOS-525b (12-68)

Described by _____
 U.S. DEPARTMENT OF COMMERCE
 ESSA
 COAST AND GEODETIC SURVEY

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KUHIO BAY RANGE FRONT LIGHT

OBS BY NGS

STATE: HAWAII

YEAR: 1976

THIRD

ORDER

SOURCE: 6-16241

GEODETIC LATITUDE:	19 34 07.74846	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 03 22.06996		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE*
HI 1	5101	652,644.88	327,809.63	+ 0°09'00"

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

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

THESE DATA OBTAINED FROM ADJUSTMENT OF JAN 1979

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1097
 HAWAII
 LATITUDE 19 030' TO 20 000'
 LONGITUDE 155 000' TO 155 030'
 DIAGRAM NE 5-15 HAWAII

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: **Kuhio Bay, Range Rear Light**
 CHIEF OF PARTY: **R. B. Melby** YEAR: **1975** STATE: **Hawaii** COUNTY: **Hawaii**

Description, including sketch of object:

Located in the city of Hilo, along the south shore of Puhi Bay, about 225 yards east-southeast of the inshore end of the Hilo Harbor Breakwater. The station is the spindle that supports a green, directional, navigational light on a tall, slender, skeleton tower. The light is about 125 feet above sea level. Designated as No. 3677 in the publication 'Light List, Volume III, Pacific Coast and Pacific Islands, 1975'.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **Kuhio Bay, Range Rear Light**
 ESTABLISHED BY: **R.B.M.** YEAR: **1975** STATE: **Hawaii** BENCH MARK(S) ALSO
 RECOVERED BY: **C.K. Townsend** YEAR: **1976** COUNTY: **Hawaii**
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: **Located in Hilo**

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

Recovered in good condition as described in 1975. It should be noted that station is listed as Hilo Harbor Range Rear Light in the 1976 Light List Vol. No. 3.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **KUHIO BAY RANGE REAR LIGHT** OBS BY **NGS**
 STATE: **HAWAII** YEAR: **1976** **THIRD** ORDER

SOURCE: **U-16241**

GEODETIC LATITUDE:	19 44 05.9757U	ELEVATION:	
GEODETIC LONGITUDE:	155 03 07.49327	METERS:	
		FEET:	

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE *
HI 1	5101	654,037.84	327,634.25	+ 0 09 05

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From α or β)	PLANE AZIMUTH (From α or β)	CODE
THESE DATA OBTAINED FROM ADJUSTMENT OF JAN 1979			

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 191551 STATION 1098
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1.5 HAWAII

KULANI (HGS)
 (Hawaii Island, Hawaiian Government Survey, 1891).—Southeast of the center of Hawaii, on the summit of Kulani Cone, a conspicuous hill at the junction of the lands of Waiakea, Olaa, and Keauhou. Marked by a copper bolt set in a block of concrete, and a huge "ahu" of hapuu logs.

RECOVERY

DESCRIPTION OF TRIANGULATION STATION

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

NAME OF STATION: **KULANI (HGS)** STATE: **Hawaii** COUNTY: **Hawaii**

Established By: **Hawaiian G.S., 1891**

CHIEF OF PARTY: **G. T. Husemeyer** YEAR: **1949**

Described by: **C. J. Hoepfel**

NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK **1.90** METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.

OBJECT	BEARING	DISTANCE		DIRECTION
		feet	meters	
AAHUWELA (HGS)				00 00 00
pipe Azimuth mark	NNW	2 miles		11 24 27.9
Hilo Radio Mast (KIPA)	NNE	18 miles		45 19 31.6
pipe R M No. 1	SE	28.271	8.618	141 06 15
pipe R M No. 2	WSW	67.529	17.536	246 22 15

The station is located on the summit of Kulani Cone which lies about 20 miles south 44 degrees west of Hilo, about 2 miles south of Kulani Prison Camp and about 0.4 mile west of the end of the road at a small pond. The station hill is the highest ground in the vicinity.

This station was established by the Hawaiian Government Survey in 1891 and was recovered in good condition.

To reach from the post office at Hilo; go westerly, on the road which leads toward Waimea, for 6.1 miles; continue straight ahead, toward Waimea, on the graded road for 1.9 miles; turn left as per the sign reading "Kulani Prison Camp" and go southerly for 7.3 miles; turn right and go southwesterly for 11.7 miles; pass through the gate into the prison yard and continue south for 0.2 mile; turn left and follow the graded road,

southerly, for 0.5 mile; pass to the right hand side of two large water tanks and continue south for 1.7 miles to the end of the road at a small pond and pump house. From this point pack southwest, up the steep slope, for about 0.4 mile to the top of the hill and the station.

The station is the center of a 1 inch copper bolt which projects about 2 inches from the top of a concrete post which is 6 inches square. Reference mark number 1 is a standard disk, stamped KULANI NO 1 1949, set in the top of a 1 1/2 inch pipe which projects about 3 inches above the ground.

Reference mark number 2 is a standard disk, stamped KULANI NO 2 1949, set in the top of a 2 1/2 inch pipe which projects about 5 inches.

The azimuth mark is a standard disk, stamped KULANI 1949, set in the top of a 1 inch pipe which projects about 4 inches. It is located about 2 miles north northwest of the station, 52 feet southwest of the center of the prison gate and 39 feet west of the center of the road.

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

ADJUSTED HORIZONTAL CONTROL DATA

ADJUSTMENT BY NGS

NAME OF STATION: **KULANI HGS**

OBS BY **CGS**

STATE: **HAWAII**

YEAR: **1991**

FIRST

ORDER

SOURCE: **G- 9279**

GEODETIC LATITUDE: 19° 31' 24.5700	ELEVATION: 1683.0 METERS
GEODETIC LONGITUDE: 155° 18' 06.26200	5522 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ or ANGLE °
HII 1	5101	568,270.06	250,663.24	+ 0° 03' 59"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
AZ MK BASE B HSS	171° 07' 01.2	171° 03' 03"	5101

THESE DATA ARE OBTAINED FROM ADJUSTMENT OF 1951

(continued on next page)

HORIZONTAL CONTROL DATA

QUAD 191551 STATION 1098

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

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

KULANI (HGS) (continued)

FORM 526a
 (5-15-65)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

R

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KULANI (HGS)
 ESTABLISHED BY: HGS YEAR: 1891 STATE: Hawaii
 RECOVERED BY: D.M. Whipp YEAR: 1967 COUNTY: Hawaii
 Island: Hawaii

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.44 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.
 DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KEAAU -----1949 DISTANCE and DIRECTION-----				00 00 00.0
RM No. 1	SE	28.271	8.618	58 37 58
RM No. 2	WSW	57.529	17.536	163 53 58
KEAAU 1949 -----1967 DISTANCE and DIRECTION-----				00 00 00.0
RM No. 1	SE	28.149	8.580	58 39 50
RM No. 2	SW	57.508	17.528	163 52 49
Hawaiian Tel.Co., Micro-wave tower	NNW	142.546	(43.448)	222 57 57.3
Base B (HSS),(Azimuth mark)	NNW	2 miles		282 01 17.0

Station mark and both reference marks were recovered in good condition. The azimuth mark was found destroyed so a survey mark of the Hawaii State Survey was used for a new azimuth mark. There is now a road to top of hill, also a telephone micro-wave relay tower and a smaller antenna on top of hill. A complete description follows:

Station is located about 20 miles southwest of Hilo and 2 miles south of Kulani Honor Camp, on the summit of Kulani Cone, a brush-covered hill

of about 5518 feet elevation.

To reach station from the junction of State Highways 19 and 11, about 1-1/2 miles east of Hilo, go south on State Highway 11 for 4.0 miles to sign "KULANI 19". Turn right and go 18.9 miles to entrance to Kulani Honor Camp. Continue ahead for 0.15 mile; take left fork and go 0.1 mile to crossroad by gas pumps. Turn left and go 0.1 mile to crossroad. Turn right and go along telephone and power lines for 1.55 miles to fork. Take right fork, along power line, for 0.85 mile to top of hill and station. NOTE: A 4-wheel-drive vehicle is required for last mileage.)

Station is marked with a 1-inch copper pin projecting 2 inches from the top of a 7-inch-square, concrete monument that projects 3 inches from ground. It is 10 feet southwest of edge of cutbank, 63 feet northeast of a 40-foot, 3-legged radio antenna and 21 feet northwest of base of antenna guy-cable.

Reference mark number one is a standard disk stamped "KULANI NO 1 1949", cemented in the top of a 1-1/2-inch iron pipe projecting 3 inches. It is 12 feet southwest of cutbank and 2.7 feet lower than station mark.

Reference mark number two is a standard disk stamped "KULANI NO 2 1949", cemented in the top of a 2-inch iron pipe projecting 5 inches. It is 17 feet north-northwest of the radio antenna, 25.8 feet east of a wooden power pole, and 8 inches higher than station mark.

Base B (HSS) will serve as the azimuth mark. It is a 6-foot-square, concrete platform, with a tapering, concrete pillar about 2 feet high, at the center. A 2-1/4-inch iron pipe is in the center of the pillar, and

center of pipe was used for azimuth mark. "BASE B" is inscribed in the concrete on top of center pillar. The mark is located on the southwest side of the Kulani Honor Camp, on the beginning of the brushy slopes that rise up to the west from the westernmost buildings. It is 68 feet north-east of a power pole, 255 feet southwest of the track road around west side of buildings and about 100 yards south-southwest of an old, green, water tank. To reach azimuth mark from the crossroad by gas pumps, go right, southwest, upgrade, for 0.1 mile to fork. Take right fork and go 0.05 mile to top of low rise. Turn left and go 0.05 mile up bulldozed track to azimuth mark in brush area.

Hawaiian Telephone Co. Micro-wave relay tower is a 4-legged, skeleton steel structure, painted alternate red and white, 175 feet high, 18 feet square at the base and tapering to about 4 feet square at top. Distance and angle were measured to center of base.

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1098

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

KULANI (HGS) (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KULANI HGS
 ESTABLISHED BY: HGS YEAR: 1891 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: L.A. Critchlow YEAR: 1977 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 12 miles West of Mountain View
 HEIGHT OF TELESCOPE ABOVE STATION MARK 4 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 4 FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KEAAU 1949'				00 00 00.0
HM 1'	SE	28.154	8.583	58 40 39
HM 3'	SW	71.05	21.658	157 26 38
HAWAIIAN TELEPHONE CO TOWER'	WNW	142.59	43.46	222 59 01.1
Azimuth Mark'	Geodetic Distance NNW	(10291.82)	3136.952	282 01 19.11

Station mark, reference mark 1 and the azimuth mark were recovered in good condition. Reference mark 2 was searched for but not recovered. Reference mark 3 was set at this time. The distance and direction to reference mark 1 checked the 1967 data and the distance and direction to HAWAIIAN TELEPHONE COMPANY TOWER, compared favorable to the 1967 data, the difference being 0.01 meter more and 01 minute, 03.8 seconds. Following is a new description.

The station is located about 20 miles southwest of Hilo, 12 miles west of Mountain View and 2 miles south of the Kulani Honor Camp. It is on state property and permission was obtained from the Kulani Honor Camp, Phone Number 935-3758.

To reach the station from the junction of State Highways 19 and 11, about 1-1/2 miles east of Hilo, go south on Highway 11 for 4.0 miles to a crossroad and sign, KULANI 19. Turn right and go westerly on Stainback Road for 0.3 mile to a reverse fork on the right; continue westerly on the paved road for 13.55 miles to an iron gate, locked at times; continue westerly on the paved road for 3.2 miles to an iron gate and the entrance to the Kulani Honor Camp. Continue ahead for 0.05 mile to a crossroad. Turn left and go south and southeast on a dirt road for 0.15 mile to some large buildings on the right. Continue south on the dirt road for 1.5 miles to a fork; take right fork and go 0.85 mile to the top of the hill and the station. A 4-wheel-drive vehicle is required on the last mile.

To reach the azimuth mark from the crossroad, just after entrance to the Kulani Honor Camp, go southwest on a dirt road for 0.15 mile to the office building on the right; continue ahead for 0.05 mile to some gas pumps on the left; bear right and go westerly on the gravel road for 0.05 mile to a side road on the right. Turn right on a gravel road and go 0.05 mile, passing to the left of some buildings, then left across rocky terrain for 0.05 mile to a slight rise and the azimuth mark.

Station mark is a 1-inch copper pin projecting 2 inches from the top of a 7-inch-square concrete monument that projects about 3 inches above its concrete foundation, which has 2 concrete pillars projecting 3.5 feet that are cemented in the same foundation. It is 63 feet north-north-east of a small triangular shaped radio tower, 21 feet northwest of the base of a guy cable and 10 feet southwest

of the edge of a cutbank.

Reference mark 1 is a standard disk stamped KULANI NO 1 1949. It is cemented in a drill hole in the northeast corner of the concrete base of an electric generator and projects about 3 inches above the ground surface. It is 12 feet southwest of a cutbank and 5.5 feet east-northeast of an 8-inch tree.

Reference mark 3 is a standard disk stamped KULANI 1891 NO 3 1977. It is cemented in a drill hole in the northeast corner of the concrete base of an electric generator and projects about 3 inches above the ground surface. It is 24.8 feet east of a power pole, 12.6 feet west of the triangular shaped radio tower and 5.5 feet northeast of the northeast corner of a small metal building.

Azimuth mark is the center of a 2-1/2 inch iron pipe that is cemented in the center of a tapering concrete pillar that projects about 2 feet above its 5 foot square concrete foundation, with the letters BASE B, inscribed in the foundation. It is 237 feet southwest of a metal light pole and 68 feet northeast of a power pole number 5.

U.S. DEPARTMENT OF THE INTERIOR
 GEOLOGICAL SURVEY
 Form 9-1165
 (Rev. 12-74)

REPORT ON PERMANENT SURVEY MARK

AREA OFFICE

STATE: Hawaii COUNTY: Hawaii QUADRANGLE: 35
 QUOTE: PRIMARY REFERENCE: On the summit of Kulani Cone
 (Direction and distance)

DESIGNATION: LISTED KULANI (HGS)
 STAMPED

TYPE OF MARK: BM _____ TT _____ TRIANG.
 Lat. 19° 31' 24.578"
 Long. 155° 18' 06.262"
 Elev. 5519 feet
 CONDITION: Disturbed
 Destroyed
 Not Found
 ESTABLISHED BY: USBR
 USC&GS
 USNFS State GS
 USGLO
 USBLM (Other)

REMARKS OR REVISED DESCRIPTION:

The station was recovered in good condition as described in recovery note by D. M. Whipp in 1967. Description adequate.

SUBMITTED BY: Yukio Yamamoto
 TITLE: Cartographer
 AGENCY: USGS

DATE: 1/26/78

GPO 10-54322-6

FILL IN ALL AVAILABLE INFORMATION

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1099
 HAWAII
 LATITUDE 19 °30' TO 20 °00'
 LONGITUDE 155 °00' TO 155 °30'
 DIAGRAM NE 5-1,5 HAWAII

DESCRIPTION
~~RECOVERY NOTE~~ TRIANGULATION STATION

NAME OF STATION: KULANI HGS AZIMUTH MARK
 ESTABLISHED BY: L.A. Critchlow YEAR: 1977 STATE: Hawaii BENCH MARK ALSO
 COUNTY: Hawaii
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 12 miles West of Mountain View
 HEIGHT OF TELESCOPE ABOVE STATION MARK 4 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 4 FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KULANI HGS 1891 RM 1 Geodetic Distance	SSE (10312.31)	3143.199		00 00 00.0
KULANI HGS 1891 Geodetic Distance	(10291.82)	3136.952		00 06 28.8
CAMP INC CABLE TV MAST	SSE About 2 miles			00 30 58.9
HAWAIIAN TELEPHONE CO TOWER	SSE About 2 miles			00 47 34.0

The station is located about 20 miles southwest of Hilo, 12 miles west of Mountain View and at the Kulani Honor Camp.
 To reach the station from the junction of State Highways 19 and 11 which is about 1-1/2 miles east of Hilo. Go south on highway 11 for 4.0 miles to a crossroad and sign, KULANI 19. Turn right and go westerly on Stainback Road for 0.3 mile to a reverse fork on the right, continue westerly on the paved road for 13.55 miles to an iron gate, locked at times, continue westerly on the paved road for 3.2 miles to an iron gate and the entrance to the Kulani Honor Camp. Continue southwest for 0.2 mile to the office building on the right, continue ahead for 0.05 mile to some gas pumps on the left, bear right and go westerly on the gravel road for 0.05 mile to a side road on the right. Turn right on a gravel road and go 0.05 mile, passing to the left of some buildings, then left across rocky terrain for 0.05 mile to a slight rise and the station.
 The station is the center of a 2-1/2 inch iron pipe that is cemented in the center of a tapering concrete pillar that projects about 2 feet above its 5 foot square concrete foundation, with the letters BASE B, inscribed in the foundation. It is 237 feet southwest of a metal light pole and 68 feet northeast of a power pole number 5.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KULANI HGS AZ MK OBS BY NGS
 STATE: HAWAII YEAR: 1977 SECOND ORDER
 SOURCE: G-16241

GEODETIC LATITUDE: 19 53 05.37557	ELEVATION: 1591.6 METERS
GEODETIC LONGITUDE: 155 18 22.87920	5222 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE *
HI 1	5101	566,569.10	260,829.50	+ 0 03 53 "

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
KULANI HGS	351 °06 '55.7	351 °03 '02 "	5101

THESE DATA OBTAINED FROM ADJUSTMENT OF JAN 1979

3M 098

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

AUG 1979
 U. S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1100
 HAWAII
 LATITUDE 19 030' TO 20 000'
 LONGITUDE 155 000' TO 155 030'
 DIAGRAM NE 5-1,5 HAWAII

See Station KULANI HGS

ADJUSTED HORIZONTAL CONTROL DATA ADJUSTMENT BY NGS

NAME OF STATION: KULANI RM 1 OBS BY NGS
 STATE: HAWAII YEAR: 1978 SECOND ORDER

SOURCE: G-16241

GEODETIC LATITUDE:	19 51 24.40699	ELEVATION:	1682.1 METERS
GEODETIC LONGITUDE:	155 13 06.02932		5519 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ FOR Δ θ ANGLE *
HI 1	5101	506,292.33	250,646.02	+ 0 03 59

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

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

THESE DATA OBTAINED FROM ADJUSTMENT OF JAN 1979

SM 099

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

Q 151551 STATION 1101
 HAWAII
 LATITUDE 19° 30' TO 20° 00'
 LONGITUDE 155° 00' TO 155° 30'
 DIAGRAM NE 5-1.5 HAWAII

NO ORIGINAL TEXT

Laimi (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1912).—On east coast of Hawaii in North Hilo, land of Laimi, on main road between Honomu and Pepeekeo, at No. 1 camp of the Honomu plantation. It is about 60 meters (estimated) S. 10° W. from the camp flagpole. The station was marked by a large stone marked with a cross, in center of which is an iron bolt in drill hole. In 1912 it was reported that it was believed that the true position of this station had been permanently lost, and that the mark was 1 meter or more out of place. When standing at camp flagpole the station would appear midway between porch post and corner of nearest house.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION LAIMI
 STATE HAWAII YEAR 1877 THIRD ORDER
 SOURCE G-SP156

GEODETIC LATITUDE:	19 51 56.453	ELEVATION	110	METERS
GEODETIC LONGITUDE:	155 06 32.808	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE*
HI 1	5101	654,314.81	375,048.00	+ 0 07 58

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

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

00 345