

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1001
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

Schofield east base (Oahu Island, L. G. Simmons, 1927).—On the central plateau, about 23 miles from Honolulu, about 1/2 mile south of Wahiawa, about 150 yards east of the railroad tracks, Oahu Railway & Land Co., running into Wahiawa, on the continuation of the tangent going into the Schofield Reservation at Wheeler Field, 20 feet west of the road in front of the yardmaster's house. Marked according to note 1a, a standard disk station mark in concrete post. An underground mark was set according to note 7a, a standard disk station mark in concrete block 3 feet below surface of ground. Reference marks, note 11a, standard reference disks in concrete blocks, are at the following distances and azimuths from station: No. 1, 20.834 meters (68.35 feet), 346° 34'; No. 2, 18.288 meters (60.00 feet), 106° 31'. Re-marked according to note 14A in 1929.

SCHOFIELD EAST BASE (Hawaii, L. G. S., 1927; 477th FA Obsn. Bn., 1945) --About 1/2 mile S of Wahiawa, about 150 yards E of railroad tracks and on the continuation of the railroad, tangent going into Schofield Reservation at Wheeler Field, and 20 feet W of dirt road in front of small house. Station is in brushy field between this dirt road and the railroad tracks.

Station is marked according to Note 14A. Marks are in good condition. (G.A. Nelson, 1953)--Recovered in good condition. Considerable brush has grown up around the station.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: SCHOFIELD EAST BASE
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: HAWAII
 RECOVERED BY: G.A.N. YEAR: 1961 COUNTY: HONOLULU

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. New Description follows:

The station is located in a grove of scrub trees and bushes about 0.2 Mi. S. of the outskirts of the town of Wahiawa, on the E. side of Kanehalehu Highway (State Hwy. 49) and across the highway from Wheeler Air Force Base.

To reach the station from the intersection of California Avenue and Kanehalehu Hwy. in Wahiawa, drive south on Kanehalehu Hwy. for 1.3 Mi. to an asphalt road left (sign reads "U. S. ARMY HELICOPTER CAMP SCHOFIELD"), turn left and proceed about 250 Ft. to trail into the brush on the left, turn left and go about 250 Ft. to station on the left.

The station is marked by a standard triangulation station disk stamped SCHOFIELD EAST BASE 1927 set in top of a concrete monument. A type A Hawaiian Territorial Survey monument is centered over the station mark. Reference marks No. 1 and No. 2 are standard reference mark disks stamped SCHOFIELD EAST BASE 1927 NO 1 and SCHOFIELD EAST BASE 1927 NO 2 respectively and are set in the top 1 Ft. square concrete monuments projecting about 4 In. above the ground surface.

A magnetic station, marked by a standard magnetic station disk stamped SCHOFIELD 1961 and set in top of a 6 In. square concrete monument projecting about 4 In. above the ground surface, was established 59 Ft. West (Az. 100° 26') of this triangulation station.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: SCHOFIELD EAST BASE
 STATE: HAWAII YEAR: 1927 FIRST ORDER
 SOURCE: G-14543

GEODETIC LATITUDE:	21° 29' 01.10775	ELEVATION:	255.48 METERS
GEODETIC LONGITUDE:	158 01 42.34924		858.2 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β FOR Δ & ANGLE *
HI 3	5103	490,333.66	115,137.57	- 0° 00' 38"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
WAIPIO UKA	334° 57' 09.5	334° 57' 47"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 055

(continued on next page)

HORIZONTAL CONTROL DATA

QUAD 211582 STATION 1001

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

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

SCHOFIELD EAST BASE (continued)
U.S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: SCHOFIELD EAST BASE
 ESTABLISHED BY: L.G. Simmons YEAR: 1927 STATE: Hawaii
 RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

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

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
		1963 Distances		
R.M. No. 1	SSE	68.314	20.822	
SCHOFIELD MAGNETIC 1961	W	58.872	17.945	
R.M. No. 2	W	59.985	18.284	

Station mark, both reference marks, and a magnetic station mark were recovered in good condition. A complete description follows:

Station is located about 1 mile airline south of Wahiawa, in the dense brush-covered area along the east side of State Highway 99, across the highway from the east end of Wheeler Air Force Base.

To reach station from the junction of State Highways 80 and 99 at the south edge of Wahiawa, go southerly on State Highway 99 for 0.8 mile to hard-surfaced side road left at sign "LEILEHUA GOLF COURSE". Turn left and go east 0.1 mile to dim track road left. Turn left and go north on dim road, through dense brush, for 0.05 mile to station, on left.

Station mark is a standard disk stamped "SCHOFIELD EAST BASE", set in the top of a 14-inch-square, concrete monument that projects 4 inches. It is 25-1/2 feet west of center line of track road, 60 feet north-northwest of a T-intersection of track roads, about 135 yards east of State Highway 99 and 150 yards north of the Hawaii National Guard Armory.

Reference mark number one is a standard disk stamped "SCHOFIELD BASE E NO 1", set in the top of a 15-inch-square, concrete monument that projects 5 inches. It is located in dense brush, 19-1/2 feet west of center line of track road, opposite T-intersection of track roads, and at same elevation as station mark.

Reference mark number two is a standard disk stamped "SCHOFIELD BASE E NO 2", set in the top of a 15-inch-square, concrete monument that projects 7 inches. It is located in dense brush and is about 1 foot lower than station mark.

Schofield Magnetic Station is a standard magnetic station disk stamped "SCHOFIELD 1961", set in the top of a 6-inch-square, concrete post that projects 4 inches. It is 6-1/2 feet south of reference mark number two and at the same elevation as reference mark number two.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: SCHOFIELD EAST BASE
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: Symms YEAR: 1969 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: About 1 1/2 miles south of Wahiawa

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

The station, R.M. 1 and 2 were recovered in good condition and leveled over in 1969.

To reach from the post office at Wahiawa, go 0.1 mile southeast along Leahu Street, thence 0.2 mile southwest along California Avenue, thence 0.4 mile south along State Highway 80, thence 0.8 mile south along State Highway 99 to sign "LEILEHAU GOLF COURSE", thence 0.1 mile east along an asphalt road, thence 0.05 mile north along a narrow track road through high brush.

The station is a C&GS triangulation station disk, stamped SCHOFIELD EAST BASE. 25 feet west of the center line of a Hawaii National Guard track road, in the top of a concrete post which is under a 5-foot-square concrete platform.
 R.M. 1 is a C&GS reference mark disk, stamped SCHOFIELD NO 1 E BASE. 68.3 feet south of the station, in the top of a concrete post.
 R.M. 2 is a C&GS reference mark disk, stamped SCHOFIELD NO 2 BASE E. 60.0 feet west of the station, in the top of a concrete post.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: SCHOFIELD EAST BASE
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1 mile south of Wahiawa
 HEIGHT OF TELESCOPE ABOVE STATION MARK 64 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 74 FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
WAIPIO UKA 1873 1927				0 00 00.0
RM NO 1	S	68.285	20.813	11 35 04.
SCHOFIELD MAGNETIC 1962	WNW	58.872	17.945	125 28 17.8
RM NO 2	WNW	59.985	18.284	131 33 13
Dist. RM 2 to Schofield Mag.		6.42	1.957	

Station mark, reference marks 1 and 2, Magnetic Station mark were recovered and found in good condition, due to road changes a new and complete description follows.

Station is located about 1 mile south of Wahiawa, on the southeast side of Wheeler Air Force Base, in a dense brush-covered area on the east side of State Highway 99.

To reach from the U.S. Post Office in Wahiawa, go south on Lehuia Street for 0.1 mile to California Avenue, turn right and go westerly on California Avenue for 0.2 mile to the junction of State Highway 80, turn left and go southerly on State Highway 80 to the junction of State Highway 99 and 80, (at the south edge of Wahiawa) turn left on State Highway 99 and go southerly for 0.7 mile to a side road on the left, turn left easterly on a paved road for 0.1 mile to a track road on the left, (just north of the Hawaii National Guard Armory) turn left, northerly on track road for 0.05 mile to the station on the left.

Station mark is a standard disk, stamped SCHOFIELD EAST BASE, set in the top of a 14 inch square concrete monument which is set flush with the surface of the ground. A rock and concrete monument 5 feet 4 inches square and 3 feet 5 inches high has been erected over the mark. It is 25 feet west of the approximate center of a track road, 60 feet north northeast of a T-intersection, 135 yards east of State Highway 99, 150 yards north of the Hawaii National Guard Armory.

Reference mark 1 is a standard disk, stamped SCHOFIELD BASE E NO 1, set in the top of a 15 inch square concrete monument which projects 4 inches above the surface of the ground. It is 19 1/2 feet west of the approximate center of track road, and about the same elevation as the station mark, the brush is very dense in this area.

Reference mark 2 is a standard disk, stamped SCHOFIELD BASE E NO 2, set in the top of a 15 inch square concrete monument, which projects 6 inches above the surface of the ground. Located in dense brush and about 1 foot lower than the station mark.

Schofield Magnetic Station is a standard magnetic station disk, stamped SCHOFIELD 1961, set in the top of a 5 inch square concrete monument, which projects 3 inches above the surface of the ground. It is 6 1/2 feet south of reference mark two and about the same elevation as reference mark number two.

Note: No measurement due to dense brush on line.

* 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.

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

QUAD 211582 STATION 1002
 HAWAII
 LATITUDE 21 ° 30' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION SCHOFIELD EAST BASE

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: SCHOFIELD MAGNETIC

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: C-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 29' 01.21313	ELEVATION:	255.03 METERS
GEODETIC LONGITUDE:	158 01 42.96235		856.7 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β IOR Δ θ ANGLE *
HI 3	5103	450,275.76	115,148.21	- 0 ° 00' 38"

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

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

POSITION DETERMINED BY TRAVERSE FROM STATION SCHOFIELD E B

QH 096

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1003
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Designation	STATE SURVEY 7-1	State	Hawaii	County	Honolulu
Nearest town	Wahiawa	County	Honolulu	Chief of party	C. Symms
Distance and direction from nearest town	0.95 mile south	Leveling date	July 1969	Stamping	7-1 1969
Character of mark	SS disk				
Established by	State of Hawaii	Section			
Detailed description	<p>0.1 mile southeast along Leahu Street from the post office at Wahiawa, thence 0.2 mile southwest along California Avenue, thence 0.4 mile south along State Highway 80, thence 0.25 mile south along State Highway 99, 0.05 mile south of the junction of a road thru the main gate of the Wheeler Air Force Base, 23.9 feet west of the center line of the south bound lanes of the highway, 8.5 feet southwest of a metal light pole, 14.2 feet east of the A.F.B. boundary fence, 5.8 feet southeast of the center of a manhole cover for water valve, about level with the highway, and set in the top of a concrete post flush with the ground.</p>				

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 7-1
 STATE: HAWAII YEAR: 1969 SECOND - ORDER

SOURCE: G-14543
 NO: OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 29' 25.63574	ELEVATION:	259.96 METERS
GEODETIC LONGITUDE:	158 ° 01' 50.97549		852.9 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE *
HI 3	5103	489,519.45	117,612.62	- 0 ° 00' 41"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
SCHOFIELD EAST BASE	341 ° 46' 44.8"	341 ° 47' 25"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION SCHOFIELD E B

QH 097

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1005
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: WHEELER AFB CONTROL TOWER BEACON

CHIEF OF PARTY: Carl A. Annis YEAR: 1969 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object:

The station is the beacon on top of the control tower, which is located on Wheeler Air Force Base on the north edge of the main runway at the center of a large hangar, across the street from the Command Headquarters Building Number 108. The control tower is a small house painted red and white, with the airport beacon on top. It is 60 feet high.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WHEELER AFB CONTROL TOWER BCN

STATE: HAWAII YEAR: 1969 THIRD ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 29' 05.02924	ELEVATION:	METERS
GEODETIC LONGITUDE:	158 02 42.08770		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ ϕ ANGLE °
HI 3	5103	484,691.80	115,534.58	- 0 ° 00' 59"

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

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

QH 099

JUN 1978

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

HORIZONTAL CONTROL DATA

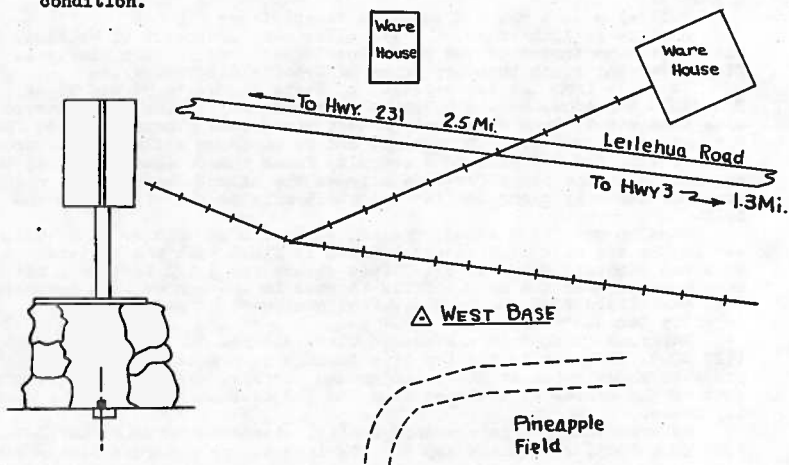
by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211582 STATION 1006
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

Schofield west base (Oahu Island, L. G. Simmons, 1927).—On the central plateau, about 23 miles from Honolulu, about 150 feet south of the southern edge of the Schofield Reservation, southeast of the Nineteenth Infantry Barracks, at the western edge of the tangent of the Oahu Railway & Land Co. tracks entering the reservation at Wheeler Field, about 225 feet west of point of tangency of curve, 24 feet south of tracks and on the edge of an old pineapple field. Marked according to note 1a, a standard disk station mark in concrete block. The underground mark, note 7a, is a standard disk station mark in concrete block 3 feet below surface of ground. Reference marks, note 11a, standard reference disks in concrete blocks, are at the following distances and azimuths from station: No. 1, 65.950 meters (216.37 feet), 281° 13'; No. 2, 44.855 meters (147.16 feet), 191° 38'. Re-marked according to note 14A in 1929.

SCHOFIELD WEST BASE (Hawaii, L.G.S., 1927; 477th FA Obsn. Bn., 1948)
--From the intersection of Highways 231 and 3 at Wheeler Field, proceed SW via Highway 3 for 0.4 mile to junction with railroad track and paved road leading NW, thence NW via paved road for 1.3 miles to intersection of railroad track across paved road and station site.
Station is 24 feet S of railroad, 15 feet N of dirt road (center-line) around pineapple field, and 180 feet S of paved road.

Station is marked according to Note 14A. Mark found in good condition.



(G.A.Nelson, 1953)--Recovered in good condition. It is at the edge of a pineapple field.

(11-76-80)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: SCHOFIELD WEST BASE
ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: HAWAII
RECOVERED BY: C.D.U. YEAR: 1961 COUNTY: HONOLULU

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 marks, which fall within the cultivated area of the pineapple field, were not recovered. New description follows:

The station is located about 2 1/2 Mi. WSW of the town of Wahiawa in the pineapple field along the south boundary of the main Schofield Barracks area.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: SCHOFIELD WEST BASE

STATE: HAWAII

YEAR: 1927

FIRST

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 29 ' 20.80795	ELEVATION:	278.13 METERS
GEODETIC LONGITUDE:	158 04 11.81550		912.5 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β ° OR Δ β ANGLE °
HI 3	5103	476,218.28	117,129.78	- 0 ° 01 ' 32 "

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
AZIMUTH MARK	289 ° 14 ' 25.1	289 ° 15 ' 57 "	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 100

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1006

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

SCHOFIELD WEST BASE (continued)

To reach the station from the intersection of California Ave. and Kanehameha Hwy. in Mahiawa, drive S. on Kam Hwy. (State Hwy. 80) for about 0.4 Mi. to junction of Kam Hwy. and Wilikina Drive (State Hwy. 99), bear right and follow Wilikina Drive for 0.8 Mi. to a traffic light at the junction of Wilikina Drive and Kunia Road (State Hwy 75), turn left and follow Kuria Road in a S'ly direction for 1.7 Mi. to asphalt surfaced road right at a facility of the Del Monte Canning Co., turn right and follow the paved road and the main pineapple road in a N'ly direction for about 1 Mi. to the fence along the S. side of Schofield Barracks, bear left and follow the fence in a WNW'ly direction for about 0.6 Mi. to the station on the left.

The station is marked by a standard triangulation station disk stamped SCHOFIELD WEST BASE 1927 set in the top of a concrete monument. Terr. Survey Mon. is centered over Sta. mark.

FORM 526a
 (2-18-68)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: SCHOFIELD WEST BASE
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii
 RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK 2.8 METERS, HEIGHT OF LIGHT ABOVE STATION MARK METERS.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
WAIPIO UKA 1873 1927				00 00 00.0
R.M. No. 4	NNW	177.753	(54.179)	218 20 31
R.M. No. 3	NE	158.808	(48.405)	286 17 07
Waipio Uka Water Tank 1957	SE			358 03 49.2

Station mark was recovered in good condition. A search was made for the reference marks by distance and angle, but they were not recovered. Two new reference marks, numbers three and four, were established. A complete description follows:

Station is located about 2-1/2 miles airline west-southwest of Wahaiawa and 2 miles north-northwest of the Kunia post office, in a pineapple field along the south side of the Schofield Barracks boundary fence, about opposite building No. 2138.

To reach station from the junction of State Highways 99 and 75 at Schofield Barracks, go southwest on State Highway 75 for 1.7 miles to

side road right, at top of grade. Turn right and go 0.15 mile; take right fork, up over rise and down across deep ravine, for 0.9 mile; bear left and go west on field road along the Schofield boundary fence for 0.65 mile to station on left.

Station mark is a standard disk stamped "SCHOFIELD W BASE 1927", set in the top of a 12-inch-square, concrete monument flush with the ground. It is 142 feet south of the fence, along the first field road, and 45 yards east from west end of pineapple field. A Territory of Hawaii Survey signal is centered over the mark. The concrete floor is 4 feet above ground and the metal target extends 7 feet above the floor.

Reference mark number three is a standard disk stamped "SCHOFIELD WEST BASE NO 3 1927 1963", set in the top of an 11-inch-square, concrete monument projecting 3 inches above ground. It is 1.2 feet south of the fence, 78.6 feet east of the east gatepost of a large gate, 17.6 feet southeast of a 3-foot eucalyptus tree, 14.6 feet north of center line of field road and 1.8 feet higher than station mark.

Reference mark number four is a standard disk stamped "SCHOFIELD WEST BASE NO 4 1927 1963", set in the top of an 11-inch-square, concrete monument that projects 4 inches above ground. It is 1.2 feet south of the fence, 97.6 feet west of the west gatepost of the large gate, and 3.4 feet lower than station mark.

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

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

USCOMM-DC 37178-P88

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: SCHOFIELD WEST BASE
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2 1/2 miles WSW of Wahaiawa.
 HEIGHT OF TELESCOPE ABOVE STATION MARK 90.0 FEET. HEIGHT OF LIGHT ABOVE STATION MARK FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
MAILI 1874 1927				0 00' 00.0
R.M. 4	WNW	178.02	(54.259)	17 43 36
R.M. 3	NE	158.61	(48.345)	85 39 44
Azimuth Mark	ESE		(0.5 mile)	143 34 39.0
Waipio Uka Water Tank 1957	SE		(4 1/2 miles)	157 26 41.0

No measurement between reference marks due to field vegetation. Station mark, reference marks 3 and 4 were recovered as described and found in good condition. The direction to the reference marks checked but a difference was noted in the distance to both reference marks and was checked in the field. An azimuth mark was established at this time.

Following is a new and complete description:

Station is located about 2 1/2 miles west-southwest of Wahaiawa, 2.0 miles north-northwest of the Kunia Post Office and is in a pineapple field near the south boundary fence of Schofield Barracks.

To reach from the intersection of State Highway's 99 and 75 at Schofield Barracks, go southwest on State Highway 75 for 1.6 miles to a side road right, turn right and go west along some pineapple sheds for 0.1 mile to a crossroad, turn right and go north on a field road, crossing a ravine for 0.9 mile to a security fence thence westerly along the south side of the fence for 0.15 mile to the azimuth mark on the right, continue westerly along the fence for 0.5 mile to the station on the left.

Station mark is a standard disk, stamped SCHOFIELD W. BASE 1927, set in the top of a concrete post which is flush with the surface. A rock and concrete monument 5 1/2 feet square and 3 1/2 feet tall has been erected over the mark. It is located in the center of a northwest-southeast field road and is 140.0 feet southwest of a gate in the security fence.

Reference mark 3 is a standard disk, stamped SCHOFIELD WEST BASE 1927 NO 3 1963, set in the top of a 10-inch square concrete post which projects about 4 inches above the ground surface. It is 12.0 feet north-east of the center of a bladed road and 1.2 feet southwest of the security fence.

Reference mark 4 is a standard disk, stamped SCHOFIELD WEST BASE 1927 NO 4 1963, set in the top of a 12-inch square concrete post which projects about 6 inches above the ground surface. It is 13.0 feet north-east of the center of the road and 1.2 feet southwest of the security fence.

Azimuth mark is a standard disk stamped SCHOFIELD W BASE 1927 1969, set in the top of a 12-inch round concrete monument which is flush with the ground surface. It is 11.0 feet NE of the center of a bladed road, 2.1 feet NW of a metal witness post and 1.8 feet SW of a security fence.

FORM C&G-526a (12-68)
 USCOMM-DC 36261-P88

ICE
 NOAA
 COAST AND GEODETIC SURVEY

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1007
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION SCHOFIELD WEST BASE

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-12

STATE HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 28' 47.76703	ELEVATION:	260.5 METERS
GEODETIC LONGITUDE:	158 03 26.50248		855 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ θ ANGLE*
HI 3	5103	480,496.45	113,794.17	- 0° 01' 16"

* 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
SCHOFIELD WEST BASE	127° 55' 18.5"	127° 56' 34"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION SCHOFIELD W B
 AND CHECKED BY ADDITIONAL OBSERVATIONS

QH 101

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1008
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 30' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

FORM 325
 (8-18-59)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY
DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: KUNIA STATE: Hawaii COUNTY: Honolulu
 CHIEF OF PARTY: C.A. Annis YEAR: 1969 DESCRIBED BY: L.B. Gittings

NOTE	HEIGHT OF TELESCOPE ABOVE STATION MARK METERS, ¹	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
		BEARING	DISTANCE		DIRECTION ¹
			FEET	METERS	
1b /	SURFACE-STATION MARK				
7a /	UNDERGROUND-STATION MARK				
	OBJECT				
11b /	WAIPIO UKA 1873 1927 /				0 00 00.0
	R.M. 1 /	S /	29.68	9.048	90 45 59
	KUNIA, KAHU RADIO STA MAST /	SSW /	(0.25 mile)		104 15 00.7
11b /	R.M. 2 /	N /	29.04	8.853	271 49 50
	R.M. 1 to R.M. 2 /		58.725	17.900	

Detailed description:
 The station is located about 5 1/4 miles northwest of Waipahu, 4 1/2 miles southeast of Wahiawa and 1 mile south of Kunia Camp on the west side of State Highway 75.
 To reach the station from the junction of State Highway 75 and State Highway 99 at Schofield Barracks, go south on State Highway 75 for 2.6 miles to a caution light at the small settlement of Kunia Camp. Continue ahead on State Highway 75 for 0.9 mile to the station on the right.
 The station mark is a standard disk, stamped KUNIA 1969, set in the top of a 12-inch round concrete monument which projects 1 inch above the ground surface. It is 31 feet west of the center of State Highway 75, 9 feet east of the center of a bladed dirt road, 5 feet west of the edge of a cut bank, and 3.5 feet northwest of a metal witness post.
 Reference mark 1 is a standard disk, stamped KUNIA NO 1 1969, set in the top of a 12-inch round concrete monument which projects 1 inch above the ground surface. It is 30 feet west of the center of the highway, 27.5 feet south of the metal witness post, 9 feet east of the center of the bladed dirt road, and 5 feet west of the edge of the cut bank.
 Reference mark 2 is a standard disk, stamped KUNIA NO 2 1969, set in the top of a 12-inch round concrete monument which projects 1 inch above the ground surface. It is 31 feet west of the center of the highway, 31.2 feet north of the metal witness post, 9 feet east of the center of the bladed dirt road and 5 feet west of the edge of the cut bank.
 No azimuth mark was set at this station as the Waipahu KAHU Radio Station Mast which is about 0.25 mile south-southwest of the station will serve as an azimuth.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KUNIA
 STATE: HAWAII YEAR: 1969 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE	21 26 51.7241z	ELEVATION	267.8 METERS
GEODETIC LONGITUDE:	158 03 45.7762l		875 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ ANGLE
HI 3	5103	478,671.42	102,086.05	- 0 01' 23"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
WAIPIO UKA	265 44 26.5	265 45 49	5103
SCHOFIELD EAST BASE	221 45 34.5	221 46 57	5103

QH 102

¹Refer to notes in manuals of triangulation and state publications of triangulation. ²Direction-angle measured clockwise, referred to initial s. ³To nearest meter only, when no trigonometric leveling is being done.

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

QUAD 211582 STATION 1005
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 411 OAHU

SEE STATION KUNIA

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-10

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 26 ' 29.87517	ELEVATION:	250	METERS
GEODETIC LONGITUDE:	158 03 44.18300	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ ± ANGLE °
HI 3	5103	478,821.05	99,881.42	- 0 01 22

* 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
KUNIA	176 ° 05 ' 40.0	176 ° 07 ' 02 "	5103

POSITION DETERMINED BY TRAVERSE FROM STATION KUNIA

QH 103

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

QUAD 211582 STATION 1010
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION KUNIA

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-11
 STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 27' 53.14083	ELEVATION:	255 METERS
GEODETIC LONGITUDE:	158 03 33.41401	NO CHECK	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ 10R Δ θ 1 ANGLE *
HI 3	5103	479,841.59	108,282.59	- 0° 01' 18"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From 1000b)	PLANE AZIMUTH * (From 1000b)	CODE
KUNIA	10° 40' 20.3"	10° 41' 58"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION KUNIA

QH 104

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

QUAD 211582 STATION 1011
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: **KUNIA. RADIO STA KAHU MAST**
 CHIEF OF PARTY: **Carl A. Annis** YEAR: **1969** STATE: **Hawaii** COUNTY: **Honolulu**

Description, including sketch of object:

The station is the red light on top of the mast, located about three miles south of Schofield Barracks, one mile southeast of Kunia Post Office, about 300 feet south of triangulation station KUNIA, and on the west side of Plantation Drive. It is a three-sided steel structure about 210 feet high.

FORM C&GS-525b (12-68)

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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **KUNIA RADID STA KAHU MAST**
 STATE: **HAWAII** YEAR: **1969** **THIRD** ORDER
 SOURCE **G-14543**

GEODETIC LATITUDE:	21° 26' 43.57893	ELEVATION:	METERS
GEODETIC LONGITUDE:	158 03 47.30877		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE *
HI 3	5103	478,526.31	101,264.26	- 0° 01' 23"

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

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

QH 105

HORIZONTAL CONTROL DATA

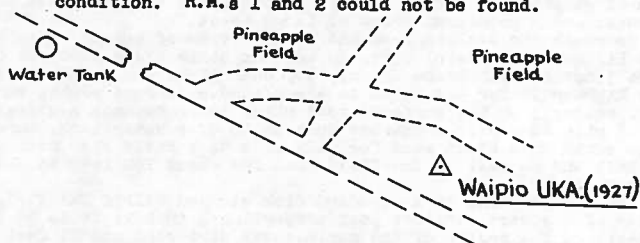
by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1013
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Waipio Uka (Oahu Island, Hawaiian Government Survey, 1873; L. G. Simmons, 1927).—Station also known by name of Waipio Mauka. About 4 miles north of Waipahu, about 8,000 feet north of where the road (main Schofield Road) to Waialua crosses the deep Kipapa Gulch, and about ¼ mile east of that road, on summit of low prominent hill. To reach by car, turn to right off Schofield road at the summit between Kipapa and Waikakalaua Gulches, and drive up to station, crossing an irrigation ditch just below station. Originally marked by concrete post with cross in top. In 1927 the concrete post was surrounded with concrete and a standard disk station mark centered over cross, note 1a. Reference marks, note 11a, standard reference disks in concrete blocks, are at the following distances and azimuths from station: No. 1, 99.900 meters (327.76 feet), 0° 48'; No. 2, 150.34 meters (493.24 feet), 119° 16'. Re-marked according to note 14A in 1929.

WAIPIO UKA (Hawaii, Hawaiian Government Survey, 1873; 477th FA Obsn. Bn., 1945)
 From intersection of Ditch and Highway 1 at Waipio Camp A, proceed SE via Highway 1 for 0.2 mile to intersection of dirt road running SW and NE, thence NE via dirt road 0.2 mile to intersection with dirt road running NW and SE, thence SE via dirt road 0.7 mile to station site in pineapple field.
 Station is marked according to Note 14A. Marks are in good condition. R.M.s 1 and 2 could not be found.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION WAIPIO UKA
 STATE HAWAII YEAR 1873 FIRST ORDER
 SOURCE G-14543

GEODETIC LATITUDE: 21 ° 27' 04.36580	ELEVATION 219.0 METERS
GEODETIC LONGITUDE: 158 00 44.07900	718 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	# OR Δ # ANGLE °
HI 3	5103	495,836.05	103,357.50	- 0 ° 00' 16"

* 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
WAIMANO	286 ° 44' 19.6"	286 ° 44' 36"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

FORM 524a
 (9-5-56)

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

R

Name of Station: WAIPIO UKA
 Established By: H.G.S. Year: 1873 State: Hawaii
 Recovered By: W.R.P. Year: 1960 County: Honolulu

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

Station was recovered as previously described. Following is a new routing to the station.

To reach from the junction of State Highways 90 and 99 in the north edge of Pearl City, go north on State Highway 99 for 5.1 mile to a side road right, turn right on black top road for 0.6 mile to a fork, take right fork, graded road for 0.05 mile to a water tank in pineapple field, turn sharp right on graded road for 0.3 mile to a side road left, turn left on graded road for 0.05 mile to the station.

(continued on next page)

QH 107

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1013

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

WAIPIO UKA (continued)

(11-8-55) U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: WAIPIO UKA
 ESTABLISHED BY: HGS YEAR: 1873 STATE: HAWAII
 RECOVERED BY: HJS YEAR: 1961 COUNTY: HONOLULU

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 marks were not searched for.

The station is the pipe on Type A Hawaiian Territory survey monument. To reach the station from the intersection of State Highways 90 and 99 at the north edge of Pearl City, go north on Highway 99 for 4.6 miles to a paved road right leading to a group of houses. Turn right on road leading to front of houses and follow to end. Park east 100 yards behind houses to pineapple field and station.

FORM 555
 (11-8-55) U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: WAIPIO UKA
 ESTABLISHED BY: H.G.S. YEAR: 1873 STATE: Hawaii
 RECOVERED BY: C.A. Burroughs YEAR: 1962 COUNTY: Honolulu

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

The station mark was recovered as described and in good condition. The reference marks were not recovered.

The station was visited by a lightkeeper only. The "to reach" is adequate.

FORM 324a
 (10-10-59) U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY
RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: WAIPIO UKA
 ESTABLISHED BY: HGS YEAR: 1873 STATE: Hawaii
 RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

Station mark was recovered in good condition. A search was made by distance and angle for the reference marks, but they were not found. There is a large irrigation canal in the area where reference mark number one was located and in the vicinity of reference mark number two there is now a row of houses. Both marks have probably been destroyed. The station is in a well-protected location, set aside by the pineapple company, and also, because of the pineapple fields there is no suitable location, so no new reference marks were established. A complete description follows:

Station is located, airline, about 3-1/2 miles south of Wahiawa, 4 miles north of Waipahu, and 570 yards east of Kamehameha Highway, at about 719 feet elevation, in a pineapple field on a rise at east side of a row of white houses and prominent grove of large trees.

To reach station from the traffic light at the junction of Lehua Avenue and State Highway 90 in Pearl City, go west on State Highway 90 for 0.6 mile; take right fork and go northwest on State Highway 99 for 5.1 miles to narrow, asphalt, side road right, at top of rise and sign "NOB HILL TURN HERE". Turn right and go easterly for 0.3 mile; take left fork, straight ahead, for 0.05 mile to crossroad. Turn right and go southerly for 0.25 mile to station on left.

Station mark is a standard disk, stamped "WAIPIO UKA 1927", set in the top of a 12-inch-square, concrete monument that projects about 3 inches above ground. It is 105 feet east of center line of road along west side of field, 0.3 mile south of silver, elevated, water tank, and set in a small, triangular plot in the pineapple field. There is a Hawaiian Territorial Survey "Type A" signal centered over the station mark, with the concrete platform about 4 feet above ground.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: WAIPIO UKA
 ESTABLISHED BY: H.G.S. YEAR: 1873 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3 1/2 miles south of Wahiawa.
 HEIGHT OF TELESCOPE ABOVE STATION MARK 16 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 16 FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
WAIMANO				° 00' 00"
RM 3	SW	119.93	(36.554)	134 01 15
	W	(3 1/2 miles)		156 21 42.5
RM 4	NW	151.07	(46.046)	181 23 40

The station mark was recovered as described and found in good condition. Reference marks 3 and 4 were established at this time. A new description follows.

The station is located about 3 1/2 miles south of Wahiawa, 4 miles north of Waipahu, on a rise in a pineapple field and just east of a row of houses and a prominent grove of large trees.

To reach the station from the intersection of Waimano Home Road and State Highway 90 in Pearl City, go west on State Highway 90 for 0.6 mile to the junction with State Highway 99, bear right and go northwest on State Highway 99 for 5.1 miles to a surfaced side road right, turn right and go easterly on the surfaced road which later becomes a graveled road for 0.3 mile to a dirt crossroad just south of a water tank, turn right and go south on a field road for 0.25 mile to a field side road left, turn left and go east on the field road for about 100 feet to the station as described.

The station mark is a standard disk stamped WAIPIO UKA 1927, set in the top of a square concrete post projecting 4 inches. It is 88 feet northeast of the center of the north-south dirt road and 21 feet northwest of the center of the east-west dirt road. There is a "Type A" Hawaii Territorial Survey Signal constructed over the mark.

Reference mark 3 is a standard disk stamped WAIPIO UKA 1873 1927 NO 3 1969, set in the top of a round concrete post projecting 4 inches. It is 23 feet southwest of the center of the north-south dirt road and 1 foot southeast of the south end of a hedgerow.

Reference mark 4 is a standard disk stamped WAIPIO UKA 1873 1927 NO 4 1969, set in the top of a round concrete post projecting 4 inches. It is 90 feet southeast of powerline pole number 35 20, 19 feet southwest of the center of the north-south dirt road and 1 foot east of the north end of the Hedgerow.

The reference marks were not measured between due to a portion of the hedgerow being on line.

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

FORM CGS-324a (11-55)
 USCOMM-DOC 21291-P-58

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1014
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION WAIPIO UKA

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-14
 STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 28' 47.78847	ELEVATION:	244	METERS
GEODETIC LONGITUDE:	158 01 15.04876	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ 'OR Δ ' θ ANGLE °
HI 3	5105	492,911.87	113,793.23	- 0° 00' 28"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
WAIPIO UKA	344° 20' 20.5"	344° 20' 48"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAIPIO UKA

QH 108

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

QUAD 211582 STATION 1015
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION WAIPIO UKA

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-15
 STATE: HAWAII YEAR: 1969 ORDER: SECOND

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 28' 35.05930	ELEVATION:	247 METERS
GEODETIC LONGITUDE:	158 00 26.40283	NO CHECK	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ IOR Δ θ I ANGLE *
HI 3	5103	497,506.27	112,508.44	- 0 ° 00' 10"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From 1983)	PLANE AZIMUTH * (From 1983)	CODE
WAIPIO UKA	10 ° 20' 27.6"	10 ° 20' 37"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAIPIO UKA

QH 105

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

QUAD 211582 STATION 1016
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION WAIPIO UKA

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-16
 STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 28' 04.55817	ELEVATION:	234	METERS
GEODETIC LONGITUDE:	158 00 00.75630	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE*
HI 3	5103	499,928.56	109,430.79	- 0° 00' 00"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
WAIPIO UKA	35° 58' 26.9"	33° 58' 27"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAIPIO UKA

QH 110

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1017
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Designation	STATE SURVEY 9-17	State	Hawaii	County	Honolulu
Nearest town	Wahiawa	County	Honolulu	Chief of party	C. Symms
Distance and direction from nearest town	4.5 miles southeast	Leveling date	July 1969	Stamping	9-17 1969
Character of mark	SS disk				
Established by	State of Hawaii				

Detailed description
 Section , T , R
 0.1 mile southeast along Lehua Street from the post office at Wahiawa, thence 0.2 mile southwest along California Avenue, thence 0.4 mile south along State Highway 80, thence 3.8 miles south-east along State Highway 99, at the "Y" junction of a dirt road to a field, at the north end of a guardrail, on the outside of a curve, 22.1 feet east of the center line of the north bound lanes of the highway, 10 feet west of the west bank of an irrigation ditch, 16.7 feet southwest of the south end of a rock retaining wall of the ditch, 5.1 miles northwest of Pearl City, about level with the highway, and set in the top of a concrete post flush with the ground.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-17
 STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 26' 42.51080	ELEVATION:	178.97 METERS
GEODETIC LONGITUDE:	158 00 55.99062		587.2 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE *
HI 3	5103	494,710.55	101,152.42	- 0 00 21 "

* 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
WAIPIO UKA	207 ° 02' 01.4	207 ° 02' 22 "	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAIPIO UKA

QH 111

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1018
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Form 528
 (11-8-65)

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

NAME OF STATION: Waipio Uka, Water Tank
 ESTABLISHED BY: HTS YEAR: 1957 STATE: Hawaii
 RECOVERED BY: D.G. Rushford YEAR: 1964 COUNTY: Honolulu

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 a silver-colored, elevated tank, supported by 4 "I-beam" steel legs. Base of tank is 27 feet above ground, top of tank is 50 feet above ground, and it is about 20 feet in diameter. Tank has a rounded bottom and a peaked top, with a silver ball on top. Located about 3-1/2 miles south-southeast of Wahiawa and 0.3 mile east of State Highway 99, in a pineapple field, about 1/4 mile north of a small group of white houses and grove of Norfolk Pines.

RECOVERY NOTE, TRIANGULATION STATION
INTERSECTION

NAME OF STATION: WAIPIO UKA WATER TANK
 ESTABLISHED BY: HTS YEAR: 1957 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: Carl A. Annis YEAR: 1969 COUNTY: Honolulu

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:

The intersection station was recovered in good condition as described by D. G. Rushford in 1964.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WAIPID UKA WATER TANK

STATE: HAWAII

YEAR: 1957

THIRD

ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21 ° 27' 17.83791	ELEVATION: METERS
GEODETIC LONGITUDE: 158 00 50.43811	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE °
HI-3	5103	495,235.46	104,716.85	- 0 ° 00' 18"

* 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 OCT 1971

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1019
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

FORM 525
 (6-16-69)

U. S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **POHAKU** STATE: **Hawaii** COUNTY: **Honolulu**
 CHIEF OF PARTY: **C.A. Annis** YEAR: **1969** DESCRIBED BY: **D.A. Bowling**

DESCR NONE	SURFACE-STATION MARK, UNDERGROUND-STATION MARK	BEARING	DISTANCE		DIRECTION: ° 00 00.0
			FEET	METERS	
	WAITMANO				
desc	R.M. NO 1	SSE	20.67	6.300	78 49 04
desc	R.M. NO 2	NNW	30.43	9.275	258 23 56
	Distance between RM 1 to RM 2		51.10	15.575	

The station is located about 6 miles south-southeast of Wahiawa, 2 1/2 miles northwest of Pearl City, 2 1/4 miles northeast of Waipahu, set on top of a concrete reservoir.

To reach from the intersection of Waimano Home Road and Kamehameha Highway (State Highway 99) in Pearl City, go west and northerly on State Highway 99 for 2.4 miles to a bladed crossroad. Turn right and go north-east on bladed road for 0.45 mile to a concrete reservoir enclosed by a cyclone fence and station on top. The reservoir is approximately 20 feet high and a ladder is needed to reach the top. A key is needed and can be obtained from Honolulu Water Department.

Station mark, a standard disk stamped POHAKU 1969, cemented in a drill hole set in the top of a concrete water reservoir. It is 8.3 feet east of the west edge of the reservoir, 23.1 feet north of a metal trap door leading into water tank.

Reference mark 1, a standard disk stamped POHAKU NO 1 1969, cemented in a drill hole set in the top of a concrete reservoir. It is 4.5 feet northwest of a metal trap door leading into water tank, 7 feet east of the west edge of the reservoir.

Reference mark 2, a standard disk stamped POHAKU NO 2 1969, cemented in a drill hole set in the top of a concrete reservoir. It is 1.2 feet east of the west edge of the reservoir, 53.2 feet north of a metal trap door leading into water tank.

State of Hawaii Survey Station Mark was used for a azimuth mark, it is a standard station mark disk stamped 6-18 1969 set in the top of a 8 inch square concrete monument set flush with the surface of the ground. It is 85 feet east of a light pole, 34 feet east of the center of State Highway 99, set about 4 feet higher than the road on the east side of the road.

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

USCOMA-DC 27171-P49

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **POHAKU**
 STATE: **HAWAII** YEAR: **1969** FIRST ORDER

SOURCE: **G-14543**

GEODETIC LATITUDE:	21° 25' 14.76733	ELEVATION:	121.0 METERS
GEODETIC LONGITUDE:	158° 00' 04.36477		397 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ 01 ANGLE
HI 3	5103	499,587.59	92,298.81	- 0 00 02

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ HOR Δ 01 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
WAITMANO	256° 00' 46.7	256° 00' 48	5103
STATE SURVEY 9-18	112° 20' 29.6	112° 20' 31	5103

QH 113

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1020
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Designation	STATE SURVEY 9-18	State	Hawaii	County	Honolulu	Chief of party	G. Symms
Nearest town	Pearl City	County	Honolulu	Levelling date	July 1969	Stamping	9-18 1969
Distance and direction from nearest town	3.35 miles northwest	Section	T	R			
Character of mark	SS disk						
Established by	State of Hawaii						
Detailed description	0.6 mile west along State Highway 90 from the intersection of Waimano Home Road at Pearl City, thence 2.75 miles northwest along State Highway 99, 0.1 mile southeast of the junction of a paved road northeast to Mililani Memorial Park, 34.0 feet northeast of the center line of the highway, 60.5 feet northeast and across the highway from light pole No. 513-H 400, 109 feet west-northwest of a 40-inch tree, 108 feet south of a 36-inch tree, 149.0 feet northwest of a metal post bearing "SPEED ZONE AHEAD" sign, about 2 feet higher than the highway, and set in the top of a concrete post flush with the ground.						

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-18

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 25' 25.96370	ELEVATION:	128.06 METERS
GEODETIC LONGITUDE:	158 00 33.46018		420.1 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE *
HI 3	5103	496,838.57	93,428.62	- 0° 00' 12"

* 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
POHAKU	292° 20' 19.0	292° 20' 31"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION POHAKU
 AND CHECKED BY ADDITIONAL OBSERVATIONS

QH 114

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211562 STATION 1021
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 535
 REV. AUG. 1965

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **KAPU ASTRO** STATE: **Hawaii** COUNTY: **Honolulu**

CHIEF OF PARTY: **R.E. Alderman** YEAR: **1961** Described by: **REA**

NOTE	HEIGHT OF TELESCOPE ABOVE STATION MARK ↓ METERS.1	HEIGHT OF LIGHT ABOVE STATION MARK ↓ METERS.	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
			OBJECT	BEARING	DISTANCE	
1a	Surface-station mark					
7a	Underground-station mark					
				feet	meters	
						0 00 00.0
						76 03 22.2
12a	RM 1		47.86	14.585		163 02 20.0
11a	RM 2		55.05	16.780		292 26 33.4

Station is about 5 air miles northwest of the town of Ewa and about 1/4 mile south of the summit of Palikea Mountain.

To reach from the junction of state routes 76 and 90, about 1.8 miles west of Waipahu, go west on state route 90 for 2.0 miles to a side road on right; take this side road as per sign, "Sites 6 & 7", on blacktop road, for 4.7 miles to a side road left leading into the missile sites; continue straight ahead, on main travelled road for 0.7 mile to a locked gate; continue straight ahead for 0.2 mile to a fork; take right fork and continue on main road for 2.7 miles to top of a cleared, narrow ridge, just before end of road, to the station on right.

Station mark, a standard disk in a concrete monument is about 2 feet from east edge of pavement, and about 6 feet from edge of ridge. It is stamped KAPU ASTRO 1961. Monument project about 2 inches above ground.

Reference mark 1 is a standard C&GS reference mark disc set in a drill hole in bedrock and is stamped KAPU ASTRO NO 1 1961. It is about 10 feet from west edge of pavement.

Reference mark 2 is a standard C&GS reference mark disc set in a concrete monument and is stamped KAPU ASTRO NO 2 1961. It is about 6 feet from west edge of pavement.

* Refer to notes in manuals of triangulation and state publications of triangulation. 1 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: **KAPU ASTRO**

STATE: **HAWAII**

YEAR: **1961**

FIRST

-ORDER

SOURCE: **G-14543**

GEODETIC LATITUDE:	21° 24' 20.33614	ELEVATION:	630.9 METERS
GEODETIC LONGITUDE:	158 06 02.99680		2726 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE
HI 3	5103	465,698.47	86,818.01	- 0 02 13

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE β OR Δ OR Δ₁ FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
WAIPIO UKA	241° 12' 18.8	241° 14' 51"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 115

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1021

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

KAPU ASTRO (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

FORM 526a
 (6-18-69)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAPU ASTRO
 ESTABLISHED BY: R.E.A. YEAR: 1961 STATE: Hawaii
 RECOVERED BY: D.G. Rushford YEAR: 1964 COUNTY: Honolulu

NAME OF STATION: KAPU ASTRO
 ESTABLISHED BY: R.E.A. YEAR: 1961 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 6 miles northwest of Ewa

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

Station mark, reference marks 1 and 2 were recovered and found in good condition. Distance and direction checked.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
WAIPIO UKA 1873 1927				00 00 00.0
R.M. No. 1	SW	47.857	14.588	163 02 40
R.M. No. 2	N	55.093	16.793	292 26 03

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
WAIPIO UKA 1873 1927				00 00 00.0
R.M. NO. 1	SW	47.86	14.588	163 02 09
R.M. NO. 2	N	55.09	16.793	292 27 25

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

Station is located about 6 miles airline northwest of Ewa, 6 miles west of Waipahu, and 1/4 mile south of the summit of Mauna Kapu; along the east side of a hard-surfaced road on a very narrow-topped part of the ridge in an open gap about 50 yards long on the otherwise ironwood-covered ridgeline.

To reach station from the junction of State Highways 76 and 90 about 2 miles west of Waipahu, go west on State Highway 90 for 2.0 miles to macadam side road right, at sign "NIKE SITE 63 and 78". Turn right and

follow main road upgrade for 5.5 miles to fork. Take right fork for 0.05 mile to locked gate. Pass through gate and continue for 2.0 miles to a 3-pronged fork at F.A.A. building No. 203. Take extreme right fork and go 0.6 mile to station on right, 0.1 mile before reaching a communications building at end of road.

Station mark is a standard disk stamped "KAPU ASTRO 1961", set in the top of a 12-inch-square, concrete monument that projects 2 inches above ground. It is 4 feet east of edge of road, 55 feet north of the north end of a prominent rock bluff running along the west side of the road, and 23.5 feet southeast of the center of the crossbar of a large, white, painted, diagonal "H" extending the width of the road, with a large "80" painted on each side of it. Station is directly in line with a row of old wooden guardrail posts, now sawed off a few inches above ground.

Reference mark number one is a standard disk stamped "KAPU ASTRO NO 1 1961", cemented in a drill hole in an 8-inch, triangle-shaped bedrock outcrop that projects 2 inches above ground. It is 20 feet north of end of rock bluff, 4 feet east of edge of ridge, about 3 feet higher than the road, and 0.3 foot higher than station mark.

Reference mark number two is a standard disk stamped "KAPU ASTRO NO 2 1961", set in the top of a 12-inch-square, concrete monument that is about 2 inches below ground surface. It is at the south side of a large, lone bush, 32 feet northwest of the center of the painted H, 6 feet west of edge of road, and 0.6 foot lower than station mark.

NOTE: Key for locked gate was obtained from the office of Campbell Estate in Honolulu.

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

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

FORM CGS-526 (6-61)
 USCOM-DC 28486-P48

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

USCOM-DC 27

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1022
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: PALIKEA STATE: Hawaii COUNTY: Honolulu
 CHIEF OF PARTY: C.A. Annis YEAR: 1969 DESCRIBED BY: H. Ellwanger

NOTE. desc.	HEIGHT OF TELESCOPE ABOVE STATION MARK 1.5 METERS. SURFACE-STATION MARK, UNDERGROUND-STATION MARK	HEIGHT OF LIGHT ABOVE STATION MARK 1.5 METERS. DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	DISTANCE		DIRECTION
			FEET	METERS	
		HALEMANO 1927			0 00 00.00
		KAHU RADIO STA MAST	NE (3.0 miles)		28 52 37.4
desc	RM 1		SW 13.94	4.248	230 11 53
desc	RM 2		N 12.76	3.888	352 26 15

The station is located on the highest point of Palikea Peak, which is about 8 1/2 miles southwest of Wahiawa, 6 1/2 miles northwest of Waipahu, 6 miles southeast of Waianae and on forest reserve land in the Waianae Mountains.

To reach the station from the junction of State Highways 90 and 75, about 1/2 mile west of Waipahu, go west on State Highway 90 for 0.35 mile to the junction with State Highway 76, continue west on State Highway 90 for 1.95 miles to a crossroad, turn right and go northerly on a surfaced road, passing through an underpass, for 0.6 mile to a fork, keep the left fork and follow the main surfaced road west and north for 3.85 miles to a fork, keep the right fork and follow the surfaced road upgrade for 0.6 mile to a fork, keep the left fork and continue on the surfaced road for 0.25 mile to a fork, keep the right fork and continue for 0.05 mile to a locked gate, pass through the gate and continue northerly on the main surfaced road for 1.35 miles to a large building on the right, continue ahead on the surfaced road for 0.55 mile to another large building on the right and a 3-way fork just beyond, keep the extreme right fork and continue on the main surfaced road for 0.65 mile to a group of buildings, the end of the road and the end of truck travel. Pack north, up some concrete steps for about 100 feet, turn left and follow a well defined trail northerly for about 1 1/2 hours to a high peak on the ridge and the station.

The station mark is a standard disk stamped PALIKEA 1969, brazed to the top of a 4 inch soil pipe projecting 5 inches above the ground.

Reference mark 1 is a standard disk stamped PALIKEA NO 1 1969, brazed to the top of a 4 inch soil pipe projecting about 4 inches. It is about the same elevation as the station.

Reference mark 2 is a standard disk stamped PALIKEA NO 2 1969, brazed to the top of a 4 inch soil pipe projecting about 6 inches. It is about 1 foot higher in elevation than the station.

No azimuth mark was set for this station.

The distance between the reference marks is 23.39 feet or 7.130 meters.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PALIKEA
 STATE: HAWAII YEAR: 1969 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21 ° 25' 03.50120	ELEVATION: 947.9 METERS
GEODETIC LONGITUDE: 158 06 11.19634	3110 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ θ' ANGLE *
HI 3	5103	464,926.71	91,173.58	- 0 02 16 "

* 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
HALEMANO	204 ° 30 38.7	204 ° 32 54 "	5103

QH 116

* 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.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1023
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

FORM 12-1969

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: PUU KAILIO STATE: Hawaii COUNTY: Oahu
 CHIEF OF PARTY: C.A. Annis YEAR: 1969 DESCRIBED BY: J.A. Tisdall

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK SURFACE-STATION MARK UNDERGROUND-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	DISTANCE		DIRECTION
			FEET	METERS	
12a	PUU O HULU MAKAI 1927		27.84	8.487	00 00 00.00
12a	R.M. 2	WNW	27.86	8.493	63 36 26.00
	R.M. 1	ESE			236 36 02.00

Detailed description:

The station is located 9 miles northwest of Waipahu, 6 miles north of Nanakuli, 4 1/2 miles east-northeast of Waianae, 1 mile south-southwest of Kolekole Pass, on a US Naval Reservation.

To reach the station from the post office in Nanakuli, go northwest on Farrington Highway for 0.2 mile to Lualualei Naval Road on the right and a sign "US Naval Ammunition Depot, Oahu-United States Naval Radio Station etc.", turn right, north and northeast on Lualualei Naval Road, for 2.5 miles to a guard gate and the entrance to the Naval Reservation, pass through the gate and continue northerly on Kolekole Road for 4.9 miles to a guard house and the station on the right.

The station is a standard disk stamped PUU KAILIO 1969, cemented in a drill hole in the southwest corner of a concrete foundation that supports the guard house, 43 feet south of the center of Kolekole Road and 3.2 feet southeast of the southwest corner of the guard house.

Reference mark 1 is a standard disk stamped PUU KAILIO NO 1 1969, cemented in a drill hole in an outcrop, which is 12 inches square and 5 feet below the top of the road grade and about the same elevation as Kolekole Road, 52 feet south of the center of Kolekole Road and 21 feet east of the southeast corner of the guard house.

Reference mark 2 is a standard disk stamped PUU KAILIO NO 2 1969, cemented in a drill hole in an outcrop, 8 feet below the edge of the road, 43 feet south of the center of Kolekole Road and 29 feet west of the southwest corner of the guard house.

Note: No measurements were made between the reference marks due to the guard house foundation on line.

Note: No azimuth mark was established at this time.

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

USCGM-DC 27171-Part 3

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU KAILIO
 STATE: HAWAII YEAR: 1969 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE	21 ° 27' 55.83809	ELEVATION	291.2 METERS
GEODETIC LONGITUDE	158 07 25.02128		955 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE*
HI 3	5103	457,964.91	108,567.52	- 0 02 45

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PUU O HULU MAKAI	36 ° 42' 13.0	36 44 56	5103

QH 117

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211582 STATION 1024
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF ~~THE~~ ~~STATION~~ ~~SECTION~~ ~~STATION~~ TRAVERSE

NAME OF STATION: PUU KAILIO 1000

CHIEF OF PARTY: C.A. Annis YEAR: 1969 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object: Station is located 6 miles north of Nanakuli and on the Lualualei Naval Reservation.

To reach the station from the intersection of Interstate H-1 and State Highway 75, which is 1-1/2 miles west of Waipahu. Go westerly on Interstate H-1, for 9.8 miles to the end of the Interstate. Continue westerly on State Highway 90, for 2.15 miles to a side road on the right and sign, "U.S. Naval Ammunition Depot Oahu - U.S. Naval Radio Station Etc." Turn right, northerly, on Lualualei Naval Road for 2.75 miles to the entrance of the base. Pass through the guard gate and continue ahead on Kolekole Road, passing through the base, for 3.2 miles to a sign "46th Street to 8-6-6-GR". Turn right on 46th Street and go easterly for 0.05 mile to the station on the right.

Station is a State of Hawaii Survey Station Mark Disk, stamped PUU KAILIO NO 1000 1969. Set in the top of an irregular mass of concrete which projects 0.2 feet above the ground surface. It is 97 feet north of a wire fence, 16 feet south of the center of a surfaced road and 7.7 feet south of the south edge of the road.

A Geodimeter Traverse was made between PUU KAILIO 1000 and PUU

KAILIO, distance being 970.427 meters or (3,183.81 feet).

FORM CG5-525b (12-68)
USCOM-DC 38290-P69

Described by _____

COAST AND GEODETIC SURVEY

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU KAILIO 1000

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 27' 50.45753	ELEVATION:	86	METERS
GEODETIC LONGITUDE:	158 07 58.23381	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ ° OR Δ ° 1 ANGLE *
HI 3	5103	454,827.31	108,027.18	- 0 02' 55"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
PUU KAILIO	260 ° 10' 48.6"	260 ° 13' 44"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PUU KAILIO

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1025
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 30' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRAVERSE FROM THIS STATION
 TRAVERSE

NAME OF STATION: PUU KAILIO 2500

CHIEF OF PARTY: C.A. Annis YEAR: 1969 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object: Station is located 5 miles north of Nanakuli and on the Lualualei Naval Reservation.

To reach the station from the intersection of Interstate H-1 and State Highway 75, which is 1-1/2 miles west of Waipahu. Go westerly on Interstate H-1, for 9.8 miles to the end of the interstate. Continue westerly on State Highway 90, for 2.15 miles to a side road on the right and sign, "U.S. Naval Ammunition Depot Oahu - U.S. Naval Radio Station Etc." Turn right, northerly, on Lualualei Naval Road for 2.75 miles to the entrance of the base. Pass through the guard gate and go northerly on Kolekole Road, passing through the base, for 2.0 miles to a side road on the right and sign "Knox Road", and the station on the left.

Station is a State of Hawaii Survey Station Mark Disk, stamped PUU KAILIO NO 2500 1969. Set in the top of an irregular mass of concrete which projects 0.2 feet above the ground surface. It is 64 feet north-west of the intersection of Knox Road and Kolekole Road, 15.7 feet west of the center of the surfaced road and 4.5 feet northeast of power line pole K-64.

A Geodimeter Traverse was made between PUU KAILIO and PUU KAILIO 2500.

Geodimeter distance 2300.556 meters or (7547.74 feet).

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU KAILIO 2500

STATE: HAWAII

YEAR: 1969

SECOND ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 26' 53.32589	ELEVATION:	48 METERS
GEODETIC LONGITUDE:	158 08 08.91148	NO CHECK	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ (OR Δ) ANGLE
HI 3	5103	453,813.72	102,263.42	- 0° 02' 59"

* 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
PUU KAILIO	213° 18' 53.3	213° 21' 52"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PUU KAILIO

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1026
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF ~~TRaverse~~ ~~SECTION~~ STATION
 TRAVERSE

NAME OF STATION: PUU KAILIO 5000
 CHIEF OF PARTY: C.A. Annis YEAR: 1969 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object: Station is located 5 miles north of Nanakuli and on the Lualualei Naval Reservation.

To reach the station from the intersection of Interstate H-1 and State Highway 75, which is 1-1/2 miles west of Waipahu. Go westerly on Interstate H-1, for 9.8 miles to the end of the interstate. Continue westerly on State Highway 90, for 2.15 miles to Lualualei Road on the right and sign "U.S. Naval Ammunition Depot Oahu - U.S. Naval Radio Station Etc." Turn right, northerly, on Lualualei Naval Road for 2.75 miles to the entrance of the base. Pass through the guard gate and go northerly on Kolekole Road for 0.5 mile to a side road on the left at the north end of Building Number 25. Turn left and cross railroad tracks, then turn left again and go southerly along the west side of the railroad tracks for 0.05 mile to the near south end of Building Number 25, and the station near the Voltage outlet control.

Station is a State of Hawaii Survey Station Mark Disk, stamped PUU KAILIO NO 5000 1969. Set in the top of a 12-inch square concrete post which projects 0.3 foot above the ground. It is 81.2 feet northwest of the northwest corner of Building Number 25, 17.6 feet northwest of the north rail of the railroad track, 13 feet east of the northeast corner of a High voltage Transformer, and 3.2 feet northeast of a power-line-pole.

Description, including sketch of object: A Geodimeter Traverse was made between PUU KAILIO and PUU KAILIO 5000.

Geodimeter distance 4,555.645 meters or (14,946.31 feet).

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU KAILIO 5000
 STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 25' 36.70935	ELEVATION:	36 METERS
GEODETIC LONGITUDE:	158 08 19.32620	NO CHECK	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE*
HI 3	5103	452,823.03	94,533.62	- 0° 03' 02"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PUU KAILIO	200° 04' 17.8	200° 07' 20"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PUU KAILIO

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1027
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF ~~TRAVERSE~~ STATION
 TRAVERSE

NAME OF STATION: PUU KAILIO 7500

CHIEF OF PARTY: C.A. Annis YEAR: 1969 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object: Station is located 4-1/2 miles north of Nanakuli and 1/4 mile south of the guard gate and entrance of Lualualei Naval Reservation.

To reach the station from the intersection of Interstate H-1 and State Highway 75, which is 1-1/2 miles west of Waipahu. Go westerly on Interstate H-1, for 9.8 miles to the end of the interstate. Continue westerly on State Highway 90, for 2.15 miles to Lualualei Naval Road on the right and sign, "U.S. Naval Ammunition Depot Oahu - U.S. Naval Radio Station Etc." Turn right, northerly, on Lualualei Naval Road for 2.5 miles to the station on the right.

Station is a State of Hawaii Survey Station Mark Disk, stamped PUU KAILIO NO 7500 1969. Set in the top of an irregular mass of concrete, flush with the ground surface. It is 41 feet south of the south rail of the railroad track, 17.7 feet north of power-line-pole Number 64, 17 feet south of the center of a surfaced road and 0.7 foot south of the south edge of the surfaced road on the curve of the south side of the road.

A Geodimeter Traverse was made between PUU KAILIO and PUU KAILIO 7500.

Geodimeter distance 5,580.097 meters or (18,307.37 feet).

FORM CGS-525b (12-68)
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Described by

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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU KAILIO 7500

STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 25' 03.55166	ELEVATION:	23 METERS
GEODETIC LONGITUDE:	158 08 25.78916	NO CHECK	FEET

STATE COORDINATES (Ft)				
STATE & ZONE	CODE	X	Y	θ HOR Δ θ ANGLE
HI 3	5103	452,209.40	91,188.54	- 0° 03' 05"

* 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
PUU KAILIO	198° 16' 20.2"	198° 19' 25"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PUU KAILIO

QH 121

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1028
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 30' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF ~~TRAVERSE~~ ~~SECTION~~ STATION
 TRAVERSE

NAME OF STATION: PUU KAILIO 10000

CHIEF OF PARTY: C.A. Annis Year: 1969 State: Hawaii County: Honolulu

Description, including sketch of object: Station is located 1 mile northwest of Nanakuli and at the center of the base of an observation tower, that has a fence enclosure, and sign "U.S. Navy-Foracs 111-Mid Station."

To reach the station from the intersection of Interstate H-1 and State Highway 75, which is 1-1/2 miles west of Waipahu. Go westerly on Interstate H-1, for 9.8 miles to the end of the interstate. Continue westerly on State Highway 90 for 0.9 miles, (key for station maybe obtained here at the office of U.S. Navy Foracs 111-South Station), continue westerly on State Highway 90 for 1.45 miles to an observation tower on the left and the station.

Station is a State of Hawaii Survey Station Mark Disk, stamped PUU KAILIO NO 10000 1969. Set in the top of a concrete cylinder, which is flush with the oiled surface area. It is 35.7 feet west-northwest of the center of the locked gate, 17.2 feet east of the cyclone fence and 10.0 feet southwest of the northeast leg of the tower.

A Geodimeter Traverse was made between PUU KAILIO and PUU KAILIO 10000.

Geodimeter distance 8,789.960 meters or (28,838.39 feet).

FORM C&GS-525b (12-65)
 11SCOMM-DC 38290-P88

Described by

ESSA
 COAST AND GEODETIC SURVEY

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU KAILIO 10000

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 23' 33.48665	ELEVATION:	4	METERS
GEODETIC LONGITUDE:	158 09 26.11984	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ or ANGLE *
HI 3	5103	446,499.81	82,106.36	- 0° 03' 27"

* 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
PUU KAILIO	203° 22' 07.2"	203° 25' 34"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PUU KAILIO

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1029
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

Paheehee (Oahu Island, Hawaiian Government Survey, 1875).—On summit of ridge in Waianae Kai, southeast of Pokai village, about 8,000 feet east of Kaneohe Point. Marked by copper bolt in center of cross cut in rock, with cairn of stones over it.

(11-8-55)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PAHEEHEE
 ESTABLISHED BY: HGS YEAR: 1875 STATE: Hawaii
 RECOVERED BY: D.G. Rushford YEAR: 1964 COUNTY: Honolulu

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

Station is destroyed. At the distance and azimuth of the station from PAHEEHEE NEW 1927 there are scattered rocks, possibly the remains of a cairn, but no mark was found.

A stone with a large chiseled cross, with a 1-inch drill hole in its center, was found near the original location of PAHEEHEE (USE), however it has an iron pipe instead of a brass bolt in the hole. Because of the rather small size of the rock it is possible that it might be the old mark, moved to the present location.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PAHEEHEE
 STATE: HAWAII YEAR: 1875 SECOND ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 26' 54.908	ELEVATION:	159	METERS
GEODETIC LONGITUDE:	158 10 21.543	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ 109 Δ § 1 ANGLE *
HI 3	5105	441,284.50	102,435.39	- 0 ° 03' 47"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE § 109 Δ § 1 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. COM-DC 34314

QI 300

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

QUAD 211582 STATION 1030
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Form 528
 (11-6-66)

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

NAME OF STATION: PAHEEHEE (USE)
 ESTABLISHED BY: U.S.E. Year: 1927 State: Hawaii
 RECOVERED BY: D.G. Rushford Year: 1964 County: Honolulu

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

Station is destroyed. The mark was found laying on top of the ground beside station PAHEEHEE NEW 1927. The mark consisted of a brass plate set in concrete in the top of a 5-inch soil pipe which is 3 feet long.

* 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.
 Com-DC 34814

R

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PAHEEHEE USE
 STATE: HAWAII YEAR: 1927 SECOND ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 26' 54.996	ELEVATION	199	METERS
GEODETIC LONGITUDE:	158 10 21.558	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE*
HI 3	5103	441,283.05	102,444.27	- 0 03 47

* 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

QI 301

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1031
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

Paheehoe New (Oahu Island, L. G. Simmons, 1927).—In western part of Oahu, on Puu Paheehoe, at eastern end of ridge directly east of Waianae, just before it drops down to the saddle, about 1¼ miles east of Waianae. Marked according to note 2, a standard disk station mark in outcropping bedrock. Station *Paheehoe (U. S. E.)* was found, marked by brass plate in concrete in 5-inch pipe; it is 5.148 meters (16.89 feet) from station in azimuth 255° 20'. Reference marks, note 12a, standard reference disks in outcropping bedrock, are at the following distances and azimuths from station: No. 1, 9.124 meters (29.93 feet), 74° 40'; No. 2, 2.928 meters (9.61 feet), 107° 59'. Re-marked according to note 14A in 1929.

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

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PAHEEHOOE NEW
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii
 RECOVERED BY: D.G. Rushford YEAR: 1964 COUNTY: Honolulu

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KUM 1927 Drill Hole in Cross on Rock Nanakuli, Kaiser Cement Plant, Water Tank	ENE	16.719	5.097	00 00 00.0 19 42 58.1
R.M. No. 1	SE			92 06 31.9
R.M. No. 2	WSW	29.920	9.120	198 49 30
	WNW	9.604	2.928	232 07 49

Station was recovered and all marks found in good condition. The 5-inch soil pipe with brass plate in top that marked PAHEEHOOE (USE) was found laying on top of the ground by station. A drill hole in the middle of a cross was found in the top of a rock. It resembles the description of PAHEEHOOE 1975 but is located at nearly the azimuth and distance as PAHEEHOOE (USE) from the station. The rock is 1 foot thick and 16 inches in diameter and sets on top of the ground so might have been moved. It is surrounded by scattered boulders believed to be the remains of a cairn. A complete description follows:

Station is located about 1 mile east of Waianae, on the east end of Paheehoe Ridge at about 652 feet elevation.

To reach station from the post office in Waianae, go north 1 block on Farrington Highway; turn right and go easterly on Lualualei Homestead Road for 1.1 miles to top of grade; go left on dirt road for 0.05 mile to end of truck travel. Go through fence and pick way up steep, brushy hillside for about 1/2-mile to top and station. A 1/2-hour pack.

Station mark is a standard disk cemented in a drill hole in bedrock flush with ground. It is on the last knoll at east end of the ridge. There is a "Type A" Hawaii Territorial Survey signal centered over the mark; the concrete platform is 30 inches above ground and a metal target extends 7 feet above the platform.

Reference mark number one is a standard disk stamped "PAHEEHOOE NO 1", cemented in a drill hole in bedrock flush with the ground, at about same elevation as station. It is usually covered with grass and weeds.

Reference mark number two is a standard disk stamped "PAHEEHOOE NO 2", cemented in a drill hole in bedrock flush with ground. It is 1.2 feet lower than station mark and usually covered with grass and weeds.

Drill hole in cross on rock is a 1-inch-diameter hole, with stub of iron pipe driven into it, at the center of a 4-inch, chiseled cross on the top of a 16-inch-diameter, flat rock, 1 foot thick. It is about flush with the surrounding rocks and is about 1 foot higher than station mark.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PAHEEHOOE NEW

STATE: HAWAII

YEAR: 1927

FIRST

—ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21° 26' 54.99447	ELEVATION: 198.7 METERS
GEODETIC LONGITUDE: 158 10 21.72982	652 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (OR Δ) ANGLE °
HI 3	5103	441,266.86	102,444.13	- 0° 03' 47"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PUU O HULU MAKAI	359° 52' 13.9"	359° 56' 01"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 125

HORIZONTAL CONTROL DATA

QUAD 211582 STATION 1031

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

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

PAHEEHEE NEW (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PAHEEHEE NEW
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1 mile east of Waianae
 HEIGHT OF TELESCOPE ABOVE STATION MARK 8.3 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 7.5 FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
		PUU O HULU MAKAI 1927 ¹		
R.M. 1	WSW	29.94	9.127	74 47 37
R.M. 2	WNW	9.63	2.930	108 05 34
Drill Hole in Cross on Rock	ENE	16.75	5.105	255 36 42

Station mark, reference marks 1 and 2, and the drill hole were recovered as described and in good condition, a complete description follows:

Station is located 4 1/2 miles northeast of Nanakuli, 3 1/2 miles southeast of Makaha, 1 mile east of Waianae, on Paheehēe Ridge 0.2 mile east of the west end of the ridge.

To reach the station from the post office in Waianae, go northwest on State Highway 90, (Farrington Highway), for 0.05 mile to the junction of Lualuāi Road, turn right on Lualuāi Road for 1.0 mile to a track road on the left at the top of the grade, turn left and follow track road for 0.35 mile to the base of Paheehēe Ridge and end of truck travel. From here pack northerly to the top of the ridge, then bear right, easterly to where the ridge drops off and the station in the center of the ridge. A 45 minute back pack.

Station mark is a standard disk stamped PAHEEHEE 1927, cemented in a drill hole in bedrock which is flush with the ground surface. A "Type A" signal, built by the Hawaii Territorial Survey is centered over the mark, the concrete platform of the signal is 5 1/2 feet square and projects 3 feet above the ground.

Reference mark 1 is a standard disk stamped PAHEEHEE NO 1, cemented in a drill hole in bedrock which is flush with the ground surface, about the same elevation as the station, and in a foot trail in the center of the ridge.

Reference mark 2 is a standard disk stamped PAHEEHEE NO 2, cemented in a drill hole in bedrock, flush with the ground surface, about 1 foot lower than the station, and 6 feet northwest of the northwest corner of the "Type A" signal.

Drill hole in cross on rock is a 1-inch diameter hole, with stub of lead pipe driven into it, at the center of a 4-inch chiseled cross on the top of an 18-inch diameter, flat rock, which projects 1 foot above the ground surface and about 1 foot higher than the station mark.

Note: No azimuth mark was established at this time.

* 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.

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

QUAD 211582 STATION 1032
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION PAHEEHEE NEW

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: DRILL HOLE CROSS ON ROCK

STATE: HAWAII

YEAR: 1964

THIRD

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 26' 55.03606	ELEVATION:	199	METERS
GEODETIC LONGITUDE:	158 10 21.55819	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ θ ANGLE *
HI 3	5103	441,283.08	102,448.31	- 0° 03' 47"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From 0000)	PLANE AZIMUTH * (From 0000)	CODE

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

POSITION DETERMINED BY TRAVERSE FROM STATION PAHEEHEE NEW

QH 126

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

QUAD 211582 STATION 1033
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION PAHEEHEE NEW

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 8-5
 STATE: HAWAII YEAR: 1965 SECOND ORDER

SOUNDING NO: G-14543
 OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 27' 08.93607	ELEVATION:	5 METERS
GEODETIC LONGITUDE:	158 11 15.38466	NO CHECK	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ (DR Δ) ANGLE*
HI 3	5103	436,199.90	103,856.68	- 0° 04' 07"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PAHEEHEE NEW	285° 30' 31.0	285° 34' 38"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PAHEEHEE NEW

QH 127

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1034
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 8-6

CHIEF OF PARTY: Carl A. Annis YEAR: 1969 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object:

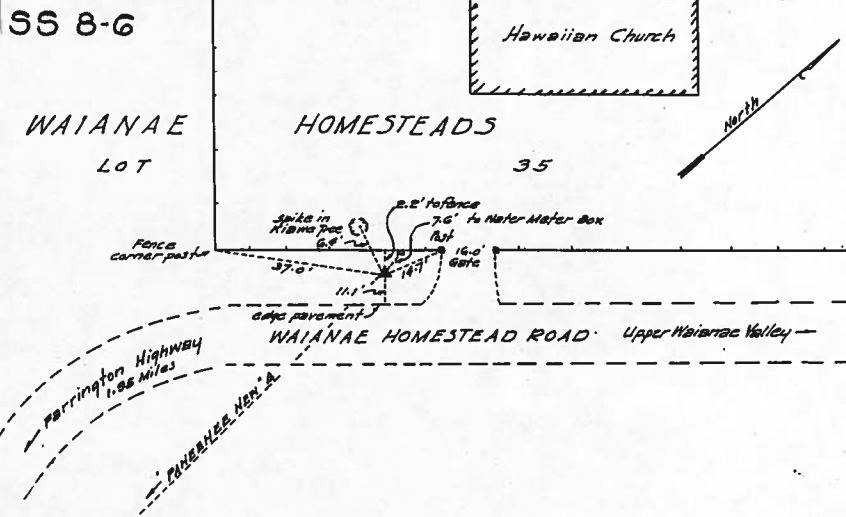
Station is located in Waianae District, in Waianae Valley and Waianae Homesteads.

To reach station from junction of Farrington Highway and Waianae Homestead Road, go northeasterly along the Homestead Road for 1.95 miles to Hawaiian Church on left. Station is close to fence line and just south of gate to church yard. (portion of Lot 35 of Waianae Homesteads).

Station mark is a standard State Survey disk stamped "8-6 1969" in concrete monument flush with ground, in grassy road shoulder between edge of pavement and fence line, on northwest side of Waianae Homestead Road. Ties from station are: W 37.0 ft. to south corner fence post of church lot, NW 6.4 ft. to spike in Kiawe Tree, NW 2.2 ft. fence line, NE 7.6 ft. and 14.7 ft. respectively to water meter box and westerly gate post and SE 11.1 ft. to edge pavement.

Sub-surface mark is identical, in concrete monument 3.0 ft. below ground level and separated from top monument with a layer of sand.

Geodimeter connection was made between "PAHEEHEE NEW" 1927 and State Survey "8-6 1969"
 Note: Station placed to see Gov't station "KOWALE" also.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 8-6

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 27' 46.89022	ELEVATION:	55	METERS
GEODETIC LONGITUDE:	158 10 17.59749	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ IOR Δ ρ I ANGLE °
HI 3	5103	441,662.96	107,680.03	- 0 ° 03' 46 "

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE ϕ IOR Δ ρ I FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PAHEEHEE NEW	4 ° 15' 48.7 "	4 ° 19' 35 "	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PAHEEHEE NEW

QH 128

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1035
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

Keaau 2 (Oahu Island, L. G. Simmons, 1927).—In the western part of Oahu, about 1½ miles from the sea, on the crest of a very sharp ridge separating the Keaau and Makaha valleys, the second ridge from and 3½ miles north of Waianae. The old territorial station, marked by a redwood post and cairn of stones, is lost. *Keaau (U. S. E.)* was recovered; it is marked by a copper bolt set in concrete in a 2-inch pipe. *Keaau 2* is marked according to note 2, a standard disk station mark in outcropping bedrock. The distances and azimuths to reference marks are as follows: To *Keaau (U. S. E.)*, 3,400 meters (11.15 feet), 224° 30'; to reference mark, note 12a, a standard reference disk in outcropping bedrock, 1,135 meters (3.72 feet), 141° 12'. Re-marked according to note 14X in 1929.

FORM 526a
 (9-16-65)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KEAAU 2
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii
 RECOVERED BY: D.G. Rushford YEAR: 1964 COUNTY: Honolulu

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
R.M. No. 2	1927 DISTANCES AND AZIMUTHS	3.72	1.135	141 12
R.M. No. 2		3.726	1.136	

Station mark and reference mark were recovered in good condition. KEAAU (USE) was searched for but not found and is believed destroyed. A complete description follows:

Station is located about 1-1/2 miles north of Makaha village and 1-1/2 miles east-northeast of Kepuhi Point, at about 2266 feet elevation, on Puu Keaau, where the ridge line drops down steeply for about 100 feet.

To reach station from the shopping center at Makaha village, go northwest on Farrington Highway for 1.8 miles to a hard-surfaced side road right, and a telephone company building on right, and end of truck

travel. From a point about midway between the highway and the building, pack northerly up side of very steep ridge to station KEPUHI NEW on top. From here follow along crest of ridge for about 1-1/4 miles to station.

Station mark is a standard disk stamped "KEAAU 1927", cemented in a drill hole in bedrock 1 inch below ground level.

The reference mark is a standard disk stamped "KEAAU NO 2", cemented in a drill hole in bedrock at same elevation as station mark.

NOTE: There is no longer a type 14X signal on the station.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KEAAU 2
 STATE: HAWAII YEAR: 1927 FIRST ORDER
 SOURCE: G-14543

GEODETIC LATITUDE: 21° 29' 35.98058	ELEVATION: 650.9 METERS
GEODETIC LONGITUDE: 158 12 39.29721	2267 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	∠ OR Δ ∠ ANGLE °
HI 3	5103	428,293.09	118,703.75	- 0° 04' 38"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From 1929)	PLANE AZIMUTH* (From 1929)	CODE
PAHEEHEE NEW	321° 20' 09.4	321° 24' 48"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 125

HORIZONTAL CONTROL DATA

QUAD 211582 STATION 1035

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

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

KEAAU 2 (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KEAAU 2
 ESTABLISHED BY: L. G. S. YEAR: 1927 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: C. A. Annis YEAR: 1969 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2 miles northeast of Makaha
 HEIGHT OF TELESCOPE ABOVE STATION MARK 5 FEET. HEIGHT OF LIGHT ABOVE STATION MARK FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FROM THE GROUND AT THE STATION		
		FEET	METERS	
PAHEEHEE NEW 1927				° 0 00' 00.0"
RM No. 3	SW	25.91	7.901	48 27 54
Kaena Pt. Light	NW	(7-1/2 miles)		180 18 14.7
RM No. 2	NW	3.73	1.136	181 35
RM No. 4	E	10.15	3.094	292 39

The station mark and Reference Mark No. 2 were recovered. The stamping on the station mark disk has been defaced by a target so that the stamping is not clear. The distance to Reference Mark No. 2 was checked and found to be correct. It was too close to focus on, and the ridge was too narrow to extend out, so the direction was not checked.

Reference Marks Nos. 3 and 4 were established at this time.

A new description follows:

The station is located about 4-1/2 miles west-southwest of Mt. Kaala, 2 miles northeast of Makaha, and 1-1/2 miles east of Kepuhi Point, on the western slope of Puu Keaau.

The station was reached by helicopter. It is believed that the station may be reached on foot by packing easterly up ridge for about 1-1/2 miles from station KEPUHI NEW 1927.

The station mark, a standard disk stamped KEAAU 1927, is set in a drill-hole in bedrock which is flush. The mark is in the approximate center of the ridge.

Reference Mark No. 2, a standard disk stamped KEAAU NO 2, is set in a drill-hole in bedrock which is flush and about the same elevation as the station.

Reference Mark No. 3, a standard disk stamped KEAAU 2 1927 NO 3 1969, is set in a drill-hole in bedrock which is about 6 feet lower than the station.

Reference Mark No. 4, a standard disk stamped KEAAU 2 1927 NO 4 1969, is set in a drill hole in outcropping bedrock which projects 3 feet.

Due to rock and difference in elevations, no measurement between marks was made.

* 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.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1037
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

Kepuhi New (Oahu Island, L. G. Simmons, 1927).—Territorial survey station could not be recovered. *Kepuhi New (U. S. E.)* recovered and used as station. It is about 3¼ miles north and west of Waianae, on west end of second ridge north of Waianae, about ¼ mile back from shore line, and on same ridge as *Keaau 2*. (See description thereof.) Marked by a United States Engineers' brass plate, rectangular in form, cemented in bedrock. Reference marks, note 12a, standard reference disks in outcropping bedrock, were set at the following distances and azimuths from station: No. 1, 5.208 meters (17.09 feet), 193° 42'; No. 2, 2.642 meters (8.67 feet), 103° 15'. Re-marked according to note 14X in 1929.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **KEPUHI NEW**
 STATE: **HAWAII** YEAR: **1927** FIRST ORDER
 SOURCE: **G-14543**

PUNY 7-20
 (8-19-66)

COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **KEPUHI NEW**
 ESTABLISHED BY: **L.G.S.** YEAR: **1927** STATE: **Hawaii**
 RECOVERED BY: **D.G. Rushford** YEAR: **1964** COUNTY: **Honolulu**

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
1927 DISTANCES and AZIMUTHS				
R.M. No. 1		17.09	5.208	193 42
R.M. No. 2		8.67	2.642	103 15
-----1964 DISTANCES-----				
R.M. No. 1		16.909	5.154	
R.M. No. 2		8.642	2.634	

Station was recovered and all marks found in good condition. The distances to the reference marks were checked. A complete description follows:

Station is located about 3-1/2 miles northwest of Waianae and 1/2 mile north of Makaha Beach, at 1278 feet elevation, on the end of the prominent ridge overlooking Kepuhi Point. There is an old concrete pillbox near the station and the remains of the winch-house of an old WW-II aerial tram is about 50 yards southeast downridge from station. To reach station from the center of Makaha Village, go northwest

on Farrington Highway for 2.2 miles to a Hawaiian Telephone Co. building on the right, at base of ridge. This is end of truck travel. Pack northerly up the steep, brushy slope of ridge, from about midway between the building and the highway, to top of first point on ridge and station. Station mark is a rectangular, brass plate, stamped "US ENGRS ELEV", set in the top of a 7-inch-diameter concrete mass flush with ground. It is 34.5 feet northeast of the center of the roof entrance of the concrete pillbox.

Reference mark number one is a standard disk stamped "KEPUHI NEW NO 1", cemented in a drill hole in a bedrock ledge that projects 2 feet on the low side. The mark is 16 inches north of an iron pin, about 5 feet lower than station, and hidden by brush.

Reference mark number two is a standard disk stamped "KEPUHI NEW NO 2", cemented in a drill hole in bedrock and about 1 foot lower than station.

(continued on next page)

GEODETIC LATITUDE: 21° 29' 19.56514	ELEVATION: 1279 METERS
GEODETIC LONGITUDE: 158 13 35.66465	1279 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	OR Δ ANGLE
HI 3	5103	422,967.41	117,054.85	- 0 04 59

* 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
KAENA POINT USE	149° 35' 35.4	145° 44' 34	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 131

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 211582 STATION 1037

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

KEPUHI NEW (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KEPUHI NEW
ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK ALSO
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3 1/2 miles northwest of Waianae
HEIGHT OF TELESCOPE ABOVE STATION MARK 4 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 4 FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KAENA POINT (USE) 1914 1919				° 0 00 00.0
RM 1	N	16.94	5.164	44 04 19
RM 2	W	8.64	2.634	313 24

The station mark and reference marks 1 and 2 were recovered and found in good condition.

A new description follows.

The station is located about 3 1/2 miles northwest of Waianae, 2 1/2 miles south of Kaneana Cave, 1/2 mile north of Makaha Beach, 50 yards east of the remains of a winch-house of an aerial tram and on the end of a prominent ridge overlooking Kepuhi Point.

The station was reached at this time from the parking lot at Kaneana Cave, via helicopter, by flying a magnetic course of about 170 degrees for about 3 minutes to the station as described.

The station mark is a 3 x 4 inch brass plate of the US Engineers which is stamped US ENGRS ELEV, cemented to bedrock which is flush with the surrounding surface.

Reference mark 1 is a standard disk stamped KEPUHI NEW NO 1, set in a drill hole in a 3 x 3 foot exposed section of bedrock which projects about 2 feet on the lower side and is about 5 feet lower than the station mark.

Reference mark 2 is a standard disk stamped KEPUHI NEW NO 2, set in a drill hole in a 2 x 6 foot section of exposed bedrock which is flush with the surrounding surface and about 1 foot lower than the station mark.

The reference marks were not measured between due to heavy brush and the crest of the ridge on line.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1058
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

Lahilahi (Oahu Island, L. G. Simmons, 1927).—On western coast of Oahu, about 2 miles northwest of Waianae, on the summit of Mauna Lahilahi, next to shore line, a prominent small rocky hill standing by itself. Marked according to note 5, a standard disk station mark in concrete on bowlder. Reference marks, note 12a, standard reference disks in outcropping bedrock, are at the following distances and azimuths from station: No. 1, 2.776 meters (9.11 feet), 44° 29'; No. 2, 14.050 meters (46.10 feet), 266° 12'.

LAHILAH I (Hawaii, L.G.S., 1927; G.K.G., 1932)
 --The station is now marked according

to Note 14A.

Reference marks found as described. Previous description of station is adequate.

(477th FA Obsn.Bn., 1945)--On the summit of Mauna Lahilahi, a prominent small rocky hill which stands by itself along the shoreline about 2 miles NW of Waianae.

Station is marked according to Note 14X. Marks are in good condition.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: LAHILAH I
 STATE: HAWAII YEAR: 1927 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 27 ' 48.63401	ELEVATION:	70.3 METERS
GEODETIC LONGITUDE:	158 12 57.95521		231 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE *
HI 3	5103	426,516.28	107,874.73	- 0° 04' 45"

* 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
PAHEEHEE NEW	290° 07' 57.9	290° 12' 43"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 132

(continued on next page)

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1038

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

LAHILAHI (continued)

FORM 526e
 (1-14-69)

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

R

NAME OF STATION: LAHILAHI
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii
 RECOVERED BY: W.R. Porter YEAR: 1964 COUNTY: Honolulu

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
1927 DISTANCES & DIRECTIONS				
PAHEEHEE NEW				00 00 00.0
R.M. No. 1		9.11	2.776	114 21
R.M. No. 2		46.10	14.050	336 04
1964 DISTANCES				
R.M. No. 1		9.078	2.767	
R.M. No. 2		46.037	14.032	

Station was recovered in good condition. The station disk could not be examined because of the Hawaii Territory Survey signal centered over it. A tunnel passes under the concrete platform but it is too small and obstructed, and the pipe socket is tightly plugged. Both reference marks are in good condition. The station was not occupied because a large wooden signal was secured above the platform; so distances to the reference marks were checked by occupying both reference marks. A complete description follows:

Station is located along the west coast of Oahu, at the southwest edge of Makaha village, on a very prominent rock butte of about 230 feet elevation.

To reach station from the Cornet Village Shopping Center in Makaha, go north on Farrington Highway for 0.2 mile; turn left and go west on Lahilahi St. for 0.2 mile to where street turns right, and Lahilahi Pl. goes straight ahead through a gate. From here pack westerly, following up along crest of butte for about 1/4 mile to station.

Station mark is a standard disk, stamping unknown, set in concrete on the top of a 6-foot-square bedrock outcrop that projects about 4 feet above the hill line. The 5-foot-square concrete platform of the "Type B" Hawaii Territory Survey signal is supported firmly by stone and concrete buildup on top of the rock. A concrete pedestal, 16 inches square at the base and tapering slightly, projects 2-1/2 feet above the center of the platform and has a 2-1/2-inch iron pipe up through its center. The center of this pipe was used as center of station.

Reference mark number one is a standard disk stamped "LAHILAHI NO 1", cemented in a drill hole in bedrock on the south edge of the hilltop. It is about 7 feet lower than station mark.

Reference mark number two is a standard disk stamped "LAHILAHI NO 2", cemented in a drill hole in bedrock along crest of hill. It is about 3 feet lower than station mark.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: LAHILAHI
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2 miles northwest of Waianae

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

The station mark and reference marks 1 and 2 were recovered as described in 1964. The 1969 observations follow.

OBJECT	BEARING	FEET	METERS	DIRECTION
PAHEEHEE NEW 1927				0 00 00.0
RM 1	SW	9.11	2.777	114 20
RM 2	E	46.02	14.026	336 03 59

No measurement was made between the reference marks due to the "Type B" Hawaii Territory Survey Signal on line.

FORM CGS-526 (1-68)
 USCOMM-DC 36496-P06

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1039
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

PUU O HULU MAKAI (Hawaii, L.G.S., 1927)--Identical with old Army station PUU O HULU MAKAI (U.S.E.). On W coast of Oahu, on the summit of the most W of the two peaks of Puu o Hulu Ridge on the Waianae coast about 3-1/4 miles S of Waianae. Approached by trail from the main Waianae road leading around the N side of the ridge.

The old army mark, an iron stake embedded in concrete, was replaced by a standard station-mark disk set in an irregular mass of concrete.

R.M. 1, a standard reference disk in concrete steps of structure at summit, is 1.737 meters (5.70 feet) from station in azimuth 163°10'; R.M. 2, a standard reference disk with arrow pointing toward the station, wedged in a drill hole in outcropping bedrock, is 5.286 meters (17.34 feet) from station in azimuth 24°30'.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU O HULU MAKAI
 STATE: HAWAII YEAR: 1927 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE	21° 24' 14.30363	ELEVATION	262.2 METERS
GEODETIC LONGITUDE	158 10 21.34211		860 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE*
HI 3	5103	441,285.64	86,230.29	- 0° 03' 47"

* 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
LAHILAHI	145° 37' 43.5"	145° 41' 30"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF OCT 1971

QH 133

(continued on next page)

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1039

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

PUU O HULU MAKAI (continued)

FORM 526a
 (9-19-69)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PUU O HULU MAKAI
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii
 RECOVERED BY: W.R. Porter YEAR: 1964 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.63 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KAHE 1875-1927				00 00 00.0
USMR 4(R.M. No. 3)	SW	35.566	10.841	81 30 45
Iron Pipe	W	11.425	3.483	139 48 15
R.M. No. 1	NNW	5.705	1.740	201 36 11

Station was recovered. The station mark could not be examined because of the signal built over it. Reference mark number one was recovered in good condition. Reference mark number two has been destroyed; the bed-rock ledge where it was located has eroded away until it is now only 15 feet from the station. A U.S. Military Reservation Boundary marker was found and used for reference mark number three. A complete description follows:

Station is located about 2 miles northwest of Nanakuli and 1-1/2 miles south-southeast of Mailli, at Mailli Point on the summit of Puu O Hulu Kai,

a hill of about 856 feet elevation that has several old military pillboxes along its top.

To reach station from the post office in Nanakuli, go north on Farrington Highway for 2.5 miles to track side road right. Go right for 50 yards to fork; continue straight ahead on left fork for 0.25 mile to end of truck travel at beginning of dim trail in trees on right. Pack up trail about 1/2 mile to station.

Station mark was previously described as a standard disk. The "Type C" Hawaii Territory Survey signal which was built over the mark in 1929 consists of a 5-1/2-foot-square platform; a concrete post 0.9 foot square at the bottom and tapering to 0.5 foot square at the top, projects 2.5 feet from the center of the platform. A 2-1/2-inch iron pipe runs up through the center of the post. The center of the pipe was used as center of station. Station sets at the southeast corner of the pillbox on the highest point of the hill.

Reference mark number one is a standard disk stamped "PUU O HULU NO 1 1927", cemented in a drill hole in a concrete step. It is 14 inches east of the east side of the roof entrance of the pillbox and is 2 feet lower than station platform.

USMR 4 will serve as reference mark number three. It is a bronze disk, stamped "4", set in the top of an 8-inch-square concrete post that projects 4 inches, and is located down on the southwest slope of the hill, just above an 8-foot, red rock cliff, 18.3 feet lower than station platform. Slope distance to top of station pipe is 12.470 meters. Iron pipe is 1-1/2-inch pipe projecting 16 inches from roof of pillbox.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PUU O HULU MAKAI
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1 1/2 miles south-southeast of Mailli
 HEIGHT OF TELESCOPE ABOVE STATION MARK 2 1/2 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 2 1/2 FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
LAHILAHI 1927				00 00 00.0
RM NO 1	NNW	9.46	2.883	115 50 07
RM NO 3 (USMR 4)	Sk	35.57	10.842	257 07 50
Iron Pipe	W	11.43	3.484	315 33 07

The station mark could not be examined because of the signal built over it. Reference marks 1 and USMR 4 was used for reference mark 3. A new station mark was set on top of a 2 1/2 inch iron pipe. A complete description follows.

The station is located about 2 miles northwest of Nanakuli, 1 1/2 miles south-southeast of Mailli, at Mailli Point on the summit of Puu o Hulu Kai, A hill of about 856 feet in elevation that has several old military pillboxes along its top.

To reach from the Post Office in Nanakuli, go northerly on Farrington Highway for 2.35 miles to Hookele Street on the right, turn right on Hookele Street and go easterly for 0.1 mile to a cross street of Waapuhi Street, turn right southerly and go for 0.1 mile to the end of the street, from here pack southerly on a good trail to the top of the ridge and station. (about 1 hour pack).

Station mark is a standard disk stamped PUU O HULU MAKAI 1927 1969, cemented in the top of a 2 1/2 inch iron pipe, the pipe is set in a concrete pyramid which projects 2 1/2 feet above a 5 1/2 foot square concrete base. Station is set at the southeast corner of a pillbox and the highest point of hill. This is a Type C signal.

Reference mark 1 is a standard disk stamped PUU O HULU MAKAI NO 1 1927, cemented in a drill hole in a step about 6 feet lower than the station mark, it is 1.2 feet east of the east side of roof entrance to the pillbox.

USMR 4 surveyed as reference mark 3. It is a bronze disk, stamped "4", set in the top of a 8 inch square concrete post which projects 4 inches above the surface of the ground, and is about 18 feet lower than the station mark and on a southwest slope. A very steep drop off to the south of mark. Iron Pipe is 1 1/2 inch pipe projecting 16 inches above the roof of pillbox and approximate center of pillbox.

No measurement between reference mark due to steep slope.

* 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.

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

QUAD 211582 STATION 1040
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION PUU O HULU MAKAI

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: USMR 4
 STATE: HAWAII YEAR: 1964 SECOND ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 24' 14.04480	ELEVATION:	262	METERS
GEODETIC LONGITUDE:	158 10 21.59767	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β (OR Δ) ANGLE °
HI 3	5103	441,261.46	86,204.20	- 0° 03' 47"

* 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

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970
 POSITION DETERMINED BY TRAVERSE FROM STATION PUU O HUL MAKAI

QH 154

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

QUAD 211582 STATION 1041
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION PUU O HULU MAKAI

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: IRON PIPE NR PUU O HULU MAKAI
 STATE: HAWAII YEAR: 1964 THIRD -ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 24' 14.32558	ELEVATION	262	METERS
GEODETIC LONGITUDE:	158 10 21.46077	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ FOR Δ θ ANGLE *
HI 3	5103	441,274.43	86,232.51	- 0° 03' .47 "

* 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
<p>THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970 POSITION DETERMINED BY TRAVERSE FROM STATION PUU O HUL MAKAI</p>			
QH 135			

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1042
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 8-4

CHIEF OF PARTY: Carl A. Annis YEAR: 1969 STATE: Hawaii COUNTY: Honolulu

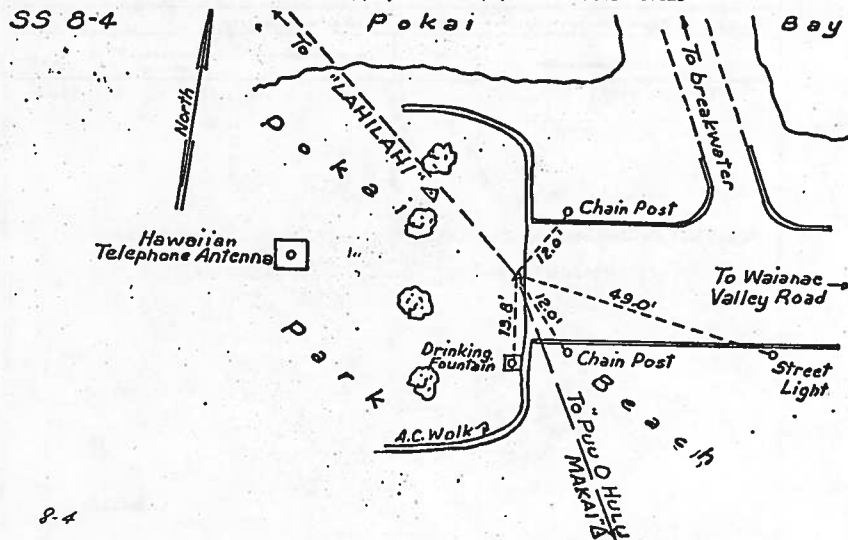
Description, including sketch of object:

Station is located in Waiānae District, in County Park at the south end of Pokai Bay. To reach station from intersection of Farrington Highway and Waiānae Valley Road, go southmost or seaward along Waiānae Valley Road for about 500 feet, turn left into Pokai Bay Street for 50 feet and right into Pokai Beach Park. Go along park road leading to breakwater to station on seaward side of A.C. walkway just beyond entrance to breakwater.

Station mark is a standard State Survey disk stamped "8-4 1969" in concrete monument flush with ground. Ties from station are: NS 12.0 feet to chain post; E 49.0 feet to street light; SE 12.0 feet to chain post and S. 13.8 to drinking water fountain.

Sub-surface mark is identical with station mark, in concrete monument 2.3 feet below ground level and separated from top monument by a layer of sand.

Geodimeter connection was made between "LAHILAHII" and State Survey "8-4".
 Geodimeter connection was made between "PUU O HULU MAKAI" and State Survey "8-4".
 This station is also Bench Mark 8-4(SS) of the 1969 First Order Levels



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 8-4

STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 26' 38.33776	ELEVATION:	3.50 METERS
GEODETIC LONGITUDE:	158° 11' 36.49627		11.5 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	δ OR Δ δ° ANGLE*
HI 3	5103	434,201.78	100,771.71	- 0° 04' 15"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PUU O HULU MAKAI	333° 57' 22.6"	334° 01' 37"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PUU O HULU MAKAI
 AND CHECKED BY ADDITIONAL OBSERVATIONS

QH 136

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

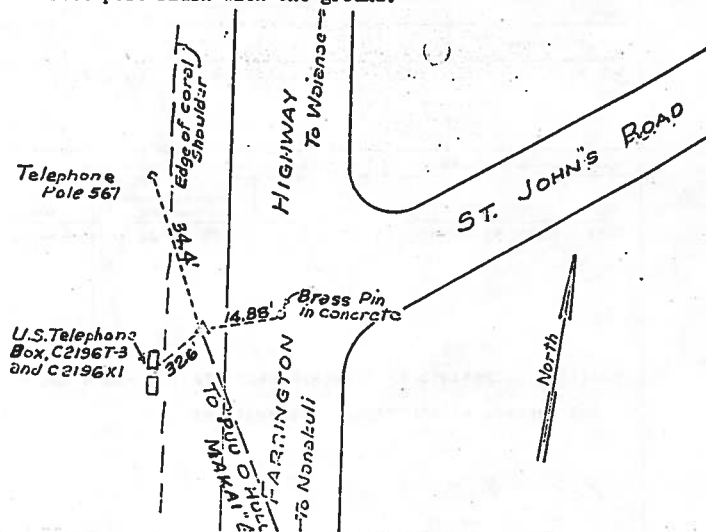
QUAD 211582 STATION 1043
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Designation **STATE SURVEY 8-7** State **Hawaii** County **Honolulu**
 Nearest town **Waianae** County **Honolulu** Chief of party **C. Symms**
 Distance and direction from nearest town **2.0 miles south** Leveling date **July 1969**
 Character of mark **SS disk** Stamping **8-7 1969**
 Established by **State of Hawaii**
 Detailed description

2.0 miles south along State Highway 90 from the post office at Waianae, at the junction of St. Johns Road, at a point in line with the extended center line of the road, 14.9 feet west of the center line of the highway, 3.9 feet west of the west edge of the highway pavement, 34.4 feet southeast of telephone pole 561, 32.6 feet northeast of a brown (Army type) telephone box marked C 2196-T3 C 2196-21, 159 feet south of fire hydrant No. 11517, and set in the top of a concrete post flush with the ground.

SS 8-7



DESTROYED

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **STATE SURVEY 8-7**
 STATE: **HAWAII** YEAR: **1969** SECOND ORDER

BOUNDARY: **G-14543**
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 25' 06.84351	ELEVATION:	3.85 METERS
GEODETIC LONGITUDE:	158 10 46.57988		12.6 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE °
HI 3	5103	438,906.84	91,534.26	- 0° 05' 56"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
PUU O HULU MAKAI	335° 46' 42.3	335° 50' 38"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PUU O HUL MAKAI

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1044
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Designation	STATE SURVEY 8-7A	State	Hawaii	County	Honolulu
Nearest town	Waianae	County	Honolulu	Chief of party	C. Symms
Distance and direction from nearest town	2.2 miles south				
Character of mark	SS disk				
Established by	State of Hawaii				
Detailed description	2.2 miles south along State Highway 90 from the post office at Waianae, near house No. 87-616, 17.4 feet east of the center line of the highway, 7.8 feet west of the south corner of a concrete block wall, 75.7 feet north of telephone pole 158, 69.0 feet south of telephone pole 158X, 34 feet south of guy pole 504T, 49.7 feet south of the north corner of the concrete block wall, and set in the top of a concrete post flush with the ground.				

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 8-7A

STATE: HAWAII

YEAR: 1969

SECOND ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 24' 57.63494	ELEVATION:	3.75 METERS
GEODETIC LONGITUDE:	158 10 44.96580		12.3 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ OR Δ ± ANGLE °
HI 3	5103	439,058.28	90,604.94	- 0 ° 03' 56"

* 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
PUU O HULU MAKAI	332 ° 57' 05.8	333 ° 01' 01"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PUU O HUL MAKAI

QH 138

HORIZONTAL CONTROL DATA

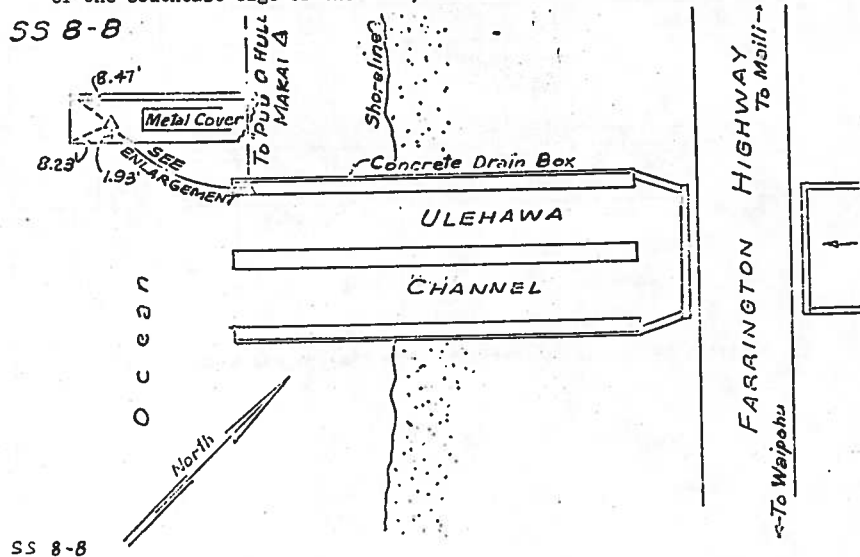
by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1045
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Destination STATE SURVEY 8-8 State Hawaii County Honolulu
 Nearest town Manakuli County Honolulu Chief of party C. Symms
 Distance and direction from nearest town 0.7 mile northwest Leveling date July 1969
 Character of mark SS disk Stamping 8-8 1969
 Established by State of Hawaii
 Detailed description Section T R

0.7 mile northwest along State Highway 90 from the post office at Manakuli, in the top and 3.0 feet northeast of the southwest end of the northwest concrete retaining wall for a drain of the Ulehawa Stream, 234.5 feet southwest of the northwest end of the southwest concrete railing for bridge over Ulehawa Stream, 251.4 feet southwest of the center line of the highway, 1.8 feet southeast of the raised portion of the wall, 2.2 feet southwest of the southwest end of a metal door in the wall, 1.9 feet northwest of the southeast edge of the wall, and about level with the highway.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 8-8
 STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 23' 42.47059	ELEVATION:	2.71 METERS
GEODETIC LONGITUDE:	158 09 38.20815		8.9 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE °
HI 3	5105	445,358.35	83,014.00	- 0° 03' 31"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PUU O HULU MAKAI	128° 14' 24.5"	128° 17' 55"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PUU O HUL MAKAI

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1046
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC SURVEY
 FORM 533
 Rev. Aug. 1963

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: NANAKULI STATE: Hawaii COUNTY: Honolulu

CHIEF OF PARTY: D.G. Rushford YEAR: 1964 Described by: R.F. Hanson

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK SURFACE-STATION MARK UNDERGROUND-STATION MARK	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	HEIGHT OF LIGHT ABOVE STATION MARK METERS		DIRECTION:
			feet	meters	
12a	KAHE 1875-1927 R.M. No. 2 Nanakuli, Kaiser Cement Plant, Water Tank		10.978	3.347	00 00 00.0 101 11 29 198 54 30.7
12a	R.M. No. 1		5.602	1.707	233 30 37

Station is located on the southwest end of the ridge running down toward the sea from Puu Heleakala, about 1/4 mile north of the north edge of Nanakuli village, at about 367 feet elevation and about midway between two power lines that cross the ridge about 1400 feet apart. To reach the station from the post office in Nanakuli, go southeast on Farrington Highway for 0.15 mile; turn left on Haleakala Av. just after passing under a pedestrian overpass, and go northeast for 0.7 mile to end of road at fence and power line. Pack northwest on trail along power line for about 1/4 mile to crest of ridge. Go left, down along top of ridge for about 700 feet to station. Station is marked with a "Type C" signal established by the Hawaii

Territorial Survey in 1930. This signal consists of a 5-foot-square, concrete platform projecting about 2 inches above ground. At the center of the platform is a concrete pedestal, 0.9 foot square and 2 feet high, with a 2-1/2-inch iron pipe running up through the center. A removable, red and white metal target is set into the pipe and extends 8 feet above the platform. The center of the 2-1/2-inch pipe is used as center of station. The concrete platform has "1930" inscribed in it.

Reference mark number one is a standard disk stamped "NANAKULI NO 1 1964", cemented in a drill hole in a large, brown, bedrock outcrop that projects 6 inches above ground. It is about 1-1/2 feet lower than top of station pipe.

Reference mark number two is a standard disk stamped "NANAKULI NO 2 1964", cemented in a drill hole in a 1-1/2 x 2-foot, square-cornered, brown, bedrock outcrop that projects 8 inches above ground. It is 3 feet northeast of the ridge trail and about 3 feet lower than top of station pipe.

NOTE: This station is described, but was not previously tied into the triangulation network.

* Refer to notes in manuals of triangulation and state publications of triangulation. † Direction-angle measured clockwise, referred to initial station. (To nearest meter only, when no trigonometric leveling is being done.) 16-58882-1 U. S. GOVERNMENT PRINTING OFFICE

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: NANAKULI

STATE: HAWAII YEAR: 1964 SECOND-ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21° 23' 31.39083	ELEVATION: 111.6 METERS
GEODETIC LONGITUDE: 158° 08' 42.58836	366 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ ± ANGLE
HI 3	5103	450,613.49	81,890.93	- 0° 05' 11"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
KAHE	339° 49' 58.3	339° 53' 09"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 140

(continued on next page)

JUN 1978

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

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211582

STATION 1046

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

NANAKULI (continued)

RECOVERY NOTE, TRIANGULATION STATION
TRAVERSE

R

NAME OF STATION: NANAKULI
ESTABLISHED BY: D.G.R. YEAR: 1964 STATE: Hawaii BENCH MARK(S) ALSO
RECOVERED BY: C.A.A. YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1/2 mile north of Nanakuli

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

The station mark was recovered as described in 1964, and in good condition. The center of the pipe, which was previously the mark was held. A standard triangulation disk stamped NANAKULI 1964 1969, was cemented in a drill hole in the center of a concrete slab which originally was the platform for a "Type C" Hawaiian Territorial Survey Signal. Reference marks 1 and 2 have been destroyed.

A new to reach follows:

To reach the station from the post office in Nanakuli. Go south-east on State Highway 90, for 0.15 mile to a side road on the left. Turn left and go east on Haleakala Avenue for 0.3 mile to Palikea Street on the left. Turn left on Palikea Street and go north for 0.05 mile to a T-road. Turn left and go west and north on a paved road for 0.2 mile to the end of truck travel. From here pack northerly for 20 minutes to the top of the ridge and the station.

A Geodimeter Traverse was made between NANAKULI 1964 1969 and

KAHE 1875 1927.

Geodimeter distance 4,376.800 meters or (14,359.41)

FORM CG-5-526 (10-60)

ENVIRONMENTAL SERVICE SERVICES ADMINISTRATION

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

QUAD 211582 STATION 1047
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: **NANAKULI USN ELEC LAB FORACS III S STA**
 CHIEF OF PARTY: **C.A. Annis** YEAR: **1969** STATE: **Hawaii** COUNTY: **Honolulu**

Description, including sketch of object:

The station is located about 200 feet west of the highway, 1.3 mile southeast of the village of Nanakuli. The station is the red light that is about 2 feet above the roof of a small white building on top of a 3 legged steel structure. The light is about 50 feet above the ground.

FORM C&GS-325b (12-68)
 30250-Pes

Described by _____
 U.S. DEPARTMENT OF COMMERCE
 5284
 COAST AND GEODETIC SURVEY

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **NANAKULI USN LAB 111 S STA**
 STATE: **HAWAII** YEAR: **1969** THIRD ORDER

SOURCE: **G-14543**
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 22' 41.48821	ELEVATION:	METERS
GEODETIC LONGITUDE:	158° 08' 33.49726		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR θ ANGLE *
HI 3	5103	451,468.07	76,854.97	- 0 03 07 "

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

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

QH 141

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

QUAD 211582 STATION 1048
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION
NANAKULI USN ELEC LAB FOR ACST III MID STA

NAME OF STATION:

CHIEF OF PARTY: C.A. Annis YEAR: 1969 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object:

The station is the light on top of the small house, located in the village of Nanakuli just north of the junction of Farrington Highway and Lualuale Naval Road. It is a small house that is on top of a 3-legged gray steel tower that is 30 feet high and it is on the west side of Farrington Highway on the beach.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: NANAKULI USN LAB 111 MID STA

STATE: HAWAII YEAR: 1969 THIRD ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 23' 33.49072	ELEVATION:	METERS
GEODETIC LONGITUDE:	158° 09' 26.15364		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ (OR Δ) ρ (ANGLE) °
HI 3	5103	446,496.62	82,106.78	- 0° 03' 27"

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

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

FORM C&GS-525b (12-68)

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

QH 142

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1049
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Kahe (Oahu Island, Hawaiian Government Survey, 1875; L. G. Simmons, 1927).—On summit of ridge near boundary between the Ewa and Waianae districts, the most southerly ridge leading off west from the Waianae Range, overlooking the shore road to Waianae, and about 700 feet from the sea. Originally marked by concrete post and cairn of stones, which in 1927 was replaced with a new mark, note 6a, a standard disk station mark in concrete in tile. Reference mark No. 1, note 12a, a standard reference disk in outcropping bedrock, is 20.258 meters (66.46 feet) from station in azimuth 249° 22'. Reference mark No. 2, a standard reference disk set in drill hole in concrete base, is 7.552 meters (24.78 feet) from station in azimuth 17° 39'. Re-marked according to note 14A in 1929.

C.A. Burroughs, 1962)--The station and reference marks were recovered in good condition as described. 2nd-order astronomic observations were made.

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

FORM CGS-526 (9-24-64)
 USCOMM-DC 6981-P64

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION KAHE
 STATE HAWAII YEAR 1875 FIRST ORDER
 SOURCE G-14543

GEODETIC LATITUDE	21° 21' 17.80039	ELEVATION	84.8 METERS
GEODETIC LONGITUDE	158 07 50.21694		278 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	g OR Δ g ANGLE *
HI 3	5103	455,551.59	68,407.34	- 0 02' 51"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
PUU O HULU MAKAI	141° 16' 39.7"	141° 19' 31"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 143

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1049

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

KAHE (continued)

FORM 526a
 (6-18-69)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAHE
 ESTABLISHED BY: HGS YEAR: 1875 STATE: Hawaii
 RECOVERED BY: W.R. Porter YEAR: 1964 COUNTY: Honolulu

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
		METERS		
PALAILAI 1873-1927				00 00 00.0
R.M. No. 2	SSW	24.787	7.556	89 59 07
R.M. No. 1	ENE	66.446	20.254	321 46 05

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

Station is located about 2-1/4 miles southeast of Nanakuli and 4 miles west-northwest of Barbers Point Naval Air Station, at about 277 feet elevation, on the extreme west end of a ridge. It is at the south side of the new Hawaiian Electric Company power plant and about 600 feet east of Farrington Highway.

To reach station from the traffic light at the main intersection in Waipahu, go westerly on Farrington Highway for 6.8 miles to the intersection of Campbell Park Road on the left. Continue ahead on the high-

way for 2.8 miles to wide graveled road right, with a locked cable gate about 50 yards off the highway. Pass through the gate and go 0.7 mile to another locked cable gate. Pass through and continue for 0.15 mile to end of truck travel about 100 yards before reaching a micro-wave relay building. Pack westerly down along old road for about 200 yards to station.

Station mark is a standard disk stamped "KAHE 1927", set in concrete in the top of a 6-inch tile that projects 1 foot above ground. It is 75 feet north of an old military observation post with top caved in. A "Type A", Hawaii Territory Survey signal is centered over the mark; the concrete floor is 3-1/2 feet above ground and the red and white metal target extends 8 feet above the floor.

Reference mark number one is a standard disk stamped "KAHE NO 1 1927", cemented in a drill hole in lava outcrop that projects 8 inches. It is down at the base of the station knoll, 12.3 feet lower than station mark.

Reference mark number two is a standard disk stamped "KAHE NO 2 1927", cemented in a drill hole in the center of a hexagonal concrete foundation that is 6 feet across the center. It is in the bottom of a depression about 3 feet deep and 12 feet across. The mark is 5.1 feet lower than station mark and is usually covered with leaves and dirt.

NOTE: Key for locked gates may be obtained at the Hawaiian Electric Company power plant mentioned above.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAHE
 ESTABLISHED BY: H.G.S. YEAR: 1875 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: C.A.A. YEAR: 1969 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2 3/4 miles south-southeast of Nanakuli
 HEIGHT OF TELESCOPE ABOVE STATION MARK 8.7 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 8.0 FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
		METERS		
·PUU O HULU MAKAI 1927 1969				0 00 00.0
·R.M. 1	·ENE	66.38	20.231	108 04 51
·MICRO—WAVE DISH (center of back)	·E	(0.25 mile)		120 46 28.2
·R.M. 2	·SSW	24.68	7.522	236 19 07

The station mark and both reference marks were recovered and found to be in good condition. A shorter distance to both reference marks was noted, from what was recorded in the 1964 data. A complete description follows.

The station is located about 4 miles northwest of Barbers Point Naval Station and 2 3/4 miles south-southeast of Nanakuli, on the west end of a low ridge, just above Interstate Highway H-1.

To reach the station from the junction of State Highway 75 and Interstate Highway H-1, go west on the interstate for 5.1 miles to the Campbell Industrial Exit on the right. Continue northwest on the interstate for 2.5 miles to a graveled side road right, and a locked gate about 200 feet from the interstate. (Key for this gate was obtained from the Civil Defense office at City Hall in Honolulu.) Turn right on graveled road, passing through gate, and follow main road northeast then west for 0.8 mile to the top of a ridge. (This is about 0.1 mile before reaching a micro-wave installation.) Turn left, picking way through brush, for 0.15 mile to the west end of the ridge and the station on a small knoll.

The station mark is a standard disk, stamped KAHE 1927, set in the top of a concrete-filled 6-inch iron pipe which projects about 1 foot. A Hawaii Territory "Type A" signal is over the mark. It is a 5-foot square concrete slab supported on two ends by rock walls. It is about 3 1/2 feet tall and 75 feet north of an old military observation post.

Reference mark 1 is a standard disk, stamped KAHE NO 1 1927, cemented in a drill hole in outcropping rock which projects about 8 inches. It is at the base of the knoll and about 12 feet lower than the station.

Reference mark 2 is a standard disk, stamped KAHE NO 2 1927, cemented in a drill hole in the near center of a hexagonal concrete slab that is 6 feet across. It is about 5 feet lower than the station.

The back center of the micro-wave dish was intersected and may serve as an azimuth.

No measurement between reference marks due to rough terrain.

* 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. ~24c

FORM CG 5-526a (12-69)
 USCGM&C 3831-P&S

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1050
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 8-9

CHIEF OF PARTY: Carl A. Annis YEAR: 1969 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object:

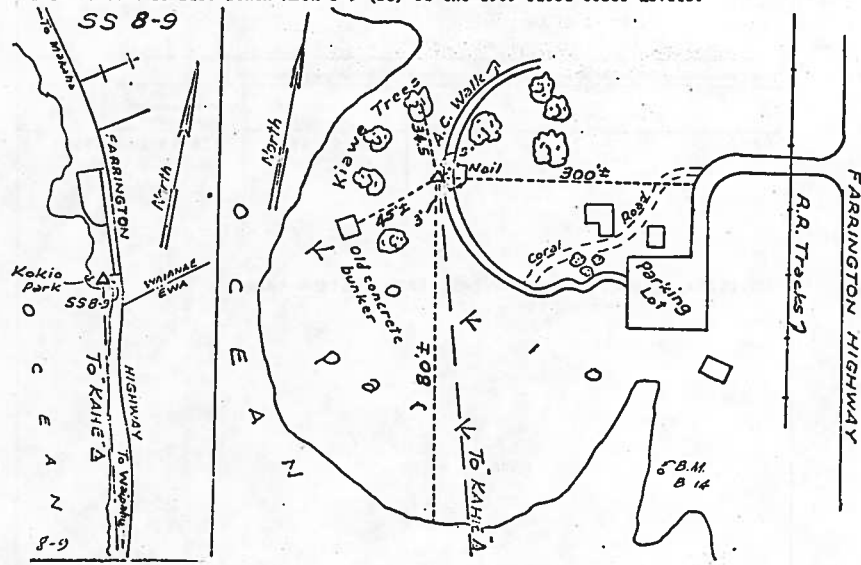
Station is located in Manakuli, just northerly of Ewa-Waianae district boundary, in the Kokio Beach Park about 100 ft. makai of Farrington Highway at makai end of parking lot. Station is on makai edge of asphaltic-concrete walkway about 300 ft. from parking lot near four Kiawe Trees.

Station mark is a standard State Survey disk stamped "8-9 1969" in concrete monument flush with ground level. Ties from station are: SW 45 ft. + to old concrete bunker; N 34.5 ft. to Kiawe Tree; NE 3 ft. to nail in walkway; SE 3 ft. to nail in walkway.

Sub-surface mark is identical with station, cemented in coral 2.6 ft. below ground level and separated from top monument by a layer of sand.

Geodimeter connection was made between "KAHE" and "State Survey 8-9."

This station is also Bench Mark 8-9 (SS) of the 1969 First Order Levels.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 8-9

STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 22' 21.29415	ELEVATION:	3.71 METERS
GEODETIC LONGITUDE:	158° 08' 24.67683		12.2 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE*
HI 3	5103	452,299.85	74,816.64	- 0° 03' 04"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
KAHE	333° 02' 54.3	333° 05' 58"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION KAHE

QH 144

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1051
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-1

CHIEF OF PARTY: Carl A. Annis YEAR: 1969 STATE: Hawaii COUNTY: Honolulu

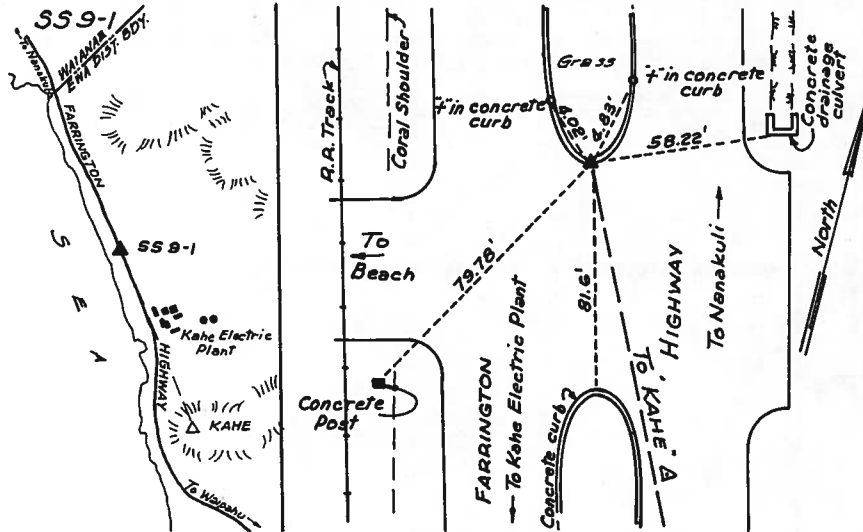
Description, including sketch of object:

Station is located in Honouliuli, Ewa District, on Farrington Highway, between Kahe Point and the Waianae-Ewa District boundary. It is 1.0 mile northwest of Kahe Park and 0.3 mile northwest of the Hawaiian Electric Company's Kahe Power Plant.

Station mark is a standard State Survey disk stamped "9-1 1969" cemented in drill hole in concrete curb in medial strip of Farrington Highway. It is at north end of break in medial strip at intersection with road leading to beach. Ties from station are: SW 79.78 ft. to concrete post at southwest side of intersection, NW 4.02 ft. and N 4.83 ft. respectively to crosses in concrete curb of medial strip, NE 58.22 ft. to southwest corner of concrete drainage culvert and SE 81.6 ft. to south end of break in medial strip.

Geodimeter connection was made between "KAHE 1875 1927" and State Survey "9-1 1969".

This station was also used as Bench Mark 9-1 (SS) in the 1969 First Order Levels.



NAME OF STATION: STATE SURVEY 9-1

STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 21' 50.58155	ELEVATION:	9.09 METERS
GEODETIC LONGITUDE:	158 08 03.69171		29.8 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ IOR Δ θ ANGLE
HI 3	5103	454,280.68	71,716.02	- 0° 02' 56"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
KAHE	338° 56' 18.9	338° 59' 15"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION KAHE

QH 145