

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581

STATION 1001

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

OPANA (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: OPANA
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: 4 miles west of Kahuku
HEIGHT OF TELESCOPE ABOVE STATION MARK 10 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 9 FEET.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KAHUKU NEW 2 1965				0 00 00.0
R.M. 1	ENE	114.00	(34.748)	17 55 51
R.M. 2	S	166.58	(50.775)	128 22 25
KAHUKU WATER TANK	W	(About 150 feet)		203 35 38.0

The station mark and reference marks were recovered as described in the 1964 data and found to be in good condition. A slight difference was found in the measurements from the station to both reference marks. A new and complete description follows.

The station is located about 4 miles west of Kahuku, 2 1/2 miles southwest of the northern-most point of the island and on the same ridge as the Kahuku Water Tank.

To reach the station from the Kahuku Sugar Plantation office in Kahuku, go northwest on State Highway 83 for 4.2 miles to a crossroad and sign "United States Army Training Area--Kahuku B". Turn left, southerly, on surfaced road for 1.4 miles to a track road on the right. (This is about 0.05 mile before reaching the enclosed area where the Kahuku Water Tank is located.) Turn right for 0.05 mile to the station on the left.

The station mark is a standard disk, stamped OPANA 1927, set in a concrete filled 5-inch pipe which projects from the top of the concrete top of a large reservoir. There is a rock and concrete monument which is about 3 1/2 feet tall and 5 feet square over the mark. It is 93 feet north of the center of the surfaced road, 52 feet east of the security fence enclosing the water tank, and 8.5 feet east-northeast of the reservoir cupalo.

Reference mark 1 is a standard disk, stamped OPANA NO 1, cemented in a drill hole in the top of a large boulder which is about 11 feet across and projects 5 feet. It is 50 feet east of the center of the track road and about 16 feet lower than the station.

Reference mark 2 is a standard disk, stamped OPANA NO 2, cemented in a drill hole in a 5 by 6 foot rock outcrop which projects 1 foot. It is 73.5 feet south of the center of the surfaced road, 39 feet east of the security fence and about 8 feet lower than the station.

No measurement was made between the reference marks because of thick brush.

The distance to the water tank could not be measured due to the security fence around it.

* 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 505-526 (12-68)
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

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

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581

STATION 1001

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

OPANA (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: OPANA
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: 4 miles west of Kahuku
HEIGHT OF TELESCOPE ABOVE STATION MARK 10 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 9 FEET.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KAHUKU NEW 2 1965				0 00 00.0
R.M. 1	ENE	114.00	(34.748)	17 55 51
R.M. 2	S	166.58	(50.775)	128 22 25
KAHUKU WATER TANK	W	(About 150 feet)		203 35 38.0

The station mark and reference marks were recovered as described in the 1964 data and found to be in good condition. A slight difference was found in the measurements from the station to both reference marks. A new and complete description follows.

The station is located about 4 miles west of Kahuku, 2 1/2 miles southwest of the northern-most point of the island and on the same ridge as the Kahuku Water Tank.

To reach the station from the Kahuku Sugar Plantation office in Kahuku, go northwest on State Highway 83 for 4.2 miles to a crossroad and sign "United States Army Training Area--Kahuku B". Turn left, southerly, on surfaced road for 1.4 miles to a track road on the right. (This is about 0.05 mile before reaching the enclosed area where the Kahuku Water Tank is located.) Turn right for 0.05 mile to the station on the left.

The station mark is a standard disk, stamped OPANA 1927, set in a concrete filled 5-inch pipe which projects from the top of the concrete top of a large reservoir. There is a rock and concrete monument which is about 3 1/2 feet tall and 5 feet square over the mark. It is 93 feet north of the center of the surfaced road, 52 feet east of the security fence enclosing the water tank, and 8.5 feet east-northeast of the reservoir cupalo.

Reference mark 1 is a standard disk, stamped OPANA NO 1, cemented in a drill hole in the top of a large boulder which is about 11 feet across and projects 5 feet. It is 50 feet east of the center of the track road and about 16 feet lower than the station.

Reference mark 2 is a standard disk, stamped OPANA NO 2, cemented in a drill hole in a 5 by 6 foot rock outcrop which projects 1 foot. It is 73.5 feet south of the center of the surfaced road, 39 feet east of the security fence and about 8 feet lower than the station.

No measurement was made between the reference marks because of thick brush.

The distance to the water tank could not be measured due to the security fence around it.

* 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 505-526 (12-68)
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL 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 211581 STATION 1002
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Designation STATE SURVEY 5-11 State Hawaii County Honolulu
Nearest town Kanuku County Honolulu Chief of party C. Symms
Distance and direction from nearest town 5.2 miles northwest Leveling date July 1969
Character of mark SS disk Stamping 5-11 1969
Established by State of Hawaii
Detailed description

5.2 miles northwest along State Highway 83 from the
Kahuku Plantation Company Headquarters at Kahuku, in the northeast
corner of a grassy triangle formed by the junction of a dirt road
southwest, 15.5 feet northwest of the center line of the highway,
7 feet southeast of the center line of the road, 92 feet northeast
of the center line of a dirt road west-northwest, 106½ feet south-
west and across the road from power pole 92-342T, about level with
the highway, and set in the top of a concrete post 0.1 foot under-
ground.

FORM C&GS-638
(6-68)
USCOMM-DC 60258-P68

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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 5-11

STATE: HAWAII

YEAR: 1969

SECOND

--ORDER

SOURCE: G-14543
NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 41' 46" 18037	ELEVATION:	4.76 METERS
GEODETIC LONGITUDE:	158 01 19.26210		15.6 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE °
HI 3	5103	492,525.03	192,334.79	- 0° 00' 29"

* 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
OPANA	306° 01' 03.0	306° 01' 32"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION OPANA

QH 027

QUAD 211581 STATION 1003
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NE 411 OAHU

QH 028

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1004
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Waialeale (Oahu Island, Hawaiian Government Survey, 1875; L. G. Simmons, 1927).—On northern coast of Oahu, in the land of Waialeale, about 3½ miles west of Kahuku, on the highest point at north end of a ridge about ¾ mile south of Waialeale Industrial School. Car can be driven to station over pineapple roads. Originally marked by concrete post with cross in top. In 1927 a standard disk station mark was set in center of cross, note 1b. Reference marks, note 12c, standard reference disks in boulders, are at the following distances and azimuths from station: No. 1, 15.125 meters (49.62 feet), 50° 28'; No. 2, 19.950 meters (65.45), 344° 09'. Re-marked according to note 14A in 1929.

FORM 526a
(2-15-63)

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

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

HEIGHT OF TELESCOPE ABOVE STATION MARK 2.79 METERS, HEIGHT OF LIGHT ABOVE STATION MARK METERS.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
OPANA 1927				00 00 00.0
R.M. No. 2	SSE	65.446	19.948	91 52 03
PUPUKA 1875-1927				149 45 36.3
R.M. No. 1	SW	49.621	15.126	158 09 34

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

Station is located in north Oahu, about 3 miles southwest from Kahuku Point and 0.3 mile southeast of Kamehameha Highway, on a bare hill of about 534 feet elevation that lies between Kaunala and Waialeale Gulches.

To reach station from the Kahuku Plantation Company office in Kahuku, go northwest and west on Kamehameha Highway for 6.2 miles to a graveled side road left, by water hydrant G-6 and a sign "BOULDER ROAD". Turn left and follow the graveled road upgrade for 0.2 mile to a board

gate. Pass through gate and continue for 0.6 mile to crossroad. Turn left and follow track road for 0.3 mile to station.

Station mark is a standard disk stamped "WAIALEALE 1927", set in the top of a 10-inch-diameter, concrete monument that projects 6 inches above ground. A "Type A" signal, built by the Hawaii Territorial Survey in 1929, is centered over the mark. The concrete platform of the signal is about 3-1/2 feet above ground.

Reference mark number one is a standard disk stamped "WAIALEALE NO 1", cemented in a drill hole in a triangular boulder about 3 feet on each side and projecting 1-1/2 feet above ground. It is 3.7 feet lower than station mark.

Reference mark number two is a standard disk stamped "WAIALEALE NO 2", cemented in a drill hole in a large boulder about 6 feet in diameter and projecting 3-1/2 feet above ground. It is 4 feet lower than station mark.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WAIALEALE

STATE: HAWAII

YEAR: 1875

FIRST

-ORDER

SOURCE: G-14543

GEODETTIC LATITUDE:	21° 41' 08.45731	ELEVATION:	163.1 METERS
GEODETTIC LONGITUDE:	158 01 26.01032		535 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	# OR Δ & ANGLE
HI 3	5103	491,888.04	188,528.49	- 0 00 32

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

TO STATION OR OBJECT	GEODETTIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
KAHUKU NEW 2	238° 18' 34.8	238° 19' 07"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 029

(continued on next page)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1004

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

WAI'ALEE (continued)

FORM 526a
(2-12-68)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: WAI'ALEE

ESTABLISHED BY: H.G.S.

YEAR: 1875

STATE: Hawaii

RECOVERED BY: C.A. Annis

YEAR: 1969

COUNTY: Honolulu

Airline Distance From Nearest Town: 2 miles northeast of Sunset Beach

HEIGHT OF TELESCOPE ABOVE STATION MARK 8.7 Feet. HEIGHT OF LIGHT ABOVE STATION MARK 7.7 Feet.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KAHUKU NEW 2 1965				° 0 00 00.00
R.M. 2	SSE	65.45	19.953	105 50 12
R.M. 1	SW	49.65	15.132	172 07 34
R.M. 1 to R.M. 2		64.29	19.597	

Station and reference marks were recovered as described and in good condition, a complete description follows:

Station is located 5 miles west of Kahuku, 3 miles southwest of Kahuku Point, 0.3 mile southeast of State Highway 83, (Kamehameha Highway), and on a bare knoll between Kaunala and Waialeale Gulches.

To reach the station from the Kahuku Plantation Company Office, in Kahuku, go northwest on State Highway 83 for 6.35 miles to a side road on the left and sign "U.S. Army Training Area "Kahuku A"; turn left and follow the main road westerly for 0.2 mile to a gate; continue ahead northwesterly for 0.85 mile up slope of ridge to a side road on the left, in a saddle of the ridge; turn left, east, for 0.05 mile to a crossroad; turn left on track road and go northerly for 0.4 mile to the top of a round knoll and station.

Station is a standard disk stamped WAI'ALEE 1927, set in the top of a 10-inch concrete cylinder which projects 6 inches above the ground surface and on the highest point in the immediate vicinity. The station has a "Type A" signal built by the Hawaii Territorial Survey centered over it, the concrete platform of the signal is 5 1/2 feet square and projects 3 feet above the ground surface.

Reference mark 1 is a standard disk stamped WAI'ALEE NO 1, cemented in a drill hole in the top of a 2-foot square boulder which projects 1 foot on its east side and 2 1/2 feet on its west side, about 3 feet lower than the station and on the southwest slope of the hill.

Reference mark 2 is a standard disk stamped WAI'ALEE NO 2, cemented in a drill hole in the top of a 6-foot square boulder which projects 4 feet above the ground surface, about 4 feet lower than the station and on the south slope of the hill.

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.

FORM CG-526a (12-68)
USCOMM-DC 56291-P68

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 211581 STATION 1005
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

MALU (Hawaii, H.A.P., 1932)--Station is 2.3 miles E of Waimea, 1/2 mile WNW of Paumalu Camp, where the cliff turns SE up the Kaunala Gulch. A telephone line passes 2 meters E of station.

Station mark is a standard disk set in concrete in a depression in a boulder.

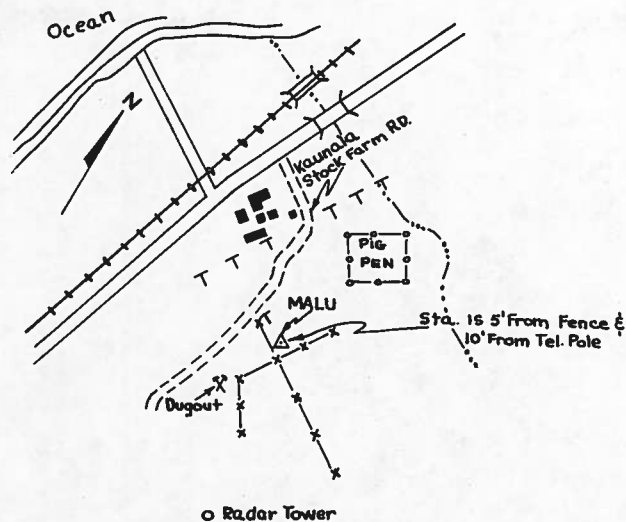
R.M.s 1 and 2 are standard disks set in concrete in depressions in outcropping bedrock.

Witness mark 1 is a concrete post, 8 inches square with a 1-1/2-inch galvanized-iron pipe in center, set flush with the ground, 1 foot W of a fence line.

Witness mark 2 is the last telephone pole before the line goes over the cliff.

OBJECT	DISTANCE meters	DIRECTION
WAIALEE		0°00'00"0
R.M. 2	13.56	11 56 41
Witness mark 1	2.14	132 20
R.M. 1	7.96	249 13
Witness mark 2	3.24	306 05

(477th FA Obs.Bn., 1945)--Station is 2.3 miles NE of Waimea, 1/2 mile WNW of Paumalu Camp, on prominent ridge SE of Paumalu station where cliff turns SE up the Kaunala Gulch. Station is 10 feet from a telephone pole and 5 feet from fence corner. Marks are in good condition.



(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MALU

STATE: HAWAII

YEAR: 1932

SECOND

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 40' 45.67057	ELEVATION:	111	METERS
GEODETIC LONGITUDE:	158° 02' 10.55230	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE
HI 3	5103	487,686.58	186,230.05	- 0° 00' 48"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
WAIALEE	241° 18' 19.2"	241° 19' 07"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

POSITION DETERMINED BY TRAVERSE FROM STATION WAIALEE

AND CHECKED BY ADDITIONAL OBSERVATIONS

QH 030

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1005

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

MALU (continued)

FORM 526a
(2-15-65)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: MALU
ESTABLISHED BY: H.A.P.
RECOVERED BY: W.R. Porter
YEAR: 1932
STATE: Hawaii
COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK		1.50 METERS,		HEIGHT OF LIGHT ABOVE STATION MARK		METERS.	
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION							
OBJECT	BEARING	DISTANCE		DIRECTION			
		FEET	METERS				
-----1932 DISTANCES AND DIRECTIONS-----							
WAIALEE				00	00	00.0	
R.M. 2			13.56	11	56	41	
Witness mark 1			2.14	132	20		
R.M. 1			7.95	249	13		
-----1963 DISTANCES AND DIRECTIONS-----							
R.M. No. 2	ENE	49.760	15.168	11	56	28	
Witness Mark 1	SSW	6.923	2.110	132	22	02	
R.M. No. 1	NW	24.897	7.590	249	10	22	

Station was recovered and all marks found in good condition. Discrepancies were noted in the distances to both reference marks; they were checked in the field and the 1963 distances are correct. Measurements to the two witness marks checked closely, so the reference mark measurements were probably erroneous and not an indication of shifting of any marks. A complete description follows:

Station is located about 2-3/4 miles airline northeast of Waimea and 1/4 mile southeast of Kamehameha Highway, at 366 feet elevation, overlooking Sunset Beach, on northwest point of a bare, pastureland hill, in the north angle of a cross-fence junction, and about 1/2 mile north of a large group of wooden antenna poles.

To reach station from the Kahuku Plantation Company headquarters in Kahuku, go westerly on Kamehameha Highway for 6.5 miles to asphalt side road left, at sign "GIRL SCOUT CAMP", 0.2 mile before reaching the Sunset Store. Turn left and follow road upgrade for 1.25 miles to water tank at top of grade. Continue ahead for 0.05 mile to wire gate on left. Pass through gate and follow dim track road north across pastureland for 0.3 mile to 2 water troughs. Pass through 4 wire gates, then bear left and follow track road downgrade for 0.55 mile to end of hill and station.

Station mark is a standard disk stamped "MALU 1932", cemented in a drill hole in a 1 x 2-foot boulder that projects 4 inches. It is 8.3 feet northeast of the large, round, main fence post of the cross-fence junction.

Reference mark number one is a standard disk stamped "MALU NO 1", cemented in a drill hole in a 1 x 2-foot rock outcrop that projects 4 inches. It is under the northwest-southeast fence line, 6 inches southeast of a fence post, in dense brush, and 7 feet lower than station mark.

Reference mark number two is a standard disk stamped "MALU NO 2", cemented in a drill hole in a large boulder that is the west 1 of 2 that are the only ones in the vicinity. It is 20 feet southeast of a fence line and 11 feet lower than station mark.

Witness mark 1 is a 1-1/2-inch, iron pipe, projecting 1 inch from the top of a 10-inch-square, concrete monument flush with the ground. It is at the north side of the large, round fence post.

Witness mark 2 is an old telephone pole, 10.5 feet northeast of station. Name of chief of party should be inserted here. The officer who actually visited the station should sign his name at the end of the recovery note.

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

10C 2717A-PS

RECOVERY NOTE, TRIANGULATION STATION TRAVERSE

NAME OF STATION: MALU
ESTABLISHED BY: H.A.P.
RECOVERED BY: C.A.A.
YEAR: 1932
STATE: Hawaii
COUNTY: Honolulu
BENCH MARK(S) ALSO ☐
YEAR: 1969
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3 miles northeast of Waimea

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 as described, and in good condition. Witness marks 1 and 2 were not searched for at this time. The distance and direction to reference marks 1 and 2 were not checked at this time.
A Geodimeter Traverse was made between MALU 1932 and WAIALEE 1875 1927.
Geodimeter distance 1,459.724 or (4,789.06 ft.)

FORM C&GS-526 (2-66)
USCOMM-DC 24896-PSS

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1006
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Kawela (Oahu Island, Hawaiian Government Survey, 1875;
L. G. Simmons, 1927).—In the northern part of Oahu, in the Koolau
Range, 3½ miles west-southwest of Kahuku Mill, on the most southerly of three
bare summits, on the east side of a gulch which comes to the ocean about ½ mile
east of Waialea Industrial School. Marked originally by an iron pin; present
mark is United States Engineers' brass plate cemented in 5-inch iron pipe embed-
ded in ground. Reference mark is standard reference mark in concrete in tile,
note 13a, 5.900 meters (19.36 feet) from station, in azimuth 282° 19'.

KAWELA (Hawaii, Hawaiian Government Survey, 1875;
H.A.P., 1932) --Found a 10-
foot length of 1-inch pipe set in ground supported by a rude
frame. The reference mark was found in good condition.

FORM 3208
(9-18-69)

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

RECOVERY NOTE, TRIANGULATION STATION

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

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

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
OPANA 1927				00 00 00.0
R.M. No. 1	ESE	19.340	5.895	118 23 36
R.M. No. 2	SSE	9.337	2.846	186 02 12

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

Station is located about 3-1/2 miles west-southwest of Kahuku, 2-1/4 miles south-southeast of Kawela Bay and 200 yards west of a radar installation, on a small knoll of about 1095 feet elevation.

To reach station from the Kahuku Plantation Company office in Kahuku, go northwest on State Highway 83 for 4.2 miles to crossroad at Hanopu St. Turn left and go on hard-surfaced road through cane field for 0.45 mile to cattleguard at end of field. Cross cattleguard and continue on main road

upgrade for 0.9 mile to fork by corral on right. Take left fork and follow dirt road for 0.5 mile to fork. Take right fork and go 0.2 mile to side road left in grove of large trees on crest of ridge. Turn left and go 0.2 mile to fork. Take right fork, crossing culvert 21, and go 0.15 mile to side road right, just before reaching a mock village in army training area. Turn right and go 0.15 mile to crest of ridge by phone junction panel. Go left on track road along crest of ridge for 0.75 mile to station on right.

Station mark is a 3 x 4-inch brass plate of the U.S. Army Engineers, stamped "KAWELA" and set in the top of a 5-inch soil pipe that projects 1 inch from a mass of concrete that is flush with the ground. At center of brass plate is a 1-inch triangle which has at its center a small brass stub projecting 1/4-inch. The mark is about 60 feet south of road and 35 feet higher, 4 feet east-southeast of sheer edge of knoll, and 3 feet southeast of the base of a gnarled, windswept eucalyptus tree.

Reference mark number one is a standard disk stamped "KAWELA NO 1", set in concrete in the top of a 5-inch soil pipe that projects 7 inches above ground. It is about 1 foot lower than station mark.

Reference mark number two is a standard disk brazed to the top of a 1-1/2-inch iron pipe that is set in cement and projects 4 inches above ground. It is about 1 foot lower than station mark.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAWELA

STATE: HAWAII

YEAR: 1875

FIRST

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 40' 01.02520	ELEVATION:	333.3 METERS
GEODETIC LONGITUDE:	158 00 17.95298		1053 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S 10R Δ 41 ANGLE °
HI 3	5103	498,306.57	181,723.77	- 0 00 07

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE S 10R Δ 41 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From north)	PLANE AZIMUTH (From north)	CODE
CAMP PUPUKEA	44° 09' 57.3	44° 10' 04"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 031

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1006

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

*KAWELA (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KAWELA
ESTABLISHED BY: H.G.S. YEAR: 1875 STATE: Hawaii BENCH MARK ALSO ☐
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 4 miles southwest of Kahuku
HEIGHT OF TELESCOPE ABOVE STATION MARK 4 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 4 FEET.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
CAMP PUPUKEA				° 00 00.0
Kahuku Water Tank	NW	(1 3/4 miles)		118 37 15.6
RM 1	E	19.34	5.896	238 06 27
RM 2	S	9.33	2.843	305 35

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

A new description follows.

The station is located about 4 miles southwest of Kahuku, 2 1/2 miles southeast of Kawela Bay, 200 yards west of a radar installation and on the highest point of a low knoll.

To reach the station from the Kahuku Plantation Company Office at the northwest edge of Kahuku, go northwest on State Highway 83 for 2.0 miles to a surfaced side road left and a sign on the right reading "USAF PACAF HF/SSB Station 1891 Comm. Sq. AFSC", turn left and go southwesterly on the surfaced road for 1.2 miles to a fork, take the left fork and continue southerly for 0.3 mile to a fork and a sign "All Visitors Report to Battery Administration Building for Processing". (Note: Clearance must be obtained at this building to pass through the radar installation which is on the way to the station. To reach the building from this point, take the left fork and go southeasterly for about 1 mile to the building on the right.) Take the right fork and continue southwesterly on the surfaced road for 1.7 miles to the entrance to the radar installation, pass through the gate, turn left and go southerly for 0.1 mile to another gate, pass through the gate and continue south and west on a bulldozed road for 0.15 mile to the station on the left, about 100 feet south and 50 feet higher than the road.

The station mark is a 3 x 4 inch brass plate stamped KAWELA, set in the top of a 4 inch concrete filled soil pipe flush with the ground.

Reference mark 1 is a standard disk stamped KAWELA NO 1, set in the top of a 4 inch concrete filled soil pipe projecting 6 inches and about 1 foot lower in elevation than the station mark.

Reference mark 2 is a standard disk stamped KAWELA 1875 1927 NO 2 1964, brazed to the top of a 2 inch soil pipe projecting 4 inches and about 1 foot lower in elevation than the station mark.

The distance between RM 1 and RM 2 is 18.00 feet or 5.485 meters.

* 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 211581 STATION 1007
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

Lak (Oahu Island, L. G. Simmons, 1927).—In northern part of Oahu, on the first bare summit about 120 yards south of Kawela. Marked according to note 6a, a standard disk station mark set in concrete in top of tile. Reference marks, note 13a, standard reference disks in concrete in tiles, were set at the following distances and azimuths from the station: No. 1, 7.905 meters (25.93 feet), 321° 20'; No. 2, 2.533 meters (8.31 feet), 77° 08'. Re-marked according to note 14A in 1929.

FORM 522
(11-8-55)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: LAK
ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii
RECOVERED BY: R.M. Towill CORRECTION: 1958 COUNTY: Honolulu

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

Station found disturbed. The observing platform has been destroyed by an explosion. The mark has been shifted slightly.

FORM 522
(11-8-55)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: LAK
ESTABLISHED BY: L.G.S. 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 mark was destroyed when a large cut was made into the side of the knoll in preparation for a location for a water tank. Both reference marks were recovered.

Reference mark number one is a standard disk stamped "LAK NO 1", set in cement in the top of a 5-inch soil pipe that projects 10 inches above ground. It is 30 feet southwest of the water tank and is in good condition.

Reference mark number two is a standard disk stamped "LAK NO 2", set in cement in the top of a 5-inch soil pipe that projects about 2 feet above ground. It is loose and in poor condition.

Located on the prominent knoll just outside the fence at the south end of a radar station.

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

COM-DC 34314

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: LAK

STATE: HAWAII

YEAR: 1927

SECOND

ORDER

SOURCE: G-14543

GEODETIC LATITUDE	21° 40' 00.482	ELEVATION	329	METERS
GEODETIC LONGITUDE	158 00 13.762	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ or ANGLE °
HI 3	5103	498,701.88	181,668.95	- 0° 00' 05"

* 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 281

QI 405

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 211581 STATION 1009
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: KAHUKU RADAR DOME

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

Description, including sketch of object:

Located 0.2 mile northeast of triangulation station Kawela.
The dome is 50 feet in diameter and 80 feet high.

INTERSECTION RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: Kahuku Radar Dome
ESTABLISHED BY: C.A. Annis YEAR: 1969 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: G.M. Ward YEAR: 1970 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

7 miles Northeast of Haleiwa

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

Station destroyed. Dome and antenna removed in March 1970. Building remains.

R

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAHUKU RADAR DOME

STATE: HAWAII

YEAR: 1969

THIRD

-ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 40' 02.09751	ELEVATION:	METERS
GEODETIC LONGITUDE:	158 00 12.08910		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ HOR Δ ϕ ANGLE °
HI 3	5103	498,859.68	181,831.96	- 0° 00' 05"

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

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1010
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

FORM 325
(6-16-69)

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: CAMP PUPUKEA STATE: Hawaii COUNTY: Honolulu
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	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	BEARING	DISTANCE		DIRECTION
					FEET	METERS	
11b		GROVE		W	36.87	11.238	00 00 00.00
7a		R.M. 2		NNE	(3-1/2 miles)	69 28 11	
		KAHUKU WATER TANK				173 15 37.4	
11b		R.M. 1		SE	41.91	12.776	300 20 20
		R.M. 1 to R.M. 2			71.16	21.691	

Station is located 10 miles north-northwest of Wahiawa, 6 1/2 miles northeast of Haleiwa, 5 1/2 miles west-southwest of Kahuku, 2 1/2 miles south of Sunset Beach and 0.1 mile southeast of the entrance to Camp Pupukea.

To reach the station from the Waimea Fire Station at the junction of State Highway 83, (Kamehameha Highway), and Pupukea Road, go easterly on Pupukea Road up steep grade for 2.35 miles to the end of surfaced road, continue straight ahead on bladed road southeasterly for 0.7 mile to the entrance to Camp Pupukea on the left, continue ahead southeast on bladed road for 0.1 mile to the station on the left.

Station mark is a standard disk stamped CAMP PUPUKEA, set in the top of a 12-inch concrete cylinder which projects 3 inches above the ground surface, 36 feet northeast of a fence, 27 feet southeast of the edge of a steep grade, and 18 feet northeast of the center of the bladed road.

Reference mark 1 is a standard disk stamped CAMP PUPUKEA NO 1 1969, set in the top of a 12-inch concrete cylinder which projects 7 inches above the ground surface, 32 feet northeast of a fence and 14 feet northeast of the center of the bladed road.

Reference mark 2 is a standard disk stamped CAMP PUPUKEA NO 2 1969, set in the top of a 12-inch concrete cylinder which projects 4 inches above the ground surface, 10 feet northeast of a fence and 8 feet southeast of the center of the bladed road.

Note: No Azimuth mark was established at this time.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: CAMP PUPUKEA
STATE: HAWAII YEAR: 1969 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 38' 42.51078	ELEVATION:	299.7 METERS
GEODETIC LONGITUDE:	158° 01' 39.51360		983 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	PLANE AZIMUTH ANGLE
HI 3	5103	490,611.88	173,802.23	- 0° 00' 37"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
GROVE	24° 43' 03.9"	24° 43' 41"	5103

QH 035

244

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

USC&G-S-DC 27171-P-6

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1011
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

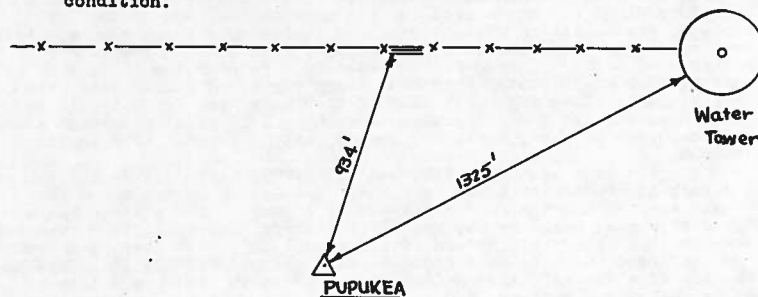
NO ORIGINAL TEXT

Pupukea (Oahu Island, Hawaiian Government Survey, 1875; L. G. Simmons, 1927).—On the sea end of the most prominent ridge about 2 miles northeast of the Waimea River and about ¼ mile from steep part of the bluff which borders the sea. Best reached by following the road from Waimea to top of hill, and taking left hand road just after reaching steep part of hill, thence following road along top of bluff some two miles. This road makes long slants inland to get around gulches. After passing the second such gulch turn off to right to reach station, which is about ¼ mile from where road emerges from gulch. Station is short distance from top of ridge. Marked by concrete post 5 inches square with cross in top. Over this was built (in 1927) a concrete pier with standard disk station mark centered over old mark. Reference marks are as follows: No. 1, standard disk reference mark in concrete in tile, note 13a, 2.463 meters (8.08 feet) from station in azimuth 138° 41'; No. 2, an 8-inch concrete cylinder with cross in top, 2.942 meters (9.65 feet) from station in azimuth 238° 42'. Re-marked according to note 14A in 1929.

(477th FA Obsn. Bn., 1945)—On the seaward end of the most prominent ridge about 2 miles NE of Waimea River and about 1/4 mile back from the steep coastal bluff.

At Waimea station on Highway 1, turn E on dirt road 135A and continue 1.5 miles to first road E of highway ranch. Turn left (N) on this road and proceed for 1 mile to water tower at cattle gate. Station is in open field about 1300 feet from water tower. A trail runs through field after passing tank.

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



(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUPUKEA

STATE: HAWAII

YEAR: 1875

FIRST

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 39' 36.91564	ELEVATION:	168.5 METERS
GEODETIC LONGITUDE:	158 02 54.24989		553 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	g OR Δ g: ANGLE *
HI 3	5103	483,562.96	179,293.58	- 0 01' 04"

* 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
AZIMUTH MARK	42 ° 09' 53.3	42 ° 10' 58"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 036

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581

STATION 1011

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

PUPUKEA (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

FORM 526a
(8-18-69)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUPUKEA
ESTABLISHED BY: Haw. Govt. YEAR: 1875 STATE: Hawaii
RECOVERED BY: D.G. Rushford YEAR: 1964 COUNTY: Honolulu

NAME OF STATION: PUPUKEA
ESTABLISHED BY: H.G.S. YEAR: 1875 STATE: Hawaii
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu BENCH MARK ALSO ☐
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1 1/2 miles northeast of Waimea
HEIGHT OF TELESCOPE ABOVE STATION MARK 74.4 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 85.6 FEET.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION		DISTANCE		DIRECTION
OBJECT	BEARING	FEET	METERS	
WAIALEE 1875-1927	---	1927	---	DISTANCE & DIRECTION
R.M. No. 2		9.65	2.942	00 00 00.0
R.M. No. 1		8.08	2.463	16 41 01
---	---	---	---	---
---	---	---	---	---
R.M. No. 2	NE	9.601	2.927	06 23 45
R.M. No. 1	NW	8.115	2.473	276 34 00

Station was recovered and all marks found in good condition, however a discrepancy of approximately 10 degrees was noted in the direction to R.M. No. 2. A complete description follows:

Station is located about 1-1/2 miles northeast of Waimea Bay and 1/2 mile inland from State Highway 83, at about 520 feet elevation in a pasture on the ridge between Kalunawaikaala and Pakulena Gulches.

To reach station from the fire station in Waimea Village, go east on Pupukea Rd. for 1.5 miles; turn left on Alapio Rd. and go 0.2 mile; continue straight ahead, where main road turns left, and go 0.15 mile to

track road right, with a locked gate about 25 yards down road. Pass through gate and continue on track road for 0.3 mile to fork. Take left fork and go 0.35 mile to locked gate. Pass through gate and continue for 0.1 mile; turn left into a wire corral, pass through wire gate in corner, and go across pasture for 0.2 mile to station.

Station mark is a standard disk stamped "PUPUKEA 1927", set in the top of a 10-inch-square, concrete monument that projects 4 inches above ground. It is 50 yards southwest of a clump of ironwoods, 130 feet southeast of a fence, and has a clump of brush by the west side. A "Type A" signal, built by the Hawaii Territorial Survey in 1929, is centered over the mark. The concrete platform of the signal is about 3 feet above ground and the red and white metal target extends 8 feet above the platform.

Reference mark number one is a standard disk stamped "PUPUKEA NO 1", set in concrete in the top of a 5-inch soil pipe that projects 7 inches above ground. It is at the northeast corner of the brush clump and is about 1 foot lower than station mark.

Reference mark number two is a cross in the top of a 10-inch-diameter, concrete monument that projects 1 inch above ground. It is 0.62 foot lower than station mark.

NOTE: Keys for the locked gates were obtained from Mr. A. Forsythe at 59395 Pupukea Rd.

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

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

USCOMM-DC 27178-P89

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
OBJECT	BEARING	DISTANCE	
		FEET	METERS
WAIALEE 1875 1927			
R.M. 2	NE	9.64	2.939
R.M. 3	SE	66.28	20.204
Azimuth Mark	SW	(3/4 mile)	180 08 55.3
R.M. 1	NW	8.16	2.489

Station and reference marks were recovered as described and in good condition. Due to a discrepancy in the distance and direction of reference mark Number 1, the establishment of an azimuth mark and a few road changes, a complete description follows:

Station is located 1 1/2 miles northeast of Waimea Bay, 1/2 mile inland from State Highway 83 and on the ridge between Kalunawaikaala and Pakulena Gulches.

To reach the station from the Waimea Fire Station, which is located at the junction of State Highway 83 and Pupukea Road, go easterly on Pupukea Road for 0.75 mile up steep slope to Alapio Road on the left, turn left, on Alapio Road for 0.5 mile to where Alapio Road turns right, continue straight ahead on a surfaced road for 0.05 mile to the entrance of Sunset Hills, continue ahead passing through entrance gate for 0.05 mile to a fork, turn right and go 0.3 mile on Wilinau Road to the intersection of Wilinau and Makana Roads, (to reach the azimuth mark from here, turn right on Makana Road for 0.2 mile to the mark on the left), continue ahead, leaving Wilinau Road and following a track road easterly down grade for 0.25 mile to a locked gate; pass through the gate and continue on the track road for 0.6 mile to a gate on the left; turn left passing through the gate, then bear sharp right and follow track road northeasterly along the north side of the fence line for 0.1 mile to a gate; pass through the gate, then turn sharp left passing through another gate, then pick way northerly across pasture for 0.1 mile to the station.

Station is a standard disk stamped PUPUKEA 1927, set in the top of a 8-inch square concrete monument which projects 6 inches above the ground surface and 130 feet southeast of a fence. The station has a "Type A" signal built by the Hawaii Territorial Survey in 1929 centered over it, the concrete platform of the signal is 3 feet above the ground.

Reference mark 1, is a standard disk stamped PUPUKEA NO 1, set in the top of a cement filled 5-inch iron pipe which projects 5 inches above the ground surface, 5.0 feet west of the west edge of the type A monument.

Reference mark 2, is a cross in the top of a 10-inch concrete cylinder which is flush with the ground surface, 6.4 feet northeast of the northwest corner of the type "A" monument.

Reference mark 3 is a standard disk stamped PUPUKEA 1875 NO 3 1969, set in the top of a 12-inch concrete cylinder which projects 2 inches above the ground surface, and 4.5 feet east of the east edge of the "Type A" monument.

Azimuth mark is a standard disk stamped PUPUKEA 1875 1969, set in the top of a 12-inch concrete cylinder which projects 3 inches above the ground surface, 19 feet north of the center of Makana Road, 8 feet south of the edge of a cutbank and 2.5 feet north of a power-line-pole.

Distance between reference marks 1 and 2, 12.57 feet or 3.833 meters.

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1012
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION STATION

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

NOTE	HEIGHT OF TELESCOPE ABOVE STATION MARK	HEIGHT OF LIGHT ABOVE STATION MARK	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
			OBJECT	BEARING	DISTANCE FEET METERS	DIRECTION
1b	23.9 METERS	26.4 METERS	WAIALUA 2 1927		0 00 00.0	
7a			R.M. 2	W	91.35 27.844	46 17 24
11b			Azimuth Mark	NE	(0.2 mile) 172 20 47.7	
desc.			R.M. 1	SE	86.21 26.277	276 29 11
desc.						

The station is located about 2 1/2 miles southwest of Waimea Bay, and 2 miles northeast of Haleiwa on the southeast side of State Highway 83 at the entrance to the Meadow Gold Park. To reach the station from the junction of State Highways 83 and 821 in the north edge of Haleiwa, go northeast on State Highway 83 for 1.9 miles to the station on the right.

The station mark is a standard disk, stamped MEADOW GOLD 1969, set in the top of a 12-inch round concrete monument which is flush with the ground surface. It is 88.5 feet southwest of the center of the asphalt road leading into the Meadow Gold Park, 44 feet southeast of the center of State Highway 83 and 15 feet northwest of a hedge.

Reference mark 1 is a standard disk, stamped MEADOW GOLD NO 1 1969, cemented in a drill hole in the northwest corner of a 6 by 8 foot concrete step of the Meadow Gold Park restroom. It is 28 feet southeast of the center of a bladed road and 22 feet northeast of the center of a bladed road.

Reference mark 2 is a standard disk, stamped MEADOW GOLD NO 2 1969, set in the top of a 12-inch round concrete monument which is flush with the ground surface. It is 26 feet northwest of the center of the highway, 13 feet northeast of the center of a graveled drive, 13 feet southwest of another graveled drive and 1.5 feet southwest of power pole number 124.

The azimuth mark is a standard disk, stamped MEADOW GOLD 1969, cemented in a drill hole in the northwest corner of a bridge and projects 6 inches above the highway surface. It is 13 feet northwest of the center of the highway and 1 foot northeast of the southwest end of the bridge.

No measurement between reference marks due to hedge and tree on line.

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

USCOMA-DC 27171-P88

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MEADOW GOLD
STATE: HAWAII YEAR: 1969 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 37' 06" 79872	ELEVATION:	4.36 METERS
GEODETIC LONGITUDE:	158° 05' 27" 82008		14.3 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	CR Δ ANGLE
HI 3	5103	469,067.76	164,152.84	- 0° 02' 01"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
AZIMUTH MARK	219° 32' 45.5	219° 34' 46"	5103

QH 037

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1013
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 6-1

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

Description, including sketch of object:

Station is located in the Kawaiiloa District, on the northerly side of Kamehameha Highway, about 300 ft. west of the intersection of Pohakuloa Way and Kamehameha Highway and 0.3 mile northeast from concrete bridge crossing Kamehameha Highway with azimuth mark from "MEADOW GOLD 1969" in its west corner. The bridge is about 0.2 mile northeast from entrance to Meadow Gold Dairy. Station mark is a standard State Survey disk stamped "6-1 1969" in concrete monument flush with ground level. Ties from station are: S.W. 9.57 ft. to nail in telephone pole; S.E. 6.05 ft. to nail in pavement.

Sub-surface mark is identical with station, in concrete monument 2.0 ft. below ground level and separated from top monument by a layer of sand.

Geodimeter connection was made between "MEADOW GOLD" and "STATE SURVEY 6-1."

This station is also Bench Mark 6-1 (SS) of the 1969 First Order Levels.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 6-1

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 37 ' 24.24580	ELEVATION:	6.42 METERS
GEODETIC LONGITUDE:	158 05 10.65550		21.1 FEET

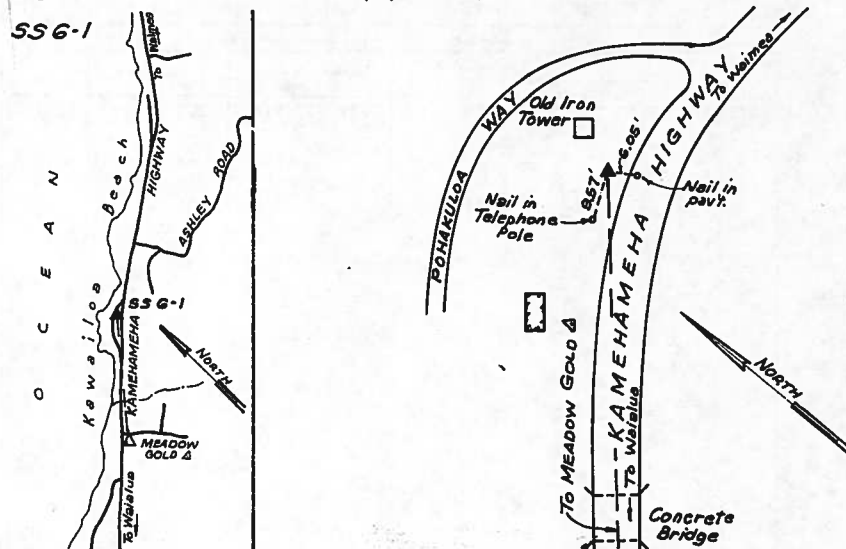
STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ 10R Δ 01 ANGLE °
HI 3	5103	470,688.34	165,912.37	- 0 01 ' 55 "

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ 10R Δ 01 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
MEADOW GOLD	42 ° 36 ' 51.1	42 ° 38 ' 46 "	5103

POSITION DETERMINED BY TRAVERSE FROM STATION MEADOW GOLD

QH 038



HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1014
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 6-2

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

Description, including sketch of object:

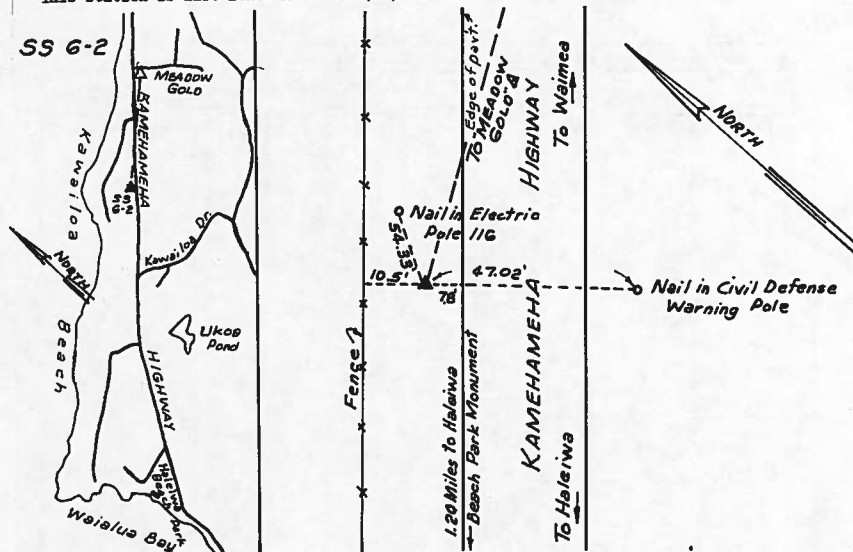
Station is located in the Kawaiiloa District on the northerly side of Kamehameha Highway being 1.20 miles from the Lions Club War Memorial fronting the Haleiwa Beach Park and 0.45 mile southwest from Meadow Gold Dairy entrance.

Station mark is a standard State Survey disk stamped "6-2 1969" in concrete monument flush with ground level. Ties from station are: S.E. 47.02 ft. to nail in Civil Defense Warning pole, S.E. 7.8 ft. to edge of pavement, N. 54.33 ft. to nail in Electric Pole No. 116.

Sub-surface mark is identical with station, in concrete monument 2.0 ft. below ground level and separated from top monument by a layer of sand.

Geodimeter connection was made between "MEADOW GOLD" and "State Survey 6-2".

This station is also Bench Mark 6-2 (SS) of the 1969 First Order Levels.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 6-2

STATE: HAWAII

YEAR: 1969

SECOND ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 36' 52.65816	ELEVATION:	2.78 METERS
GEODETIC LONGITUDE:	158 05 43.19602		9.1 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ IOR Δ α1 ANGLE °
HI 3	5103	467,616.05	162,726.89	- 0 02 06

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ IOR Δ α1 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
MEADOW GOLD	225° 28' 39.8	225° 30' 46	5103

POSITION DETERMINED BY TRAVERSE FROM STATION MEADOW GOLD

QH 039

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1015
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: GROVE STATE: Hawaii COUNTY: Honolulu
CHIEF OF PARTY: C.A. Annis YEAR: 1969 DESCRIBED BY: B.W. Miller

NOTE.	SURFACE-STATION MARK, UNDERGROUND-STATION MARK	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	BEARING	DISTANCE		DIRECTION
				FEET	METERS	
1b		HALEMANO 1927	S	63.20	19.261	0 00 00.0
7a		RM NO 2	WNW	(0.5 mile)	04 05 54	
11b		Azimuth Mark	E	42.28	12.887	120 45 27.1
16b						274 25 58
11b		RM NO 1				

The station is located about 7 miles north of Wahiawa, 4 miles east of Haleiwa, 3 1/2 miles south of Waimea Beach and on the northeast end of a grove of tall trees.

To reach from the First Hawaiian Bank in Haleiwa, which is at the junction of State Highways 83 and 821 at the north edge of Haleiwa, go northeasterly on State Highway 83 for 1.3 mile to a side road on the right (Kawailoa Road), turn right and go southeasterly on Kawailoa Road for 0.85 mile to a dirt side road right, turn right on dirt road and go southerly for 0.05 mile to a reverse fork, continue ahead on paved road and go southerly for 0.45 mile to a locked cable across road, continue southeasterly on paved road for 1.2 mile to a locked cable and azimuth mark on the right, continue southeasterly on paved road for 0.5 mile to the station on the right and on the northeast side of a grove of tall trees.

Station mark is a standard disk stamped GROVE 1969, set in the top of a 12 inch round concrete monument which projects 4 inches above the surface of the ground. It is 41 feet south of the approximate center of paved road, 21 feet west of the west edge of a grove of large trees, 16 feet north of a group of small trees.

Reference mark 1 is a standard disk stamped GROVE NO 1 1969, set in the top of a 12 inch round concrete monument which projects 5 inches above the surface of the ground, about the same elevation as the station mark, 21 feet south of the approximate center of paved road, set at the west end of grove.

Reference mark 2 is a standard disk stamped GROVE NO 2 1969, set in the top of a 12 inch round concrete monument which projects 5 inches above the surface of the ground and about 18 inches lower than the station mark. It is 14 feet north of approximate center of field road.

Azimuth mark is a standard disk stamped GROVE 1969, set in the top of a 12 inch round concrete monument which projects 2 inches above the surface of the ground. It is 41 feet west of the west edge of a canal, 34 feet south of the approximate center of paved road, 7.7 feet south of the south edge of canal, 3 feet north of a telephone pole and on the south southeast edge of a field.

No measurements between reference marks due to large trees on line.

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

USC&NA-DC 2711-100-100

ADJUSTED HORIZONTAL CONTROL DATA

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

SOURCE: G-14543

GEODETIC LATITUDE	21° 35' 46.93183	ELEVATION	244.6 METERS
GEODETIC LONGITUDE	158 03 05.92706		802 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ 10R Δ θ1 ANGLE
HI 3	5103	482,453.74	156,087.93	- 0° 01' 08"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ 10R Δ θ1 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
AZIMUTH MARK	111° 43' 25.2	111° 44' 34"	5103

QH 040

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1016
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

Kawailoa (Oahu Island, L. G. Simmons, 1927).—In northwestern part of Oahu, about 2 1/4 miles east-southeast of Kawailoa railroad station of the Oahu Railway & Land Co., back in a pineapple patch. Approached from Kawailoa railroad station by taking road leading up and by the pineapple settlement to a point about 200 yards from station where irrigation ditch crosses road. Station is on this ditch, about 200 yards to the left or north of road. Marked according to note 1a, a standard disk in concrete post. Reference mark, a standard reference disk, note 11a, is 220.18 meters (722.21 feet) from the station. Re-marked according to note 14A in 1929.

FORM 500
(11-8-65)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAWAILOA
ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii
RECOVERED BY: D.M. Whipp YEAR: 1965 COUNTY: Honolulu

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

Station mark was recovered in good condition, however cannot be used because the "Type A" signal built by the Hawaii Territorial Survey in 1929 has settled out of plumb as a result of being undermined by an irrigation canal. The reference mark was searched for but not found; only a distance was given in the original description, not an azimuth or direction. The land is now planted in sugar cane and the station is hidden during periods when the cane is high. A complete description follows: Station is located about 1-1/2 miles east-southeast of Kawailoa Camp, 2-3/4 miles east-northeast of Haleiwa, and 750 feet north of Kawailoa Rd., at about 610 feet elevation, on the east bank of an irrigation canal in a cane field.

To reach station from the First National Bank in Haleiwa, go northeast on State Highway 83 for 1.2 miles to paved side road right, at sign "KAWAILOA SCHOOL". Turn right and go 0.9 mile; turn right, at sign "FIELD 4811-4813" and go upgrade; following Kawailoa Road, for 1.9 miles to cross-intersection of canals. Turn left and follow field road north along east side of canal for 0.15 mile to station on left.

Station mark is a standard disk, unstamped, set in the top of a 6-inch-square, concrete monument that projects 18 inches above ground. It is 20 feet south of the south end of the culvert at a canal crossing and 61 yards north of a flood-gate in the canal.

RECOVERY NOTE, TRIANGULATION STATION TRAVERSE

NAME OF STATION: KAWAILOA
ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: C.A.A. YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2 3/4 east-northeast of Haleiwa

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 1965 and in good condition, however the station mark is stamped KAWAILOA 1927, it was previously believed to have no stamping. The original reference mark was searched for but believed to be destroyed.

A Geodimeter Traverse was made between KAWAILOA 1927 and GROVE. Geodimeter distance 1,420.776 meters or (4,661.28 ft)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAWAILOA

STATE: HAWAII

YEAR: 1927

SECOND

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 36' 09.71330	ELEVATION:	185	METERS
GEODETIC LONGITUDE:	158° 03' 48.89709	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S 10R Δ S1 ANGLE
HI 3	5103	478,399.52	158,388.13	- 0° 01' 24"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE S 10R Δ S1 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
GROVE	299° 32' 43.8	299° 34' 08"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

POSITION DETERMINED BY TRAVERSE FROM STATION GROVE

AND CHECKED BY ADDITIONAL OBSERVATIONS

QH 041

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1017
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

FORM 525
(8-15-68)

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

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

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK 1.5 METERS,†	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‡	
1b	SURFACE-STATION MARK.	UNDERGROUND-STATION MARK	BEARING	FEET	METERS	
7a						
desc	MAILI 1874 1927					
	State Survey 6-15 (RM 2)		W	(91.06)	27.756	0 00 00.0
	Waialua Sugar Co. Mill Stack 1910		W	(1.5 miles)		81 16 05
11b	RM 1		NE	104.60	(31.882)	95 38 25.4
						210 25 30

The station is located about 7 1/2 miles northwest of Wahiawa, 1 mile south of Haleiwa, 1 1/4 miles east of Waialua and in a traffic circle at the junction of State Highways 82 and 83.

To reach the station from the intersection of State Highway 80 and California Avenue in Wahiawa, go northerly on State Highway 80 for 1.35 miles to a fork, keep the right fork and continue northerly on State Highway 82 for 6.0 miles to the traffic circle and the station as described.

The station mark is a standard disk stamped WEED 1969, set in the top of a round concrete post flush with the surface of the ground. It is 139 feet south of the north arc of the traffic circle and 106 feet southwest of powerline pole number 24.

Reference mark 1 is a standard disk stamped WEED NO 1 1969, set in the top of a round concrete post flush with the surface of the ground. It is 75 feet southeast of the north arc of the traffic circle and 5.1 feet southeast of powerline pole number 24.

State Survey 6-15 (Reference Mark 2) is a Hawaii State Survey disk stamped HIGHWAY WEED 6-15 1969, set in the top of a square concrete post which is 1 inch below the surface of the ground. It is 46 feet east of the west arc of the traffic circle, 26.5 feet northeast of powerline pole 572, 42.5 feet northwest of the east anchor of powerline pole 572 and 25.0 feet southeast of the north anchor of powerline pole 572.

The distance between Reference Mark 1 and State Survey 6-15 (Reference Mark 2) is 178.45 feet or (54.392 meters).

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WEED
STATE: HAWAII YEAR: 1969 FIRST -ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 34' 44.62721	ELEVATION:	14.60 METERS
GEODETIC LONGITUDE:	158 06 31.94995		48.0 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ 10R Δ 61 ANGLE *
HI 3	5103	463,006.59	149,811.27	- 0° 32' 24"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
MAILI	347° 30' 35.4	347° 32' 00"	5103

QH 042

*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.

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 211581 STATION 1018
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

FORM 525
(8-18-69)

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

NAME OF STATION: State Survey 6-15 / STATE: Hawaii / COUNTY: Honolulu /
CHIEF OF PARTY: C.A. Annis / YEAR: 1969 / DESCRIBED BY: L.B. Gittings /

NOTE.	HEIGHT OF TELESCOPE ABOVE STATION MARK 1.72 METERS.		HEIGHT OF LIGHT ABOVE STATION MARK		METERS.	
	SURFACE-STATION MARK		DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT		OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	
DESC.	UNDERGROUND-STATION MARK		OBJECT		BEARING	
DESC.						
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JUN 1978
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

STATE SURVEY 6-15 (continued)

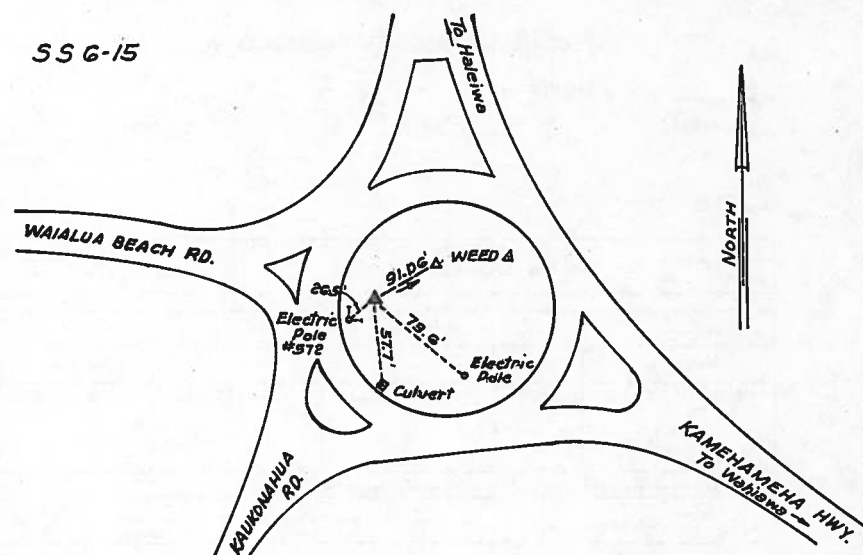
HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581

STATION 1018

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



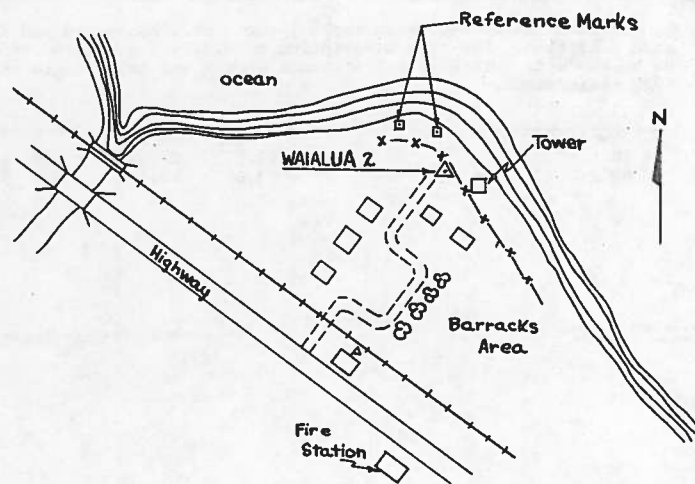
HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1019
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

Waialua 2 (Oahu Island, L. G. Simmons, 1927).—On western coast of Oahu, in Waialua District, on outermost point of peninsula between Waialua and Kaiaka Bays, about 160 feet northwest of a Japanese frame house, about 1¼ miles west and south of Haleiwa. Station marked according to note 1a, a standard disk station mark set in coral. Reference marks, note 12a, standard reference disks set in coral, are at the following distances and azimuths from the station: No. 1, 20.609 meters (67.61 feet), 53° 00'; No. 2, 16.225 meters (53.23 feet), 124° 13'. Re-marked according to note 14A in 1929.

WAIALUA 2 (Hawaii, L.G.S., 1927; 477th FA Oban.Bn., 1945)
--Station is on W coast of Oahu, on outermost point of peninsula, between Waialua and Kaiaka Bays, about 100 feet NW of a Japanese frame house, and about 1 mile W of Haleiwa.
Station is marked with a standard station disk set in coral. The structure of the Note 14A marking does not exist.
OBJECT DISTANCE AZIMUTH
meters
R.M. 1 20.609 53°00'
R.M. 2 16.225 124 13



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WAIALUA 2

STATE: HAWAII

YEAR: 1927

FIRST

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 35' 31.92326	ELEVATION:	3.2 METERS
GEODETIC LONGITUDE:	158 07 17.34893		10 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ & ANGLE °
HI 3	5103	458,725.42	154,586.72	- 0 ° 02' 41"

* 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
MEADOW GOLD	227° 11' 17.0	227° 13' 58"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 044

(continued on next page)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1019

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

WAIALUA 2 (continued)

FORM 526
(11-8-66)

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

NAME OF STATION: WAIALUA 2
ESTABLISHED BY: LGS YEAR: 1927 STATE: HAWAII
RECOVERED BY: CDU 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 the Waiialua District on the NW point (Kaiaka Point) of the peninsula between Waiialua Bay and Kaiaka Bay, about 1 1/2 Mi. NNW of the town of Waiialua.

To reach the station from the intersection of Haleiwa Road and Fresh Air Camp Road in Haleiwa go 0.1 Mi. NW on Fresh Air Camp Rd. (along N side of Haleiwa School grounds) to dirt road left, turn left and go 0.05 Mi. to dirt road right, turn right and go 0.05 Mi. to dirt road left (road thru truck garden), turn left and cross garden, at end of road turn right and follow along SW edge of garden and along shoreline for 0.55 Mi. to station.

The station is marked by a standard disk stamped WAIALUA 2 1927 set in a concrete monument which projects about 3 in. above the ground surface. Reference marks 1 and 2 are standard disks stamped NO 1 and NO 2 respectively cemented in drill holes in the coral.

FORM 526a
(10-8-66)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: WAIALUA 2
ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK 1 METERS,		HEIGHT OF LIGHT ABOVE STATION MARK METERS		
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
PUU IKI 1927	-----1927 DISTANCES	AND DIRECTIONS----		00 00 00.0
R.M. No. 1		67.61	20.609	48 44 34
R.M. No. 2		53.23	16.225	119 57 34
	-----1963 DISTANCES	AND DIRECTIONS----		
R.M. No. 1	SW	67.569	20.595	48 43 03
R.M. No. 2	WNW	55.029	16.163	119 55 35

Station was recovered and all marks found in good condition, however the station mark was found to be set in a concrete monument instead of in coral, as it was described. An old description, obtained from the State of Hawaii Survey office, describes the station as a concrete monument. There is no Hawaii Territory Survey "Type A" signal over the station mark, as described.

A 1945 recovery description states that there was no signal over the station at that time, either. A complete description follows:

Station is located at the west edge of Haleiwa, on the extreme northwest corner of Kaiaka Point; on grassy point just above coral rock shore, at a right-angle turn in track road, where it turns from north to east.

To reach station from the Waiialua Elementary School at southwest end of Haleiwa, go northwest on Fresh Air Camp Road, at northeast corner of school grounds, for 0.1 mile to T-intersection. Turn left and follow track road for 0.1 mile to farm house. Continue ahead on track road through gardens and along west end of Kaiaka Point, for 0.45 mile to station on left side of road.

Station mark is a standard disk stamped "WAIALUA 2 1927", set in the top of a 12-inch-square, concrete monument that projects 3 inches above ground. It is 22 feet east of coral beach, 12 feet northwest of center line of track road, 40 yards north of fork of track roads, 70 yards west of a small, lone, ironwood tree, and 125 yards west of the west end of a large grove of very tall ironwoods.

Reference mark number one is a standard disk stamped "WAIALUA 2 NO 1", cemented in a drill hole in coral bedrock, 22 feet east of shoreline and about 3 feet lower than station mark.

Reference mark number two is a standard disk stamped "WAIALUA 2 NO 2", cemented in a drill hole in a 7-foot-diameter, flat, coral bedrock outcrop and is about 4 feet lower than station mark.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: WAIALUA 2
ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: G.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: in the west edge of Haleiwa.

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. The 1963 description by W.R.P. was checked and found to be correct. Distance to reference mark 2 was noted to be closer to 1927 measurement.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
MEADOW GOLD		67.57	20.594	0. 00 00.0
RM NO 1	SW			189 47 18
RM NO 2	WNW	53.06	16.175	256 59 27

FORM CGOS-526 (10-66)
USCOMM-OC 26496-P66

ENVIRONMENTAL SCIENCE ADMINISTRATION
COAST AND GEODETIC SURVEY

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1020
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 6-4

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

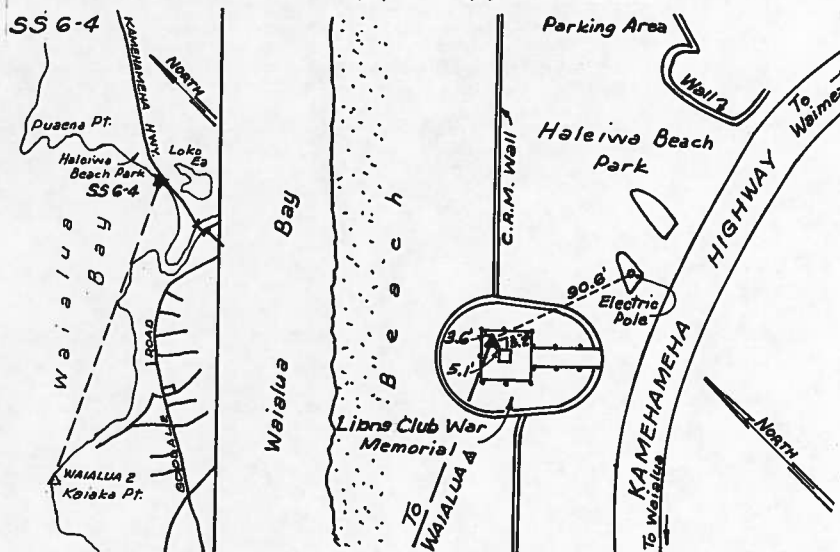
Description, including sketch of object:

Station is located in the Haleiwa District, 0.75 mile north of the Haleiwa Post Office and on the west side of Kamehameha Highway in the base of the Lions Club War Memorial fronting Haleiwa Beach Park.

Station mark is a standard State Survey disk stamped "6-4 1969" cemented in drill hole in the north corner of the concrete base of the War Memorial structure. Ties from station are: N. 3.6 ft. to N. corner of concrete base, E. 90.6 ft. to Electric Pole, E. 15.2 ft. to E. Corner of the concrete base of War Memorial and S. 5.1 ft. to corner of War Memorial.

Geodimeter connection was made between "WAIALUA 2 1927" and "State Survey 6-4."

This station is also Bench Mark 6-4 (SS) of the 1969 First Order Levels.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 6-4

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 36' 04.29681	ELEVATION:	2.94 METERS
GEODETIC LONGITUDE:	158 06 21.72321		9.6 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE
HI 3	5103	463,977.30	157,849.45	- 0° 02' 21"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
WAIALUA 2	58° 06' 37.1	58° 08' 58"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAIALUA 2

QH 045

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1021
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

Waimea (Oahu Island, Hawaiian Government Survey, O. B. French, 1910).—
On bluff east of Waimea Valley, south of the Government road, near an ancient
"heiau." Marked by concrete post and cairn of stones.

WAIMEA (Hawaii, O.B.F., 1910; H.A.P., 1932)

--Station now marked in accordance with
Note 14A. It has a disk with cross set in concrete post under
the signal.

(477th FA Oban.Bn., 1945)--On top of the sheer bluff along
the NE side of the lagoon at Waimea Bay. From Highway 1 at
Waimea station, take road No. 135A to right and up bluff. Take
first trail to right near crest and follow along top of bluff
to point on which station is located.

Station is marked according to Note 14A. Disk with cross
set in concrete post is under signal.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: WAIMEA
ESTABLISHED BY: O.B.F. YEAR: 1910 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK 2.35 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN
FROM THE GROUND AT THE STATION

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
MAILI 1874-1927				00 00 00.0
Waialua Mill Chimmey 1910				27 05 41
R.M. No. 2	NW	28.577	8.710	157 03 53
R.M. No. 1	E	19.064	5.812	260 03 38

Station was recovered in good condition. It was described in 1932
as being marked with a disk in top of concrete post, however, a large
iron yoke, which is part of the signal erected over the mark, rests on
top of the concrete monument so it is not possible to see the disk. Two
new reference marks, numbers one and two, were established. A complete
description follows:

Station is located about 4-1/2 miles airline northeast of Haleiwa
and 1/4 mile south of the village of Waimea, on a hill of about 250 feet
elevation, at the northeast side of the mouth of Waimea River, and over-
looking St. Peter and St. Paul Church to the northwest.

To reach station from the junction of State Highways 83 and 821 in
Haleiwa, go northeast on State Highway 83 for 5.1 miles; turn right and
go upgrade on Pupukea Rd. for 0.7 mile; turn right, through gate at sign
"PUU O MAHUKA HEIAU", and go 0.8 mile to parking area at the heiau.
Continue downslope on track road for 0.15 mile to end of road. Walk
northerly on trail about 35 yards to station.

Station mark is a Hawaiian Territorial Survey disk set in the top
of an 8-inch-square, concrete post that projects 8 inches. It is 50
feet west of a wire gate, 16 feet southeast of the east 1 of 3 power
poles, and under a 3-wire transmission line. A "Type A", Hawaiian
Territorial Survey signal is centered over the mark, with the concrete
floor 3 feet above ground and the red and white target extending 7 feet
above the platform.

Reference mark number one is a standard disk stamped "WAIMEA NO 1
1910", cemented in a drill hole in a boulder projecting 2 inches. It
is at left side of trail and about 2 feet higher than station mark.

Reference mark number two is a standard disk stamped "WAIMEA NO 2
1910", cemented in a drill hole in a 2-foot-diameter, bedrock outcrop
that projects 1 foot. It is 16.7 feet north of the east one of three
power poles, 17-1/2 feet south of a guy-wire base, and 3.7 feet
lower than station mark.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WAIMEA

STATE: HAWAII

YEAR: 1910

SECOND

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 38' 43.82466	ELEVATION:	77 METERS
GEODETIC LONGITUDE:	158 03 51.80427	NO CHECK	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	SECTOR ANGLE
HI 3	5103	478,131.61	173,938.50	- 0 01 26

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
MAILI	13 47 35.5	13 49 01	5103
WAIALUA 2	45 03 24.2	45 04 50	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

POSITION DETERMINED BY TRAVERSE FROM STATION WAIALUA 2

AND CHECKED BY ADDITIONAL OBSERVATIONS

QH 046

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 211581

STATION 1021

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

WAIMEA (continued)

RECOVERY NOTE, TRIANGULATION STATION TRAVERSE

R

NAME OF STATION: WAIMEA /
ESTABLISHED BY: O.B.F. / YEAR: 1910 / STATE: Hawaii / BENCH MARK(S) ALSO ☐
RECOVERED BY: C.A.A. / YEAR: 1969 / COUNTY: Honolulu /
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1 3/4 miles southwest of Waimea /

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

The station mark, reference marks 1 and 2 were recovered as described, and in good condition. The distance and direction to reference marks 1 and 2 were not checked at this time.

A Geodimeter Traverse was made between WAIMEA 1910 and WAIALUA 2 1927.

Geodimeter distance 8,353.462 meters or (2,740.60 ft.)

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

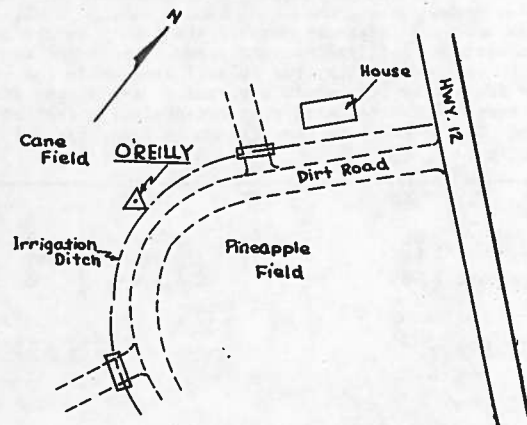
QUAD 211581 STATION 1022
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

O'Reilly (Oahu Island, L. G. Simmons, 1927).—A United States Engineers' point, originally determined by them. Station is 3 miles southeast of Waialua, 4 miles north of Schofield Barracks, on a bank along edge of pineapple irrigation ditch, about 200 feet south of where road crosses ditch, and about ¼ mile northwest of a small pond. Marked by United States Engineer plate set in concrete in 5-inch iron pipe, and stamped "O'Reilly." Reference marks are standard disks in concrete posts, note 11a, at the following distances and azimuths from the station: No. 1, 29.338 meters (96.25 feet), 211° 48'; No. 2, 9.430 meters (30.94 feet), 311° 53'. Re-marked according to note 14A in 1929.

O'REILLY (Hawaii, L. G. S., 1927; 477th FA Obsn. Bn., 1945)

and Highway 12 just S of Waialua, proceed SE via Highway 12 for 2.9 miles to intersection with ditch and dirt road leading NE and SW, thence SW (right) 0.1 mile to station site. Station is on W bank of ditch.

Station is as previously described and in good condition. Reference marks have been destroyed, as ditch bed lies where reference marks seemed to have been located.



(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: O REILLY

STATE: HAWAII

YEAR: 1927

FIRST

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 33 ' 36.68295	ELEVATION:	217	METERS
GEODETIC LONGITUDE:	158 04 15.82099	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (OR Δ) ANGLE *
HI 3	5103	475,851.73	142,948.13	- 0° 01' 34"

* 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
O REILLY 2	229 ° 18 ' 26.8	229 ° 20 ' 01 "	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

POSITION DETERMINED BY TRAVERSE FROM STATION O REILLY 2

AND CHECKED BY ADDITIONAL OBSERVATIONS

QH 047

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1022
LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

O'REILLY (continued)

Form 526
(11-8-68)

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

R

NAME OF STATION: O'REILLY
ESTABLISHED BY: L.G.S.
RECOVERED BY: C.D.U.
YEAR: 1927 STATE: HAWAII
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 recovered and were probably destroyed when an irrigation ditch was constructed in the vicinity of the station. New description follows:

The station is located about 5.6 Mi. airline NW of the outskirts of the town of Wahiawa and about 3.6 Mi. ESE of the town of Wai'alua, along the N'y edge of a concrete irrigation ditch which separates the sugar cane and pineapple fields at that point.

To reach the station from the intersection of Kamehameha Hwy. and California Ave. in Wahiawa, drive north on Kamehameha Hwy. (State Hwy 80) for 1.4 Mi. to junction of State Hwy's. 80 & 82, bear right and follow Kam Hwy. (State Hwy. 82) in a N'y direction for 4.6 Mi. to a dirt road left which parallels a concrete irrigation ditch to the north, turn left and proceed about 0.1 Mi. to the station on right.

The station is marked by a U. S. Engineers rectangular plate stamped O'REILLY set in top of a concrete filled 5 in. diameter cast iron pipe. A type A Hawaiian Territorial Survey monument is centered over the station mark.

Form 526a
(10-18-68)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: O'REILLY
ESTABLISHED BY: L.G.S.
RECOVERED BY: W.R. Porter
YEAR: 1927 STATE: Hawaii
YEAR: 1963 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK 2.5 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
HALEMANO	1927 DISTANCES AND DIRECTIONS			00 00 00.0
R.M. No. 2		30.94	9.430	07 55 11
R.M. No. 1		96.25	29.338	267 50 11
-----1963 DISTANCES AND DIRECTIONS-----				
R.M. No. 2	SE	31.071	9.470	07 39 25
R.M. No. 1	NE	96.292	29.350	267 55 48

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

Station is located, airline, about 5 miles northwest of Wahiawa and 4 miles east-southeast of Wai'alua, along the south side of State Highway 82, on the west bank, and on a curve, of an irrigation canal between a sugar cane field and a pineapple field.

To reach station from the intersection of California Avenue and Kamehameha Highway in Wahiawa, follow Kamehameha Highway northwest for 5.8 miles to small concrete bridge at canal between sugar cane and pineapple fields. Turn left and go southerly on pineapple field road for 0.15 mile to station on right, across canal.

Station mark is a 2 x 3-inch brass plate, stamped "O'REILLY US", set in the top of a 5-inch, cast-iron pipe filled with concrete and projecting 8 inches above ground. A 3/8-inch hole, surrounded by a 1-inch triangle, is at the center of the brass plate. Station is 88 yards northwest of one floodgate of the canal and 120 yards southwest of another floodgate. A "Type A", Hawaiian Territorial Survey signal is centered over the station mark, with the concrete floor 4 feet above ground.

Reference mark number one is a standard disk stamped "O'REILLY NO 1", set in the top of a 12-inch-square, concrete monument that projects 1 foot above ground. It is set on the west slope of the canal bank, 9 feet southeast of the end of a concrete flume curving into the sugar cane field, and 2 feet lower than station mark.

Reference mark number two is a standard disk stamped "O'REILLY NO 2", set in the top of a 12-inch-square, concrete monument that is 10 inches below ground surface. It is located in an 18-foot-wide area between the pineapple road and the canal, 8 feet east of canal bank, 16 feet west of center line of road, and about 3 feet lower than station mark.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: O'REILLY
ESTABLISHED BY: L.G.S.
RECOVERED BY: C.A. Amis
YEAR: 1927 STATE: Hawaii
YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 4 miles southeast of Wai'alua.

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 and found in good condition. A difference was noted on both the distance and direction to both reference marks. Due to soil erosion in the vicinity of the station and fears that this would eventually destroy the station, the Hawaii State Survey Office requested that triangulation station O'REILLY 2 be established. The to reach to the station is adequate. The 1969 observations follow.

OBJECT	BEARING	FEET	METERS	DIRECTION
HALEMANO 1927				0 00 00.0
RM 2	SE	30.99	9.447	7 43 32
RM 1	NE	96.27	29.340	267 53 28
O'REILLY 2 (Geod. Dist.)	NE		234.586	285 20 37.0

Form CGS-526 (10-68)
USCOMM-DC 26496-P46

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1023
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: O'REILLY 2 / STATE: Hawaii / COUNTY: Honolulu /
CHIEF OF PARTY: C.A. Annis / YEAR: 1969 / DESCRIBED BY: L.B. Gittings /

NOTE: 1b/ 7a/	HEIGHT OF TELESCOPE ABOVE STATION MARK SURFACE-STATION MARK, UNDERGROUND-STATION MARK	METERS, 1	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	METERS.
	OBJECT	BEARING	DISTANCE FEET METERS	DIRECTION: " " "
	MAILI 1874 1927 /			0 00 00.0
	**STATE SURVEY 6-5 (Az. Mk.) /	NNW /	(0.2 mile) /	109 56 38.32
	R.M. 1 /	NNE /	35.925 / 10.950	159 26 21
	R.M. 2 /	SE /	48.97 / 14.928	256 20 00
	R.M. 1 to R.M. 2 /		64.155 / 19.554	
	(** 16 positions) /			

The station is located about 5 miles northwest of Wahiawa, 4 miles northwest of Waiialua and 47 1/2 feet southwest of State Highway 82. To reach the station from the junction of State Highway 82 and California Avenue in Wahiawa, go northerly on State Highway 82 for 1.3 miles to a fork. Keep right fork, State Highway 809, for 0.25 mile to the junction of State Highway 82. Continue northerly on State Highway 82 for 1.75 miles to a side road right. Continue north and northwest on State Highway 82 for 2.5 miles to a crossroad and the station on the left.

The station mark is a standard disk, stamped OREILLY 2 1969, set in the top of a 12-inch round concrete monument which projects 3 inches. It is 47.5 feet southwest of the center of State Highway 82, 14.5 feet northwest of the center of a dirt road and 4 feet south of a metal witness post.

Reference mark 1 is a standard disk, stamped OREILLY 2 NO 1 1969, cemented in a drill hole in the top-center of the west headwall of a concrete bridge. It is 19.3 feet southwest of the center of the highway, 7.5 feet northwest of the southeast end of the headwall and 6.5 feet southeast of the northwest end of the headwall.

Reference mark 2 is a standard disk, stamped OREILLY 2 NO 2 1969, set in the top of a 12-inch round concrete monument which is flush with the ground surface. It is 26.0 feet southeast of the center of the dirt road, 23.0 feet southwest of the center of the highway and 52 feet southeast of the metal witness post.

No azimuth mark was established for this station, but State Survey 6-5 mark which is about 0.2 mile northwest of the station will serve as the azimuth. (To reach STATE SURVEY 6-5 from the station, go northwest on State Highway 82 for 0.2 mile to the mark on the right at the southeast end of a guard rail.) The mark is a State of Hawaii survey disk, set in the top of a 9-inch square concrete post which is flush with the ground.

It is 17.5 feet northeast of the center of the highway and 4.5 feet southeast of the southeast end of the metal guard rail. The disk is stamped 6-5 1969.

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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: O'REILLY 2
STATE: HAWAII YEAR: 1969 FIRST -ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 33' 41.65606	ELEVATION:	216.5 METERS
GEODETIC LONGITUDE:	158 04 09.63895		710 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ ° OR Δ ° 1 ANGLE °
HI 3	5103	476,435.51	143,449.66	- 0° 01' 32"

* 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
AZ MK STATE SURVEY 6-5	144° 10' 45.4	144° 12' 17"	5103

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1024
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 6-5

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

Description, including sketch of object:

Station is located in the Waialua District, about 2.8 miles southeast from Weed Junction, 1.83 miles northwest from State Survey 6-6 and on the northerly side of Kanehameha Highway near beginning of Highway guard rail.

Station mark is a standard State Survey disk stamped "6-5 1969" in concrete monument 1-in. below ground level. Ties from station are: NW 4.72 and 13.63 ft. respectively to crosses cut in concrete guard rail posts, S. 16.23 ft. spike in highway pavement and W. 7.20 ft. to nail in highway pavement.

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

Geodimeter connection was made between "O'REILLY 2" and State Survey 6-5 1929.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 6-5

STATE: HAWAII

YEAR: 1969

SECOND ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 33 ' 51.40401	ELEVATION:	197	METERS
GEODETIC LONGITUDE:	158 04 17.15999	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ 10R Δ 01 ANGLE °
HI 3	5103	475,726.01	144,433.57	- 0 ° 01 ' 35 "

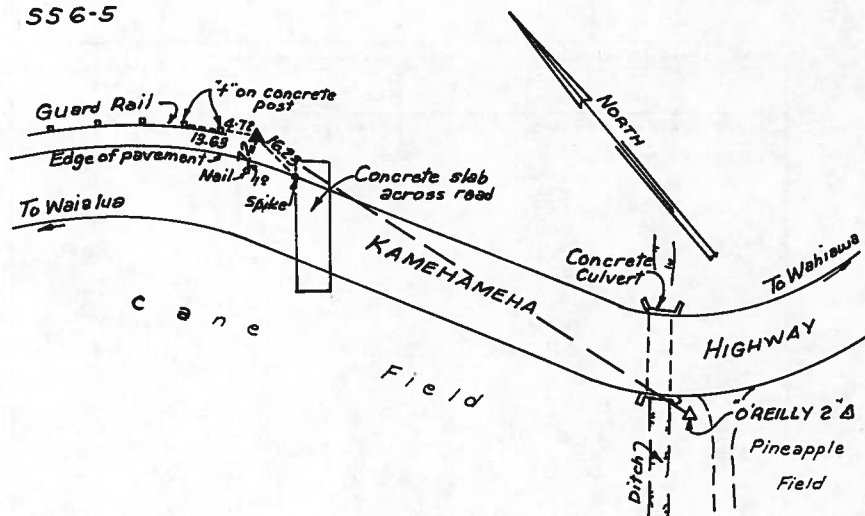
* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ 10R Δ 01 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
O REILLY 2	324 ° 10 ' 42.6	324 ° 12 ' 17 "	5103

POSITION DETERMINED BY TRAVERSE FROM STATION O REILLY 2

QH 049

SS 6-5



HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

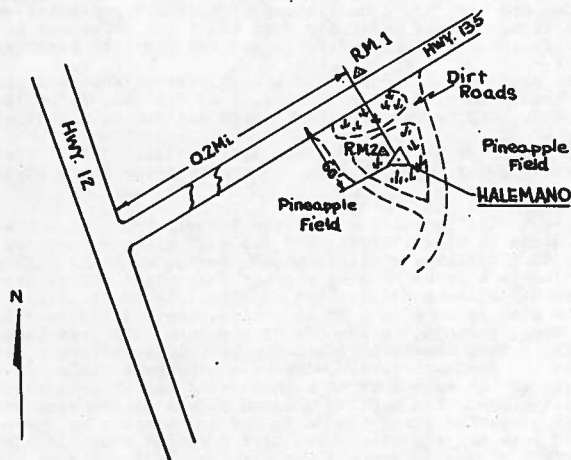
QUAD 211581 STATION 1025
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

Halemano (Oahu Island, L. G. Simmons, 1927).—Northwest of center of Oahu, about 3 miles north-northwest from Wahiawa, and ½ mile north of a small pineapple settlement, reached by pineapple road, on a low bank between irrigation ditch and road. Marked by a United States Engineers' rectangular plate set in concrete in a 5-inch pipe. Two reference marks were set as follows: No. 1, a standard reference disk in concrete post, note 11a, is 30.754 meters (100.90 feet) from station in azimuth 168° 13'; No. 2, similar disk in concrete mass, note 11c, is 5.873 meters (19.27 feet) from station in azimuth 162° 59'. Re-marked according to note 14A in 1929.

HALEMANO (Hawaii, L.G.S., 1927; 477th FA Obsn. Bn., 1945)

--From intersection of Highway 1 and Highway 12 at Karston, 1 mile NE of Schofield Barracks, proceed N via Highway 12 for 1.7 miles to junction with Highway 135 leading NE, thence NE via Highway 135 for 0.2 mile to station site.

Station and reference marks are in good condition as previously described.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: HALEMANO

STATE: HAWAII

YEAR: 1927

FIRST

—ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 32' 31.71723	ELEVATION:	321.4	METERS
GEODETIC LONGITUDE:	158 02 32.75387		1054	FEET

STATE COORDINATES (FWS)				
STATE & ZONE	CODE	X	Y	θ 10R Δ θ 1 ANGLE °
HI 3	5103	485,578.99	136,389.43	- 0° 00' 56"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
RADIO	294° 47' 39.6	294° 48' 36"	5103
STATE SURVEY 6-7	4 33 35.9	4 34 32	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 050

(continued on next page)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1025

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

HALEMANO (continued)

FORM 525
(11-8-85)

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

NAME OF STATION: HALEMANO
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 and one un-stamped reference mark were recovered in good condition. R.M. 1 was not recovered. New description follows:

The station is located about 2.8 Mi. airline N. of the outskirts of the town of Wahiawa along the south side of Paalaa Uka - Papukea Road (State Hwy. 804) and about 1 mile N.E. of the intersection of that road and Kamehameha Hwy. (State Hwy 82).

To reach the station from the intersection of Kamehameha Hwy. and California Ave. in Wahiawa, drive N. on Kamehameha Hwy. (State Hwy 80) for 1.4 Mi. to the junction of Hwy's. 80 & 82; bear right and continue on Hwy. 82 (still Kam Hwy.) in a N'ly direction for 2.1 Mi. to an asphalt surfaced road right (sign reads, "U. S. ARMY HALEMANO MILITARY RESERVATION") turn right and proceed 0.25 Mi. to station on right.

The station is marked by a U. S. Engineers rectangular plate cemented in the top of a concrete filled 5 In. diameter cast iron pipe. The un-stamped reference mark which was recovered is cemented in a drill hole in a rock and is located 13.02 Ft. N.W. of the station. A type A Hawaiian Territorial Survey monument is centered over the station mark.

R

COAST AND GEODETIC SURVEY
RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: HALEMANO
ESTABLISHED BY: L.G. Simmons YEAR: 1927 STATE: Hawaii
RECOVERED BY: Walter R. Helm YEAR: 1962 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK 2 METERS,		HEIGHT OF LIGHT ABOVE STATION MARK 2 METERS		
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
RADIO -				00 00' 00.00
Reference Mark No. 4 .	W .	113.976 -	34.740 -	160 48 30 -
Reference Mark No. 3 .	N .	112.116	34.173 -	243 28 52 .

The station mark was recovered and found to be in good condition, but reference mark No. 1 had been destroyed and reference mark No. 2 was not found. A new reference mark No. 3 and reference mark No. 4 were established by this party. A new and complete description follows:

The station is located on a slight rise between two pineapple fields about 3.0 miles north-northwest of Wahiawa, 2.7 miles northwest of the U.S. Navy Communications Station and 0.2 mile east of State Highway 82.

To reach the station from the intersection of California Avenue and State Highway 80 in Wahiawa, go northwest on State Highway 80 for

1.3 miles to the junction with State Highway 809. Take the right fork and go north on State Highway 809 for 0.25 mile to junction with State Highway 82. Continue straight ahead, north, on State Highway 82 for 1.75 miles to a paved road on right. Turn right and go east on paved road for 0.2 mile to the station on right, as described.

The station mark is a brass tablet, about 2 inches wide and 3 inches long, cemented in the top of a 4-inch cast iron sewer pipe which is in turn embedded in the top of a 12-inch square concrete post. It is at the north-northwest edge of a pineapple field, 72 feet south-southeast of the center of an asphalt road and 27 feet south-southeast of a rain guage. The mark is under a 5-foot square concrete slab which is supported along its north and south edges by two 4-foot high walls of rock and concrete. The mark projects about 16 inches above the surface of the ground and the stamping on the tablet has been obliterated, although the true station center is readily discernible.

Reference mark No. 3 is a standard disk, stamped HALEMANO NO 3 1927 1962 set in the top of a 10-inch square concrete post that projects 2 inches above the surface of the ground. It is 16 feet north-northwest of the center of an asphalt road.

Reference mark No. 4 is a standard disk, stamped HALEMANO NO 4 1927 1962, set in the top of a 10-inch square concrete post that projects 3 inches above the surface of the ground. It is 16 feet north-northwest of the center of an asphalt road and 8 feet north of a road warning sign, "Slippery When Wet".

*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 57

(continued on next page)

HALEMANO (continued)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1025

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

FORM 526a
(6-10-68)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

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

HEIGHT OF TELESCOPE ABOVE STATION MARK		2.72 METERS,		HEIGHT OF LIGHT ABOVE STATION MARK		METERS	
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION							
OBJECT		BEARING	DISTANCE		DIRECTION		
			FEET	METERS			
RADIO			1962 Distances		00 00 00.0		
R.M. No. 4		W	113.976	34.740	160	48	30
R.M. No. 3		N	112.116	34.173	243	28	52
			-----1963 Distances-----				
R.M. No. 4		W	117.288	(35.750)			
R.M. No. 3		N	112.103	(34.169)			

Station mark and reference marks number three and four were recovered and found in good condition. A search by distance and angle was made for reference marks number one and two but they could not be found and are believed to be destroyed as their locations fall in areas where digging and cultivation has been done. A complete description follows:

Station is located, airline about 3 miles north-northwest of Wahiawa, 3 miles north-northeast of Schofield Barracks and 0.2 mile northeast of State Highway 82, on a rise of about 1051 feet elevation, in a pineapple field along the southeast side of an asphalt road.

To reach station from the intersection of California Avenue and State Highway 80 (Kamehameha Highway) in Wahiawa, follow Kamehameha Highway northerly for 3.3 miles to side road right, at sign "U.S. ARMY HELEMANO MILITARY RESERVATION". Turn right and go northeast for 0.2 mile to top of rise and station on right.

Station mark is a 2-1/2 x 3-inch, brass plate set in cement in the top of a 4-inch pipe which projects 8 inches from the top of a 12-inch-square, concrete block that projects 8 inches above ground. It is on a mound about 4 feet high and 10 yards in diameter, surrounded by a field road and covered with high grass. It is 70-1/2 feet southeast of centerline of asphalt road and 25 feet southeast of southeast end of a rain-gauge box. There is a Hawaiian Territorial Survey "Type A" signal over the mark. The station mark has been hammered slightly, but the stamping "HELEMANO US" is quite plain.

Reference mark number three is a standard disk stamped "HALEMANO NO 3 1927 1962", set in the top of a 10-inch-square, concrete monument that projects 2 inches. It is 16 feet northwest of center line of asphalt road, 5 feet southeast of edge of field road, and 4-1/2 feet lower than station mark.

Reference mark number four is a standard disk stamped "HALEMANO NO 4 1927 1962", set in the top of a 10-inch-square, concrete monument that projects 2 inches. It is 16 feet northwest of center line of asphalt road, 8 feet northeast of a road sign "SLIPPERY WHEN WET", and 5-1/2 feet lower than station mark.

NOTE: The large difference of 1.01 meters in the measurement to R.M. No. 4 was noted and checked in the field. The 1963 measurement is correct.

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

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

79-P80

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **HALEMANO**
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: **3.0 miles NNW of Wahiawa.**
HEIGHT OF TELESCOPE ABOVE STATION MARK: **77.0** FEET. HEIGHT OF LIGHT ABOVE STATION MARK: FEET.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION						
OBJECT	BEARING	DISTANCE		DIRECTION		
		FEET	METERS			
RADIO 1962						
State Survey 6-7 (Azi. Mk. (Geod. Trav.))	S	2961.14	902.558	0	00	00.0
R.M. 4	W	117.19	(35.719)	69	45	56.6
R.M. 5	N	112.09	(34.165)	243	28	59
R.M. 4 to R.M. 5		151.48	(46.171)			

Station mark and reference mark 4 were recovered as described and found in good condition. The disk and the top of the monument for reference mark 3 were destroyed. Reference mark 5 was set in the remainder of the monument and in approximately the same location as reference mark 3. The direction to reference mark 4 checked the 1962 data but a slight difference was noted in the distance from the 1963 data.

Following is a new and complete description:

Station is located about 3.0 miles north-northwest of Wahiawa, 3.0 miles north-northeast of Schofield Barracks, 0.2 mile northeast of State Highway 82 and is in the edge of a pineapple field along the south side of a paved road.

To reach from the intersection of California Avenue and State Highway 80 in Wahiawa, go north on State Highway 80 for 1.3 miles to the intersection of State Highway 809; keep right on State Highway 809 for 0.25 mile to the intersection of State Highway 82; continue northerly on State Highway 82 for 1.35 miles to STATE SURVEY 6-7 (Azimuth Mark) on the right, continue northerly on the road for 0.4 mile to a paved road right; turn right and go easterly on a paved road for 0.2 mile to the station on the right at the top of a grade.

Station mark is a 2X3 inch brass tablet cemented in the top of a 4-inch sewer pipe which projects about 15 inches. It is located beneath a 5-foot square, concrete and rock monument which is about 4 feet high. The sewer pipe is set in the top of a 12-inch square concrete monument. The stamping on the disk is not legible. It is 71.0 feet south-southeast of the center of a paved road.

Reference mark 4 is a standard disk, stamped HALEMANO NO 4 1927 1962 set in the top of a 10-inch square concrete monument which is flush with the ground. It is 16.0 feet north-northwest of the center of the road, 14.0 feet south-southeast of the edge of a field and 7 1/2 feet northeast of a highway sign "Slippery When Wet".

Reference mark 5 is a standard disk, stamped HALEMANO 1927 1962 NO 5 1969, cemented in the top of a 10-inch square concrete monument which is flush with the ground. It is 16.0 feet north-northwest of the center of the road and 12.0 feet south-southeast of the edge of the field.

State Survey 6-7 (Azimuth Mark) is a State of Hawaii survey disk stamped 6-7 1969. It is set in the top of a concrete monument which is flush with the ground. It is on the east side of State Highway 82 and is on highway right-of-way property.

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

of the

FORM 526a (12-68)
USCOMM-DC 10251-P80

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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 211581 STATION 1026
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

0-6 685A
1-6-58

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, BENCH MARK

R

Bench Mark
Designation M 245 State Hawaii County Honolulu
Nearest town Wahiawa County Honolulu Chief of Party W.R. Porter
Distance and direction from nearest town 1-1/2 miles northeast Recovery Date January, 1963
Character of mark Brass disk Stamping M 245 1962
Established by U.S. Coast and Geodetic Survey
Present condition Good
Detailed report 0.1 mile southwest along California Street from the post office in Wahiawa, thence 0.85 mile northwest along State Highway 80, thence 1.6 miles northeast along State Highway 804; 25 feet north-northwest of center line of highway, 2.7 feet west-southwest of power pole No. 33, in line with the power line, at the base of a small bank sloping up to pineapple field, and set in the top of a 12-inch-diameter, concrete monument that projects about 10 inches above ground.

NAME OF STATION: BENCH MARK M 245

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 30' 59.76300	ELEVATION:	336.68 METERS
GEODETIC LONGITUDE:	158 00 52.04762		1104.6 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE *
HI 3	5103	495,085.49	127,109.37	- 0° 00' 19"

* 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
HALEMANO	134° 18' 14.8	134° 18' 34"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION HALEMANO

QH 051

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 211581 STATION 1027
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

SEE STATION HALEMANO

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 6-7

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 32' 02.46359	ELEVATION:	306	METERS
GEODETIC LONGITUDE:	158 02 35.24736	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ @ ANGLE °
HI 3	5103	485,342.77	133,437.75	- 0 ° 00' 57"

* 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
HALEMANO	184 ° 33' 34.9	184 ° 34' 32 "	5103

POSITION DETERMINED BY TRAVERSE FROM STATION HALEMANO

QH 052

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1028
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 411 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 6-6

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

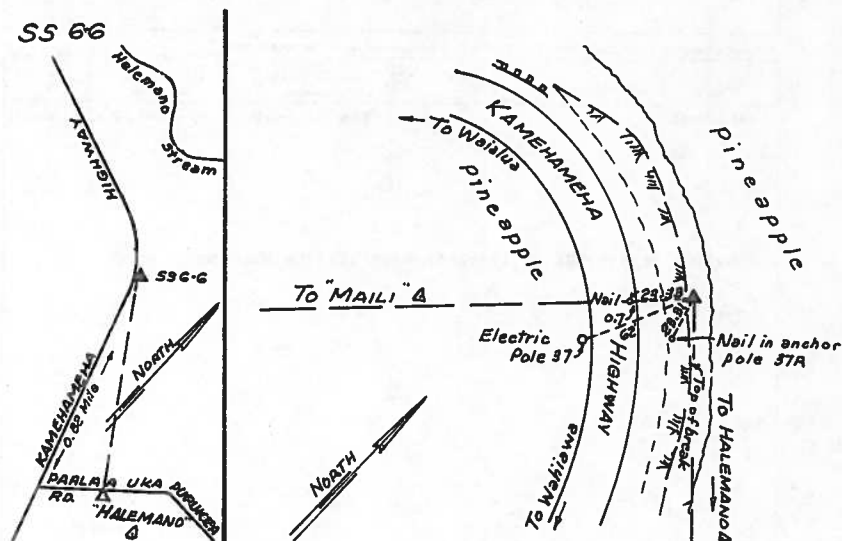
Description, including sketch of object:

Station is located in Waiulus District, 4.6 miles southeast from Weed Junction and 0.82 mile northeast of junction of Kamehameha Highway and Paalaa Uka Pupukea Road. (road leading to "HALEMANO" Station)

Station mark is a standard State Survey disk stamped "6-6 1969" in concrete monument flush with ground level on the northerly side of Kamehameha Highway at top of bank near edge of pineapple field. Ties from station are:
S 23.31 ft. to nail in Elect. brace pole 37R, SW 62 ft. to Elect. Pole 37, SW 23.13 ft. to nail in Highway pavement and on line to "MAILI" Station.

Sub-surface mark is identical with station mark, in concrete monument 2.1 ft. below ground level and separated from top monument by a layer of sand.

Geodimeter connection was made between "HALEMANO 1927" and State Survey 6-6 1969.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 6-6

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 33' 05.38442	ELEVATION:	291	METERS
GEODETIC LONGITUDE:	158 02 56.29534	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (HOR Δ S) ANGLE °
HI 3	5103	483,357.58	139,787.16	- 0° 01' 05"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
HALEMANO	326° 48' 20.4"	326° 49' 25"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION HALEMANO

QH 053

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1029
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Designation STATE SURVEY 6-8 State Hawaii County Honolulu
Nearest town Wahiawa County Honolulu Chief of party C. Symms
Distance and direction from nearest town 4.55 miles northwest Leveling date July 1969
Character of mark SS disk Stamping 6-8 1969
Established by State of Hawaii
Detailed description

Section .T .R
0.1 mile southeast along Lahau 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 3.85 miles northwest along State Highway 99, 0.2 mile southeast of the junction of State Highway 80, 18.5 feet northeast of the center line of the highway, 43.4 feet northeast and across the highway from power pole H 38, 260 feet southeast of the extended center line of a graveled road southwest, about 1 foot lower than the highway, and set in the top of a concrete post flush with the ground.

FORM C&GS-638
(6-68)
USCGM-DC 40286-P68

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 6-8

STATE: HAWAII

YEAR: 1969

SECOND

- ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 31' 19.18357	ELEVATION:	289.73 METERS
GEODETIC LONGITUDE:	158 04 17.99486		950.5 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ R1 ANGLE *
HI 3	5103	475,640.15	129,074.30	- 0° 01' 35"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ HOR Δ R1 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
HALEMANO	233 ° 37' 12.2	233 ° 38' 47"	5103

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

QH 054

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1030
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Designation STATE SURVEY 6-9 State Hawaii County Honolulu
Nearest town Wahiawa County Honolulu Chief of party C. Symms
Distance and direction from nearest town 5.35 miles northwest Leveling date July 1969
Character of mark SS disk Stamping 6-9 1969
Established by State of Hawaii
Detailed description Section T R

0.1 mile southeast along Lehai 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 4.65 miles northwest along State Highway 99, 0.6 mile northwest of the junction of State Highway 80, 5.6 miles southeast of Haleiwa, 21 feet northeast of the center line of the highway, 3.6 feet southwest of telephone pole 151 T, 13 feet southeast of the extended center line of a dirt road to a field, about 1 foot lower 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 6-9

STATE: HAWAII

YEAR: 1969

SECOND ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 31' 47.30138	ELEVATION:	279.57 METERS
GEODETIC LONGITUDE:	158 04 49.29202		917.2 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ θ ANGLE *
HI 3	5103	472,686.54	131,912.87	- 0 01' 46"

* 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
HALEMANO	250° 49' 20.3	250° 51' 06"	5103

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

QH 055

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 211581 STATION 1031
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

FORM 525
10-10-69

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

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

NOTE.	HEIGHT OF TELESCOPE ABOVE STATION MARK 1.5 METERS, HEIGHT OF LIGHT ABOVE STATION MARK 1.5 METERS.				
1b	SURFACE-STATION MARK,	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT			
7a	UNDERGROUND-STATION MARK	OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
	OBJECT	BEARING	DISTANCE		DIRECTION
			FEET	METERS	
11b	SCHOFIELD WEST BASE 1927				0 00 00.00
	RM 2	NW	33.30	10.150	128 27 44
	HONOLULU USN COMM STA TOWER	E			223 02 13.7
11b	RM 1	SE	32.93	10.036	307 11 24
	RM 1 to RM 2		66.22	20.184	

The station is located on the island Oahu, about 1 1/2 miles north of Wahiawa, 2 miles northeast of Schofield Barracks, on the road right of way and on the east side of a triangle formed by the junction of State Highways 80 and 82.

To reach the station from the intersection of State Highway 80 and California Boulevard in the approximate center of Wahiawa, go northerly on State Highway 80 for 1.35 miles to a fork; take the right fork and continue north for 0.2 mile to the station on the left.

The station mark is a standard disk stamped POAMOHU 1969, set in the top of a round concrete post flush with the ground. It is 125 paces south of the north point of the triangle, 122 feet north of a powerline pole and 27.5 feet west of the centerline of the highway.

Reference mark 1 is a standard disk stamped POAMOHU NO 1 1969, set in the top of a round concrete post flush with the ground. It is 88 feet north of the powerline pole and 25.3 feet west of the centerline of the highway.

Reference mark 2 is a standard disk stamped POAMOHU NO 2 1969, set in the top of a round concrete post flush with the ground. It is 155 feet north of the powerline pole and 30.0 feet west of the centerline of the highway.

An azimuth mark was not set for this station.

ADJUSTED HORIZONTAL CONTROL DATA

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

SOURCE: G-14543

GEODETIC LATITUDE: 21° 30' 59.36321	ELEVATION: 259.4 METERS
GEODETIC LONGITUDE: 158 02 36.34515	982 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ θ1 ANGLE °
HI 3	5103	485,237.35	127,070.86	- 0° 00' 57"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ OR Δ θ1 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
SCHOFIELD WEST BASE	42° 12' 00.2"	42° 12' 57"	5103

QH 056

*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 211581 STATION 1032
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Maili (Oahu Island, Hawaiian Government Survey, 1874; L. G. Simmons, 1927).—On one of the lower summits of a ridge which extends west by south to the summit of Mount Kaala, the highest part of the Waianae Mountains. It is the highest part of the ridge from which one can see both the northern and southern parts of the island. Best approached from firing range of Schofield, whence, after crossing Mohiaka Gulch, a trail leads to station. Old station mark was concrete post, 6 inches square, with cross in top. In 1927 station was marked according to note 1a, a standard disk station mark being set in a concrete pier which was built over and around the old mark without disturbing it. Reference marks, note 12a, standard reference disks in outcropping bedrock are at the following distances and azimuths from station: No. 1, 13.605 meters (44.64 feet), 92° 02'; No. 2, 12.435 meters (40.80 feet), 10° 17'. Re-marked according to note 14A in 1929.

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: MAILI
ESTABLISHED BY: Hawaiian G.S. YEAR: 1874 STATE: Hawaii
RECOVERED BY: Walter R Helm YEAR: 1962 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.5 METERS, 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

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
HALEMANO 1927				0 00 00.0
R M 2	S	40.772	12.428	119 18 02
R M 1	W	44.649	13.609	201 02 31

The station mark, reference mark number 1 and reference mark number 2 were recovered in good condition. The concrete platform that the Hawaiian Government Survey established in 1874 was found in poor condition and had to be dismantled by this party. A complete description follows.

The station is located about 2.5 miles northwest of Schofield Barracks, 3.0 miles east of Mt. Kaala, 3.0 miles south of the town of Waialua and 3.5 miles west-northwest of the town of Wahiawa.

To reach the station from the intersection of Goodale Av. and Highway 99 in the town of Waialua, go west on Highway 99 for 0.35 mile to a crossroad, turn right on a paved road and go north for 0.35 mile to the W.A. Company, turn right on paved road and go south for 0.75 mile to a fork, take the right fork and continue south for 0.5 mile to a fork, take

the right fork passing through corral, continue south on mountain road for 0.65 mile to a side road left and a locked gate. (Note: obtain key from the W.A. Company) Pass through the gate and continue southerly on the mountain road for 1.0 mile to a side road right leading to triangulation station PUU IKI. Continue southerly passing through seven gates for 4.5 miles, pass through the seventh gate and go southeast for 0.4 mile to a dirt road right, turn right and go 0.1 mile to the station. (Note: a two wheel drive truck was used at this date but a four wheel drive is more suitable.)

The station mark, a standard disk, stamped MAILI 1927, set in the top of a 10-inch square concrete block projecting 10-inches above the ground. It is set in the fence line on the east end of the Waianae Mountain overlooking the town of Wahiawa and Schofield Barracks.

Reference mark number 1, a standard disk, stamped MAILI NO 1, set in a cemented drill hole in the top of a 3 by 2 foot boulder projecting about 3 feet above the ground. It is 4 feet south of the fence line and the same elevation as the station.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MAILI

STATE: HAWAII

YEAR: 1874

FIRST

ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21° 31' 29.48202	ELEVATION: 459.3 METERS
GEODETIC LONGITUDE: 158 05 45.75435	1507 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	9° OR Δ 91° ANGLE
HI 3	5103	467,354.55	130,117.88	- 0° 02' 07"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE 9° OR Δ 91° FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
PUU IKI	121° 32' 01.5	121° 34' 08"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 057

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1032

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

MAILI (continued)

Reference mark number 2, a standard disk, stamped MAILI NO 2, set in a cemented drill hole in the top of a 4 by 3 foot boulder projecting about 2 feet above the ground. It is 41 feet south of the fence line and about 2 feet lower than the station.

COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: MAILI
ESTABLISHED BY: HGS
RECOVERED BY: W.R. Porter
YEAR: 1874
STATE: Hawaii
COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.74 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

FROM THE GROUND BY THE DISTANCE				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
-----1962 DISTANCES AND DIRECTIONS-----				
HALEMANO 1927	S	40.772	12.428	00 00 00.0
R M 2	W	44.649	13.609	119 18 02
R M 1	W			201 02 31
-----1963 DISTANCES AND DIRECTIONS-----				
R.M. No. 2	S	40.772	12.427	119 20 12
R.M. No. 1	W	44.672	13.616	201 02 42

All marks were recovered in good condition. There was formerly a "Type A", Hawaiian Territorial Survey signal over the station mark, but according to a 1962 description it was removed at that time since it was in poor condition. A complete description follows:

Station is located, airline, about 2-1/2 miles northwest of the northwest edge of Schofield Barracks, 3-3/4 miles southeast of Waialua, 1-1/4 miles south-southwest of the University of Hawaii Experiment Station, and 1.4 miles due west of the junction of State Highways 80 and 99; on an open, grassy point of 1510 feet elevation on an east-west ridge in the eastern foothills of the Waianae Mountains.

To reach station from the highway overpass at south end of Waialua, go west on State Highway 99 for 0.05 mile; turn left and go 0.05 mile on Kahui St.; fork left, onto dirt road, and go 0.45 mile; take right fork and go 0.4 mile to fork at corrals on right. (Kahua Ranch office is 0.2 mile up the right fork, where key may be obtained). Take left fork and go 0.2 mile to ford. Cross and continue ahead, up along edge of cane field, for 0.4 mile; take right fork, downgrade, for 0.2 mile to locked cable gate at cattle-guard. Pass through and continue for 0.65 mile to metal gate. Pass through and continue for 0.45 mile to the second one of 2 fords. Cross and continue for 0.15 mile to side road right. Go right for 0.05 mile to metal gate. Pass through and continue upgrade for 2.0 miles to T-junction at top of ridge. Turn left and go 0.4 mile to board gate. Pass through and continue for 0.25 mile to fork. Take right fork up onto knoll and go 0.05 mile to station.

Station mark is a standard disk stamped "MAILI 1927", set in the top of a 9-inch-square, concrete monument about 6 inches lower than general boulder level. It is on a boundary line angle of a fence line. A jog in the fence is built around the south side of the station mark.

Reference mark number one is a standard disk stamped "MAILI NO 1", cemented in a drill hole in a large boulder that projects 2 feet. It is 3 feet south of the fence line and 2 feet lower than station mark.

Reference mark number two is a standard disk stamped "MAILI NO 2", cemented in a drill hole in a large, red boulder that projects 1 foot above ground. It is on the south slope of the hill and is 1-1/2 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 27178-P88

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: MAILI
ESTABLISHED BY: H.G.S.
RECOVERED BY: C.A. Annis
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 4 miles southeast of Waialua
HEIGHT OF TELESCOPE ABOVE STATION MARK 4 FEET.
YEAR: 1874
STATE: Hawaii
COUNTY: Honolulu
BENCH MARK ALSO ☐
HEIGHT OF LIGHT ABOVE STATION MARK 4 FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
PUU IKI 1927	S	40.78	12.430	00 00 00.00
RM 2	W	44.52	13.568	248 45 40
RM 1				330 17 23

No measurement was made between RM's due to crest of knoll on line.

The station mark and reference mark 2 were recovered as described and found in good condition. Reference mark 1 was recovered and appears to be in good condition; however, a difference was obtained in both the distance and direction and it is believed that the boulder was disturbed at the time the fence was constructed. A new description follows.

The station is located about 2 1/2 miles northwest of Schofield Barracks, 4 miles southeast of Waialua, on a grassy knoll at a jog in a fenceline and on an east-west ridge in the foothills of the Waianae Mountains.

To reach the station from the junction of State Highways 83 and 99, about 1 mile southeast of Waialua, go northwest on State Highway 99 for 0.8 mile to a traffic circle, turn left and go west passing through an underpass for 0.1 mile to Kahui Street, turn left and go south on Kahui Street for 0.05 mile to a dirt side road left, bear left and go southeast on the dirt road for 0.25 mile to a reverse fork, continue straight ahead on a graded road for 0.2 mile to a fork, take the left fork and continue for 0.1 mile to a fork, take the right fork and go southerly for 0.3 mile to the Hai Brothers Ranch on the right, continue ahead southerly for 0.1 mile to a fork, take the right fork and continue southerly on a cane field road for 0.1 mile to a locked cable across road, pass through the cable gate and continue southerly for 0.6 mile to a side road left at a locked gate, turn left, passing through the gate and go southerly on a bladed road for 0.2 mile to a fork, take the left fork and continue on the main road for 0.65 mile to an irrigation canal, pass over the canal and continue for 0.1 mile to a gate, pass through the gate and continue southerly on a mountain road passing through 5 more gates for 5.7 miles to the sixth gate which is a combination gate and cattle guard, pass through this gate and continue for 0.2 mile to a dim track road right, turn right and follow the dim track road for 0.1 mile to the top of a knoll on the ridge and the station as described.

The station mark is a standard disk stamped MAILI 1927, set in the top of a square concrete post which is slightly lower in elevation than the surrounding remains of the old "Type A" Hawaiian Territorial Survey Signal. It is 6.0 feet north of the fence.

Reference mark 1 is a standard disk stamped MAILI NO 1, set in a drill hole in the top of a 3 x 3 foot boulder projecting about 2 feet. It is 3.0 feet south of the fence, and about 2 feet lower in elevation than the station.

Reference mark 2 is a standard disk stamped MAILI NO 2, set in a drill hole in the top of a 3 x 3 foot boulder projecting about 1 foot above the ground. It is 34.0 feet south of the fence and about 2 feet lower in elevation than the station mark.

Note: Keys for the locked gates may be obtained from the Hai Brothers Ranch which is mentioned above. This is a 4-wheel-drive station.

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

USCOMM-DC 27178-P88

USCOMM-DC 27178-P88

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1033
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

Puu Iki (Oahu Island, L. G. Simmons, 1927).—In western part of Oahu, in Waialua District, on the north slope of the Waianae Range, on the high point of the north end of the large broad ridge (bare) directly south of the Waialua sugar mills, and about 2½ miles distant from the mill building. Take the left-hand dirt road at the junction of the Haleiwa and Waialua Roads, and drive past an old abandoned church to begin the climb. Marked according to note 6a, a standard disk station mark in concrete in top of tile. Reference marks were set as follows: No. 1, note 12a, standard reference disk in outcropping bedrock, 42.395 meters (139.09 feet), from station in azimuth 321° 27'; No. 2, note 13a, standard reference disk in concrete in tile, 11.161 meters (36.62 feet) from station in azimuth 246° 38'. Re-marked according to note 14A in 1929.

PUU IKI (Hawaii, L.G.S., 1927; 477th FA Obsn. Bn., 1945)

--On the N end of a broad bare ridge, about 2-1/2 miles S of Waialua sugar mills. To reach station, take dirt road just W of underpass of Highway 11, follow this road S along railroad taking right fork at (?) miles, then next fork to left following along edge of cane field to next road on left, pass through gate to left and thence to top of hill and station.

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

FORM 326a
(2-18-69)

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

NAME OF STATION: PUU IKI
ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii
RECOVERED BY: C.D.U. YEAR: 1961 COUNTY: Honolulu

The station and reference mark No. 1 were recovered in good condition. RM 2 was found to be completely loose and was removed from the station site. New description follows:

The station is located at the north end of the Waianae Range, on the north end of a broad ridge about 2 1/2 miles south of the town of Waialua.

To reach the station from Weed Circle drive SSW of Kaukanahua Road (State Hwy. 83) for 1.1 miles to Thompson Corner, turn right on Farrington Hwy. (State Hwy 99) and drive 0.9 mi to Kahui Street, turn left and go 200 ft. to unsurfaced road left, bear left and go 0.25 mi to surfaced Sugar Co. road, bear right and go 0.2 mi to Y in road, take right fork and go 0.4 mi to another Y in road (Kahua Ranch), take right fork and follow road thru cane fields for 0.7 mi to locked gate on left (key to gate may be gotten at Kahua Ranch), turn left and follow Jeep trail for 1.0 mi to gate (normally unlocked), continue on thru gate for 1.0 mi to first trail on right, turn right and proceed 0.1 mi to end of ridge (N end) and station.

The station is marked with a standard disk stamped PUU IKI 1927 set in top of a concrete filled tile. A type A Hawaiian Territorial Survey monument is centered over the station mark. RM 1 is a standard disk stamped PUU IKI NO 1 1927 set in outcropping bed rock.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU IKI

STATE: HAWAII

YEAR: 1927

FIRST

-ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 32' 30.35404	ELEVATION:	348.6 METERS
GEODETIC LONGITUDE:	158 07 31.79796		1144 FEET

STATE COORDINATES (Fvt)				
STATE & ZONE	CODE	X	Y	§ 10R Δ §1 ANGLE °
HI 3	5103	457,347.04	136,267.07	- 0 02' 46"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH ° (From south)	CODE
WAIALIA 2	184° 15' 24.1	184° 18' 10"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 058

(continued on next page)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1033
LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

PUU IKI (continued)

FORM 524e
(9-19-59)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

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

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
MAILI 1874-1927				00 00 00.0
R.M. No. 4	SE	138.945	(42.350)	19 56 04
Rain Gauge	W	21.1	6.43	145 52 40
Waialua Mill Chimney	N			234 53 17.9
R.M. No. 3	N	16.182	4.932	252 17 24

Station mark was recovered in good condition, however the stamping could not be checked because the iron yoke of the Hawaii Territory Survey signal rests nearly on it. Both reference marks have been destroyed. Two new reference marks, numbers three and four, were established. A complete description follows:

Station is located, airline, about 2 miles south of Waialua, 1-1/4 mile south of the Kahua Ranch office, and 5 miles northwest of Schofield Barracks, on a hill of 1146 feet elevation that has an old, wartime, concrete, observation post on it.

To reach station from the highway overpass at south end of Waialua, go west on State Highway 99 for 0.05 mile; turn left and go 0.05 mile on Kahui St.; fork left, onto dirt road, and go 0.45 mile; take right fork and go 0.4 mile to fork at corrals on right. (Kahua Ranch Office is 0.2 mile up the right fork, where key for locked gate may be obtained). About 50 yards up this right fork a road forks left up into the sugar cane field. Take this left fork and go 0.65 mile to locked gate on left. Pass through gate and follow track road for 1.0 mile to metal gate. Pass through gate and continue for 0.9 mile to side road right, 75 yards before reaching two board gates. Turn sharp right and go 0.1 mile to end of road and station.

Station mark is a standard disk, stamping unknown, set in concrete in the top of a 4-inch, iron pipe that projects 1 foot above ground. It is 21.1 feet east of a metal rain gauge and 15 feet south of the southeast corner of the observation post. A "Type A", Hawaii Territory Survey signal is centered over the mark. The concrete floor of the signal is 3 feet above ground.

Reference mark number three is a standard disk stamped "PUU IKI NO 3 1927 1963", cemented in a drill hole in the southeast corner of the observation post, about 1 foot lower than station mark.

Reference mark number four is a standard disk stamped "PUU IKI NO 4 1927 1963", cemented in a drill hole in the northeast end of a large, red boulder, about 5 feet higher than station mark. (NOTE: This is the same boulder that reference mark number one was located in, and the hole was drilled at the front end of the large depression which was formerly filled with cement and held R.M. No. 1).

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

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

the end

USCOMM-DC 5711-2-P00

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUU IKI
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 south of Waialua

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 3 and 4 were recovered as described in the 1963 data. The iron yoke that was covering the station disk was removed and the stamping on it is PUU IKI 1927. A slight change in the distance and direction to the reference marks was found.

OBJECT	BEARING	FEET	METERS	DIRECTION
WAIALUA 2 1927				0 00 00.0
R.M. 3	N	16.20	4.938	09 43 18
R.M. 4	SE	138.96	(42.356)	137 10 50
WAIALUA MILL CHIM	N			352 09 12.6

No measurement between reference marks due to thick trees on line.

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 211581 STATION 1034
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Designation STATE SURVEY 6-10 State Hawaii County Honolulu
Nearest town Haleiwa County Honolulu
Distance and direction from nearest town 1.95 miles south
Character of mark SS disk
Established by State of Hawaii
Detailed description
1.95 miles south along State Highway 83 from the post office at Haleiwa, at the junction of State Highway 99, in the west corner of the junction of State Highway 99 and a dirt road southwest, 20.1 feet southwest of the center line of State Highway 99, 25.5 feet northwest of the center line of the road and the extended center line of State Highway 83, 53.4 feet northwest and across the road from bench mark T 4, 0.5 mile south along Goodale Avenue from the post office at Waialua, thence 0.7 mile southeast along State Highway 99, and set in the top of a concrete post flush with the ground.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 6-10

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 33' 54.52076	ELEVATION:	21.51 METERS
GEODETIC LONGITUDE:	158 06 57.13141		70.6 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ ± ANGLE °
HI 3	5103	460,626.13	144,757.13	- 0 02' 33"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
PUU IKI	21 ° 04' 31.1	21 ° 07' 04"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PUU IKI

QH 055

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1035
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 6-11

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

Description, including sketch of object:

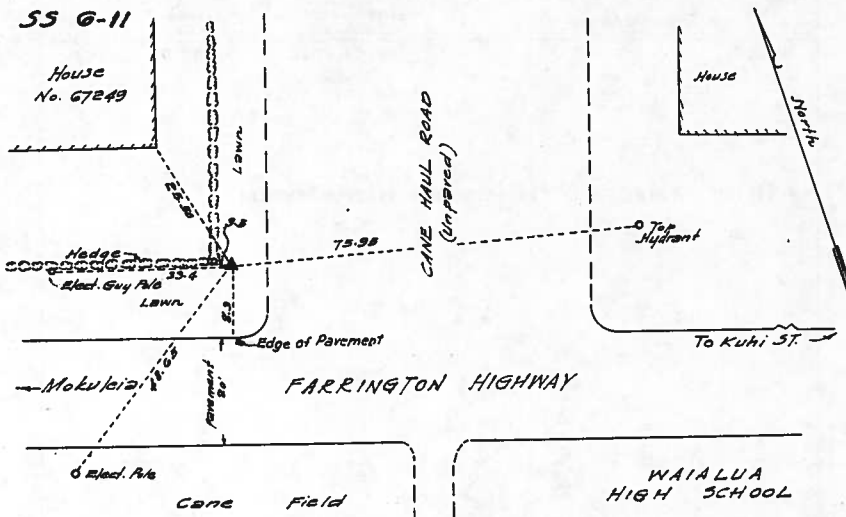
Station is located in the Waiialua District, on the north side of Farrington Highway, nearly opposite the northwest corner Waiialua High School.

To reach station from Kaula Road and Farrington Highway (Thompson Corner), go west towards Mokuia along Farrington Highway for 1.05 miles, passing Waiialua High School on left, then Kuli Street on right to next intersection.

Station mark is a standard State Survey disk stamped "6-11 1969" in concrete monument at the northwest corner of intersection of Farrington Highway and Cane Haul Road. Station is in grass strip 3.5 ft. east from corner of hedge of House No. 67249. Ties from station are: SE 75.95 ft. to top of hydrant across Cane Haul Road, NW 33.4 ft. to Elect. Pole in Hedge, SW 48.65 ft. to Elect. Pole across Highway and NW 25.50 ft. to corner of House No. 67249.

Sub-surface mark is identical, in concrete monument 1.7 ft. below ground level and separated from top monument by a layer of sand.

Geodimeter connection was made between "PUU IKI 1927" and State Survey "6-11 1969". This station is also Bench Mark 6-11 (SS) of the 1969 First Order Levels.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 6-11

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543
NO

OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 34' 15.12914	ELEVATION:	13.20 METERS
GEODETIC LONGITUDE:	158 07 51.28877		43.3 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (OR Δ θ) ANGLE
HI 3	5103	455,515.85	146,840.61	- 0° 02' 53"

* 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
PUU IKI	350° 07' 35.3	350° 10' 29"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PUU IKI

QH 060

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 211581 STATION 1036
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY
Form 855
Rev. Aug. 1968

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: KAALA

STATE: Hawaii

COUNTY: Honolulu
Island: Oahu

CHIEF OF PARTY: D.M. Whipp

YEAR: 1965

Described by: R.F. Hanson

NOTE.	HEIGHT OF TELESCOPE ABOVE STATION MARK		1.53 METERS.	HEIGHT OF LIGHT ABOVE STATION MARK		METERS.	
1a	Surface-station mark,	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS					
7a	Underground-station mark	WHICH CAN BE SEEN FROM THE GROUND AT THE STATION					
	OBJECT		BEARING	DISTANCE		DIRECTION	
				feet	meters		
11a	KAUPAKUHALE 1927					00	00 00.0
	RM No. 1		E	10.981	3.348	102	21 04
	RM No. 2		S	74.984	22.855	188	28 56

Station is located about 8 miles west of Wahiawa and 4-1/2 miles south-southwest of Waiialua, at about 4025 feet elevation, on the summit of Mt. Kaala, the highest point on Oahu.

To reach station from the high school in Waiialua, go west on Farrington Highway for 1.4 miles; turn left on T-road along power line and go 1.0 mile to locked gate by FAA field office. Pass through gate and continue, upgrade, for 1.7 miles to another locked gate. Pass through gate and continue upgrade for 5.3 miles to top of mountain and station on left.

Station mark is a standard disk stamped "KAALA 1965", set in the top of a 10-inch-square, concrete monument that projects 3 inches above ground. It is located on the small, brushy point 20 feet northwest of

the northwest side of a small, flat, raised area about 5 feet higher than surrounding ground, at northwest end of hilltop, 80 feet north of the road and about 100 yards west-northwest of the Hawaii Air National Guard office.

Underground station mark is a standard disk stamped "KAALA 1965", set in concrete about 3 feet below ground level.

Reference mark number one is a standard disk stamped "KAALA NO 1 1965", set in the top of a 14-inch-square, concrete monument that projects 3 inches above ground and is at about same elevation as station mark. It is on the small point just across the small drainage ravine at northwest side of the raised area and on the east end of the point on which the station is located.

Reference mark number two is a standard disk stamped "KAALA NO 2 1965", cemented in a drill hole in the concrete box at road culvert No. 80. It is 2 feet west from east end of the box, 5 feet north of edge of road surface, 1-1/2 feet above ground, and 8.32 feet lower than station mark.

NOTE: Key for locked gates may be obtained at the Hawaii Air National Guard Office in Bldg. No. 204 at Wheeler AFB upon proof of security clearance.

* Refer to notes in manuals of triangulation and state publications of triangulation. † Direction-angle measured clockwise, referred to initial station.
‡ To nearest meter only, when the trigonometric leveling is being done.

16-56897-1 U. S. GOVERNMENT PRINTING OFFICE

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAALA

STATE: HAWAII

YEAR: 1965

FIRST

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 30' 40.26248	ELEVATION:	1224.3
GEODETIC LONGITUDE:	158 08 44.39419		4017 METERS FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ & ANGLE
HI 3	5103	450,483.07	125,164.60	- 0° 03' 12"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PIPE	123° 02' 12.7	123° 05' 25"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 061

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581

STATION 1036

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

KAALA (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KAALA
ESTABLISHED BY: D.M.W. YEAR: 1965 STATE: Hawaii BENCH MARK ALSO ☐
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 4 1/2 miles SSW of Waialua.
HEIGHT OF TELESCOPE ABOVE STATION MARK 10.0 FEET. HEIGHT OF LIGHT ABOVE STATION MARK FEET.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
PIPE				
R.M. 1	E	10.98	3.347	00 00 00
R.M. 3 (Geodimeter Traverse)	E	(234.79)	71.538	148 33 07
R.M. 2	S	74.92	22.836	150 01 46.0

No measurement between reference marks due to rough terrain.

Station mark, reference marks 1 and 2 were recovered as described in 1965 and were found in good condition. A new reference mark 3 was established at this time.

Following is a new and complete description:

Station is located about 8.0 miles west of Wahiawa, 4 1/2 miles south-southwest of Waialua and is on the summit of Mt. Kaala which is the highest point on the island of Oahu.

To reach from the intersection of State Highways 99 and 83 which is about 1.0 mile southeast of Waialua, go northwesterly on State Highway 99 for 0.8 mile to a highway junction on the right, continue north on State Highway 99 for 1.5 miles, passing beneath an overpass, to a side road left, turn left and go west on a surfaced road for 0.2 mile to a stop sign at a crossroad, continue west on the surfaced road for 0.85 mile to a locked, wooden gate, pass through the gate and continue west and southerly on the paved road for 7.0 miles to the highest point of Mt. Kaala, the end of the road and the station which is about 300 feet north-northwest of a National Guard Office building.

Station mark is a standard disk stamped KAALA 1965, set in the top of a 10-inch square concrete monument which projects about 2 inches. It is 84.0 feet west-northwest of a metal ladder which is attached to the north side of a large radar dome, 6.0 feet south of the edge of the hill and 3.2 feet north of a fence.

Reference mark 1 is a standard disk, stamped KAALA NO 1 1965, set in the top of a 13-inch square concrete monument which projects about 3 inches above the ground surface. It is 74.7 feet west-northwest of ladder, 2.5 feet south of the edge of the hill, 1.5 feet north of the fence and about the same elevation as the station.

Reference mark 2 is a standard disk, stamped KAALA NO 2 1965, cemented in a drill hole in the north headwall of a concrete culvert. The mark projects about 1.3 feet above the road. It is 10.0 feet north of the center of a paved road, 98.0 feet east of a security gate, 3.0 feet east of the west end of the headwall and 2.0 feet west of the east end of the headwall.

Reference mark 3 is a standard disk, stamped KAALA NO 3 1965 1969, set in the top of a round concrete post which is flush with the surface. It is 70.0 feet west of the northeast corner post of a fence, 28.2 feet east of the northeast corner of a tin building and 3.4 feet southwest of a fence. A geodimeter traverse was made to this reference mark.

* 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 211581 STATION 1037
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

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

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: MT. Kaala, NW Radar Dome

Island: Oahu
COUNTY: Honolulu

CHIEF OF PARTY: D.M. Whipp YEAR: 1965 STATE: Hawaii

Description, including sketch of object: Located about 8 miles west of Wahiawa and 4-1/2 miles south-southwest of Waialua, at about 4025 feet elevation, on the summit of Mt. Kaala, the highest point on Oahu.
Station is a large, grey, radar dome, about 50 feet in diameter, mounted on a rounded, metal building. It is the northwest, and lowest one, of two domes.

RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

NAME OF STATION: Mt. Kaala, NW Radar Dome
ESTABLISHED BY: D.M. Whipp YEAR: 1965 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: J.V. Teater YEAR: 1973 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 as described and found to be in good condition. It should be noted that there are now 3 radar domes on the mountain.

FORM CGS-525 (6-66)
USCOM-OC 26490-P66

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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MT KAALA NW RADAR DOME

STATE: HAWAII

YEAR: 1965

THIRD

-ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21 ° 30' 39.65135	ELEVATION: METERS
GEODETIC LONGITUDE: 158 08 43.43417	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S. IOR Δ S. I ANGLE *
HI 3	5103	450,573.66	125,102.85	- 0 03 12

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE S. IOR Δ S. I 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

QH 062

WILEY-INTERSCIENCE
(212) 850-6000

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

CHIEF OF PARTY: D.M. Whipp YEAR: 1965 STATE: Hawaii

Island: Oahu
County: Honolulu

Station is a large, grey, radar dome, about 50 feet in diameter, mounted on a high, rounded, metal building. It is the southeast, and highest one, of two domes.

NAME OF STATION: Mt. Kaala, SE Radar Dome

ESTABLISHED BY: D.M. Whipp YEAR: 1965

STATE: Hawaii BENCH MARK(S) ALSO ☐

RECOVERED BY: J.V. Teater YEAR: 1973

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 as described and found to be in good condition. It should be noted that a new radar dome has been built about 150 yards southeast of this facility. The station would be the center one of three 3 radar domes.

FORM C&GS-526 (8-66)
USCGM-PC 20400-P00

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

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1038
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

NAME OF STATION: MT KAALA SE RADAR DOME

STATE: HAWAII

1965

THIRD

INDEX

SOURCE: G-14543

GEODETIC LATITUDE: 21° 30' 38.69223
 GEODETIC LONGITUDE: 158 08 41.75378

ELEVATION:	METERS	FEET
------------	--------	------

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ FOR Δ BE ANGLE
HI 3	5103	450,732.25	125,005.92	- 0° 03' 11"

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

PLANE AZIMUTH HAS BEEN COMPUTED BY THE \sin^{-1} FORMULA REFLECTING THE SECOND TERM.			
TO STATION OR OBJECT	GEODETTIC AZIMUTH (From south) 0 1 2	PLANE AZIMUTH * (From south) 0 1 2	CODE

THESE DATA OBTAINED FROM ADJUSTMENT OF OCT 1971

QH 065

QH 063

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1039
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

Moku (Oahu Island, L. G. Simmons, 1927).—In western part of Oahu on the divide of the Waianae Range, near the boundary between Mokuleia and Kawaihāpai districts, and about 50 yards northwest of the highest point. Best reached from the Waialua side of the range. Marked according to note 6a, a standard disk station mark set in concrete in top of tile. Reference marks were set as follows: No. 1, note 4, standard disk in bowlder, is in azimuth 172° 57' from station. No. 2, note 13a, standard reference disk in concrete in tile, is 5.681 meters (18.64 feet), from station in azimuth 76° 39'. Re-marked according to note 14A in 1929.

(11-8-55)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: MOKU
ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii
RECOVERED BY: R.M. Towill Corp. YEAR: 1958 COUNTY: Honolulu

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

Station recovered as described.
Reference mark 1 found as described. Reference mark 2 not searched for.
The pipe socket in platform has been pulled loose, probably in an attempt to remove the target, which was frozen in the socket. Target repainted. Needs brushing out.

* 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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MOKU

STATE: HAWAII

YEAR: 1927

FIRST

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 32' 50.58104	ELEVATION:	643.3 METERS
GEODETIC LONGITUDE:	158 11 50.44434		2111 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ 10R Δ 01 ANGLE °
HI-3	5103	432,931.50	138,333.28	- 0° 04' 21"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE § 10R Δ 01 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
AZ MK RM 1	172° 56' 43.4"	173° 01' 04"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 064

(continued on next page)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1039

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

MOKU (continued)

RECOVERY NOTE, TRIANGULATION STATION

FORM 526e
(8-18-68)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

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

HEIGHT OF TELESCOPE ABOVE STATION MARK 2.44 METERS.		HEIGHT OF LIGHT ABOVE STATION MARK METERS.		
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
PUU IKI 1927				00 00 00.0
R.M. No. 3	SE	59.364	18.094	53 00 25
Tank	SSW	81.910	24.966	109 35 31.4
R.M. No. 2	WSW	18.625	5.677	161 47 18
R.M. No. 1 (Azimuth Mark)	N	350 (approx)		258 10 39.2

Station was recovered and all marks found in good condition. Due to the poor location and great distance of reference mark number one, a new reference mark, number three was established. A complete description follows:

Station is located about 5 miles west-southwest of Waialua and 2-1/2 miles due south of Dillingham Airfield, along the summit of the Waianae Range on a point of about 2108 feet elevation. It is about 200 yards south of a radar installation and slightly higher.

To reach station from the overpass at Waialua, go west on State Highway 99 for 3.8 miles to side road left at sign "SITE 84 IFC". Turn left

and go 0.4 mile to T-intersection; turn left and go 0.3 mile; turn right and go 0.3 mile on paved road to locked gate. Pass through gate and continue on paved road upgrade for 4.0 miles to end of road at radar installation. Walk south up ridge for about 175 yards to station.

Station mark is a standard disk set in concrete in the top of a 5-inch soil pipe that projects 1 inch above ground. It sets 10 feet west of the edge of a track road. The disk could not be examined for stamping because a large iron yoke, which is part of the Hawaii Territorial Survey "Type A" signal, rests upon it. The concrete platform of the signal is 3 feet above ground. A red and white metal target extends about 6 feet above the platform.

Reference mark number one is a standard disk stamped "MOKU NO 1", cemented in a drill hole in a black boulder that projects 2 feet above ground. It is on a sharp, bare point of the ridge, on east side of track road above a cutbank, and above end of paved road to radar installation.

Reference mark number two is a standard disk stamped "MOKU NO 2", set in concrete in the top of a 5-inch soil pipe that projects 8 inches above ground. It is in brush, 8 feet east of edge of high bank, and 1.8 feet lower than station mark.

Reference mark number three is a standard disk stamped "MOKU 1927 NO 3 1964", brazed to the top of a 1-1/2-inch iron pipe that is set in cement and projects 8 inches above ground.. It is on grassy point at the beginning of a footpath and is 0.9 foot higher than station mark.

Tank is 15 feet in diameter, 12 feet high, and is painted silver. It sets in a cut in the hillside with its top at the same elevation as station, and is not visible to other stations.

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

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

USCOMM-DC 27178-PL 1

NAME OF STATION: MOKU
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: 5 miles southwest of Waialua
HEIGHT OF TELESCOPE ABOVE STATION MARK FEET. HEIGHT OF LIGHT ABOVE STATION MARK FEET.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
PIPE				° 00 00.0
RM 1 (Azimuth Mark)	N	Approx. 350 feet		57 53 21.6
RM 3	SE	59.35	18.093	212 42 49
RM 2	W	18.63	5.682	321 28 43

The station mark and reference marks 1, 2 and 3 were recovered and found in good condition. The "Type A" Hawaii Territorial Survey Signal is still over the station mark, however the iron yoke which previously prevented checking of the stamping on the station mark, was removed at this time. A new and updated description follows.

The station is located about 5 miles southwest of Waialua, 2 1/2 miles south of Dillingham Airfield, on a ridge near the north end of the Waianae Mountain Range and on a point about 200 yards south and slightly higher than a radar installation.

To reach the station from the junction of State Highways 83 and 99, which is about 1 mile southeast of Waialua, go northwest on State Highway 99 (Farrington Highway) for 0.75 mile to a traffic circle, turn left, passing through an underpass and go westerly on State Highway 99 for 3.8 miles to a side road left, turn left and go south on a dirt road for 0.3 mile to a "T" intersection. Turn left and go easterly on a dirt road for 0.3 mile to a side road right, turn right and go southerly on a dirt road which becomes a surfaced road for 0.9 mile to a locked gate, pass through the gate and continue southerly on the surfaced, winding mountain road for 3.4 miles to the entrance to the radar installation and the end of truck travel. Pack southeast up steep slope for about 150 feet to reference mark 1 (Azimuth Mark) on the left, bear right and go southerly along ridge for about 350 feet to the station.

The station mark is a standard disk stamped MOKU 1927, set in concrete in the top of a 5 inch soil pipe flush with the ground.

Reference mark 1 is a standard disk stamped MOKU NO 1, set in a drill hole in a boulder projecting about 2 feet. It is about 150 feet south of and about 50 feet higher than the paved road.

Reference mark 2 is a standard disk stamped MOKU NO 2, set in concrete in the top of a 5 inch soil pipe projecting about 8 inches and about 2 feet lower in elevation than the station mark.

Reference mark 3 is a standard disk stamped MOKU 1927 NO 3 1964, brazed to the top of a 2 inch soil pipe projecting about 7 inches and is about 1 foot higher in elevation than the station mark.

The distance between reference mark 2 and reference mark 3 is 67.70 feet or 20.635 meters.

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 211581 STATION 1040
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: MOKU RADAR ANTENNA

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

Description, including sketch of object:

The station is a T-shaped pipe on top of the antenna, which is located about 400 feet north of triangulation station MOKU, five and one-half miles southeast of Kaena Point. It is a cigar-shaped radar antenna which is mounted on top of a four-legged steel tower painted black. The antenna is 30 feet high.

INTERSECTION RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: Moku Radar Antenna
ESTABLISHED BY: C.A. Annis YEAR: 1969 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: G.M. Ward YEAR: 1970 COUNTY: Honolulu

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

4½ miles southwest of Waialua

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

Station destroyed. Antenna removed in March 1970. Tower remains.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MOKU RADAR ANTENNA

STATE: HAWAII

YEAR: 1969

THIRD

-ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 32' 56.33037	ELEVATION:	METERS
GEODETIC LONGITUDE:	158 11 50.05895		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ 10R Δ § 1 ANGLE °
HI 3	5103	432,968.62	138,913.35	- 0° 04' 21"

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

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1041
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

FORM 329
(10-18-65)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

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

NOTE	HEIGHT OF TELESCOPE ABOVE STATION MARK 1.5 METERS, HEIGHT OF LIGHT ABOVE STATION MARK 1.3 METERS.		DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
	SURFACE-STATION MARK	UNDERGROUND-STATION MARK	DISTANCE		DIRECTION	
	OBJECT		BEARING	FEET	METERS	
desc	MOKU 1927		NNW	14.29	4.355	0 00 00.0
desc	R.M. 2		E	(0.25 mile)		32 49 16
desc	MT KAALA SE DOME		SSE	10.93	3.331	120 38 28.0
desc	R.M. 1					218 17 12

Detailed description:
The station is located about 6 miles west-northwest of Schofield Barracks, 5 miles south-southwest of Waialua and 1/4 mile west of the highest part of Mt Kaala on a brushy narrow ridge.
To reach the station from the junction of State Highways 83 and 99, about 1 mile southeast of Waialua, go west on State Highway 99 for 0.8 mile to a traffic circle. Continue west on State Highway 99, passing under overpass, for 1.5 miles to a side road left. Turn left, south, for 0.2 mile to a stop sign and crossroad. Continue ahead for 0.85 mile to a locked gate. (Key was obtained from the FAA in Honolulu.) Pass through gate and follow winding asphalt road up mountain for 6.7 miles to a fork. Keep right fork for 0.15 mile to a building and end of truck travel. Pack southerly along brushy, swampy, narrow ridge for about 0.25 mile to the station. About a 20 minute pack.
The station mark is a standard disk, stamped WEST KAALA 1969, welded atop a 2-inch iron pipe which projects 6 inches. It is on a narrow brushy ridge and 15 feet west of a witness sign which is nailed to a small tree.
Reference mark 1 is a standard disk, stamped WEST KAALA NO 1 1969, welded atop a 2-inch iron pipe which projects 6 inches. It is about 6 feet lower than the station.
Reference mark 2 is a standard disk, stamped WEST KAALA NO 2 1969, welded atop a 2-inch iron pipe which projects 6 inches. It is about 3 feet lower than the station.
No azimuth mark was established for this station because triangulation station KAALA 1965 is only about 0.25 mile away.
No measurement made between reference marks because of heavy brush and rough terrain between them.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WEST KAALA
STATE: HAWAII YEAR: 1969 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 30' 31.72332	ELEVATION:	1192.3 METERS
GEODETIC LONGITUDE:	158 09 05.57486		3912 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE
HI 3	5103	448,482.20	124,304.88	- 0 03' 20"

* 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
MOKU	131° 59' 53.6	132° 03' 14"	5103

QH 066

- 20 1/2

*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.

USCOMB-DC 27171-P88

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 211581 STATION 1042
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

FORM 525
(5-15-65)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

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

NOTE	HEIGHT OF TELESCOPE ABOVE STATION MARK	HEIGHT OF LIGHT ABOVE STATION MARK	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	DISTANCE		DIRECTION
				FEET	METERS	
deso	PAD	1.5 METERS				
deso	RM 1			22.05	6.721	0 00 00.0
deso	RM 2			24.47	7.459	260 29 23
	KAENA POINT RADAR DOME					348 50 59
	RM 1 to RM 2			32.46	9.895	356 38 46.5

The station is located about 6 1/2 miles west of Waialua, 4 miles southeast of Kaena Point and 1 mile southeast of the Kaena Point Tracking Station.

To reach the station from the post office in Waianae, go northerly on State Highway 90 for 6.4 miles to Kaneana Cave on the right, continue northerly on State Highway 90 for 2.1 miles to a side road right and a sign "United States Air Force-Space and Missile Systems-Kaena Point Tracking Station", turn right and go easterly on the winding, surfaced road for 1.9 miles to the guard station just after crossing a ridge. Turn right and follow the surfaced road south, east and northeast for 0.6 mile to a dim track road right. With a 4-wheel drive vehicle, turn right and go southeasterly on the rough, winding road for 1.7 miles to where the main road crosses over a ridge and a dim track road leads northerly along the ridge, bear left and follow the dim track road northerly to the highest point in the immediate vicinity and the station about 0.05 mile north of where the main road crosses the ridge.

The station mark is a standard disk stamped PIPE 1969, brazed to the top of a 2 1/2 inch soil pipe projecting about 2 inches above the ground. It is about 0.2 mile north of an old bunker which is on a slightly higher point of the ridge, 9 feet east of the approximate center of the track road and 5.0 feet northwest of a witness post.

Reference mark 1 is a standard disk stamped PIPE NO 1 1969, brazed to the top of a 2 1/2 inch soil pipe projecting about 7 inches above the ground. It is 20.4 feet southwest of the witness post and 7 feet west of the center of the track road.

Reference mark 2 is a standard disk stamped PIPE NO 2 1969, brazed to the top of a 2 1/2 inch soil pipe projecting about 6 inches above the ground. It is 29.1 feet northwest of the witness post and 5 feet west of the track road.

No azimuth mark was set for this station.

ADJUSTED HORIZONTAL CONTROL DATA

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

SOURCE: G-14543

GEODETIC LATITUDE:	21° 33' 34.52178	ELEVATION:	574.9 METERS
GEODETIC LONGITUDE:	158° 13' 30.93319		1886 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ 10R Δ §1 ANGLE
HI 3	5103	423,451.37	142,779.85	- 0° 04' 58"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PAD	111° 00' 15.2	111° 05' 13	5103

QH 067

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1043
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: MOKULEIA STATE: Hawaii COUNTY: Honolulu
CHIEF OF PARTY: C.A. Annis YEAR: 1969 DESCRIBED BY: J.A. Tisdall

NOTE*		HEIGHT OF TELESCOPE ABOVE STATION MARK 1.5 METERS.†		HEIGHT OF LIGHT ABOVE STATION MARK 1.5 METERS.		
1b	SURFACE-STATION MARK,	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT				
7a	UNDERGROUND-STATION MARK	OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
	OBJECT	BEARING	DISTANCE		DIRECTION‡	
			FEET	METERS		
11b	WAIALUA 2 1927				0 00 00.00	
16b	R.M. 1	S	42.86	13.064	102 45 08	
16b	Azimuth Mark	SW	(0.3 mile)		164 06 48.8	
11b	R.M. 2	W	38.23	11.652	187 15 21	
	R.M. 1 to R.M. 2		54.62	16.651		

The station is located about 4.0 miles west-northwest of Waiialua, 0.1 mile north of State Highway 99, (Farrington Highway), and at the northeast corner of the Mokuleia Beach State park.

To reach the station from the intersection of State Highways 83 and 99, (Farrington Highway), which is about 1.0 mile southeast of Waiialua, go northwest on State Highway 99 for 0.8 mile to a traffic circle; continue northwest on State Highway 99 for 4.45 miles to the entrance to the Mokuleia Beach State Park on the right, (to reach the azimuth mark from here continue northwest on State Highway 99 for 0.25 mile to the mark on the right); turn right into the park and follow along the west side of the boundary fence for 0.1 mile to the end of the fence and the station as described.

Station mark is a standard disk stamped MOKULEIA 1969, set in the top of a 12-inch concrete cylinder which is flush with the ground surface, 44 feet north of the north end of a boundary fence which borders the east side of the park and 7.0 feet west of the edge of a cutbank.

Reference mark 1 is a standard disk stamped MOKULEIA NO 1 1969, set in the top of a 12-inch concrete cylinder which is flush with the ground surface, 3.0 feet west of the edge of a cutbank, 1.4 feet northwest of the north end of the fence and about 18 inches lower than the station.

Reference mark 2 is a standard disk stamped MOKULEIA NO 2 1969, set in the top of a 12-inch concrete cylinder which is flush with the ground surface, 56.0 feet northwest of the north end of the fence, 44 feet west of the edge of the cutbank and about the same elevation as the station.

Azimuth mark is a standard disk stamped MOKULEIA 1969, set in the top of a 12-inch concrete cylinder which is flush with the ground surface, 54.5 feet northeast of the northeast corner of a bridge abutment, 25 feet north of the center of State Highway 99 and 1.4 feet south of a chain fence.

*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.

USC&MS-DC 27171-P-68

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MOKULEIA
STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 35' 37.76189	ELEVATION:	4.85 METERS
GEODETIC LONGITUDE:	158° 11' 36.51449		15.9 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ θ1 ANGLE
HI 3	5103	434,263.72	152,173.51	- 0° 04' 16"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ OR Δ θ1 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
AZIMUTH MARK	68° 24' 29.2"	68° 28' 45"	5103

QH 068

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1044
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Designation STATE SURVEY 6-12 State Hawaii County Honolulu
Nearest town Waialua County Honolulu
Distance and direction from nearest town 6.05 miles west
Character of mark SS disk
Established by State of Hawaii
Detailed description
0.5 mile south along Goodale Avenue from the post office
at Waialua, thence 5.4 miles west along State Highway 99, thence 0.15
mile north and west along a sandy track road, at an abandoned gun
turret, 12 feet north of the center line of the road, about 2 feet
lower than the road, in the top of a concrete post which is in the
center of the concrete base of the gun turret and projects about 0.2
foot above the surface of the base.

Section ,T ,R

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 6-12

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE	21° 35' 08.71169	ELEVATION	3.65 METERS
GEODETIC LONGITUDE	158° 12' 12.67683		12.0 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ θ ANGLE *
HI 3	5103	430,850.87	152,273.70	- 0° 04' 30"

* 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 *	CODE
MOKULEIA	271° 36' 23.8	271° 40' 53"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION MOKULEIA

QH 069

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 211581 STATION 1045
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

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

NAME OF STATION: PAD STATE: Hawaii COUNTY: Honolulu
CHIEF OF PARTY: C. A. Annis YEAR: 1969 DESCRIBED BY: G. D. Banks

NOTE	HEIGHT OF TELESCOPE ABOVE STATION MARK METERS	HEIGHT OF LIGHT ABOVE STATION MARK METERS
desc. none	SURFACE-STATION MARK, UNDERGROUND-STATION MARK	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION
	OBJECT	BEARING
		DISTANCE FEET METERS
		DIRECTION
	WAIALUA 2 1927	0 00' 00.0
	Kaena Pt. Radio Mast	37 13 35.7
desc. 12a	R.M. 2	SE 22.99 7.005 59 33 04
	R.M. 1	E 66.80 20.361 351 58 24
	R.M. 1 to R.M. 2	61.81 18.840

Station is located about 1.0 mile east of the most northwesterly point of the island of Oahu and is on the Kaena Point Tracking Station and is near Sub Station Building No. 41.

To reach from the post office in Waianae, go north on the highway for 7.0 miles to the Kaneana Cave on the right and a parking area on the left, continue northerly on the highway for 2.35 miles to a side road on the right and sign on the right "Kaena Pt Tracking Station etc.", turn right and follow paved road uphill for 2.1 miles to a guard shack on the left which is just before reaching a T-road, turn left and follow paved road westerly along the top of the ridge for 2.0 miles to the end of the road and the station as described.

Station mark is a standard disk, stamped PAD 1969, cemented in a drill hole in a 4 X 4 foot concrete pad which is flush with the ground surface. It is 77.0 feet west-northwest of the north gate post of a metal gate, 34.0 feet north-northwest of northeast corner of a metal, wire mesh fence and 11.4 feet west-southwest of a witness post.

Reference mark 1 is a standard disk, stamped PAD NO 1 1969, cemented in a drill hole in the top of an outcrop which is on the extreme east edge of the hill. It is 84.4 feet northeast of a fence corner, 69.0 feet north of a metal fence, 55.3 feet east-northeast of the witness post and 7.8 feet north of a metal fence. It is about the same elevation as the station.

Reference mark 2 is a standard disk, stamped PAD NO 2 1969, cemented in a drill hole in the southeast corner of a 4 1/2 X 4 1/2 foot concrete pad which is flush with the ground surface. It is 54.2 feet west of the gate, 21.5 feet south-southeast of the northeast corner of the fence, 20.5 feet north of the northwest corner of a fence and about the same elevation as the station.

ADJUSTED HORIZONTAL CONTROL DATA

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

SOURCE: G-14543

GEODETIC LATITUDE:	21 34 31.75990	ELEVATION:	274.5 METERS
GEODETIC LONGITUDE:	158 16 10.36260		901 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ 10R Δ 01 ANGLE *
HI 3	5103	408,411.82	148,579.22	- 0° 05' 57"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ 10R Δ 01 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
WAIALUA 2	263° 05' 30.9	263° 11' 28"	5103

QH 070

*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.

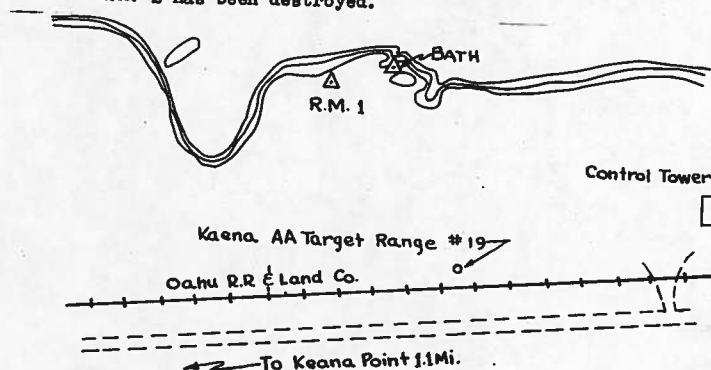
HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1046
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

BATH (Hawaii, H.A.P., 1932)--Station is 1.1 miles E of
Kaena Point, about 100 meters E of large rock 10 meters offshore,
and on the W side of a deep hole in the coral reef.
Station and Reference Mark No. (?) are standard disks set
in concrete in depressions in outcropping bedrock.
Station ALEI is visible.
OBJECT DISTANCE DIRECTION
WET meters 0°00'00"0
R.M. 2 18.56 38 52 00
R.M. 1 19.08 146 41 00
High-water line 1 270
Height of signal above station mark - 3 meters.
Height of instrument above station mark - 1.5 meters.

(477th FA Obsn. Bn. 1945)--A Coast and Geodetic Survey marker,
set in coral 438 feet N of station 19, which is located 400 feet
W of entrance to AAA camp on railroad. Mark is in good condition.
R.M. 1 is in good condition and as described.
R.M. 2 has been destroyed.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BATH

STATE: HAWAII

YEAR: 1932

SECOND

ORDER

SOURCE: G-14543

GEODETIC LATITUDE	21 ° 34' 51.79442	ELEVATION:	2.15 METERS
GEODETIC LONGITUDE	158 15 56.52132		7.1 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ FOR Δ θ: ANGLE °
HI 3	5103	409,721.69	150,598.52	- 0° 05' 52"

* 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
PUEO	49° 25' 04.1	49° 30' 56"	5103
PAD	32 52 22.1	32 58 14	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970
POSITION DETERMINED BY TRAVERSE FROM STATION PAD
AND CHECKED BY ADDITIONAL OBSERVATIONS

QH 071

(continued on next page)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1046
LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

BATH (continued)

FORM 526a
(9-18-69)

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

NAME OF STATION: BATH
ESTABLISHED BY: H.A.P. YEAR: 1932 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.5 METERS,		HEIGHT OF LIGHT ABOVE STATION MARK METERS.				
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION						
OBJECT	BEARING	DISTANCE		DIRECTION		
		FEET	METERS			
PUEO 1932	SE SW			00	00	00.0
R.M. No. 3		72.203	22.008	266	24	35
R.M. No. 1		62.560	19.068	356	32	45

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

Station is located about 1 mile airline east of Kaena Point and 2-1/2 miles west of Camp Erdman, on a section of coral bedrock shoreline along the north coast of Oahu.

To reach station from the post office in Waialua, go south on Goodale Avenue for 0.5 mile; take right fork and go west on State Highway 99 for 7.0 miles to Camp Erdman on the right; continue ahead on the coast road for 2.7 miles to station on shoreline about 200 yards north.

Station mark is a standard disk stamped "BATH 1932", cemented in a drill hole in a 6-foot-wide coral ledge running between water line and the north edge of a 16-foot-square natural pool about 3 feet deep in the bedrock ledge. There is orange paint on the rock around the mark.

Reference mark number one is a standard disk stamped "BATH NO 1", cemented in a drill hole in bedrock ledge at the south edge of a small pool in the bedrock and at about same elevation as station.

Reference mark number three is a standard disk stamped "BATH NO 3 1932 1963", cemented in a drill hole in coral rock outcropping about 9 feet southeast of the southeast corner of a 35 x 50-foot indentation in the shore line. It is about 1 foot higher than station mark.

RECOVERY NOTE, TRIANGULATION STATION
TRAVERSE

NAME OF STATION: BATH
ESTABLISHED BY: H.A.P. YEAR: 1932 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: C.A.A. YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 8 1/2 miles west of Waialua

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 3 were recovered as described in 1963, and found in good condition.

A Geodimeter Traverse was made between BATH 1932 and PAD.
Geodimeter Distance 733.602 meters or (2,406.80 ft.).

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1047
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF ~~STATION~~ STATION

NAME OF STATION: BATH RM 3

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

Description, including sketch of object: Station is located 1 mile east of Kaena Point and 2 1/2 miles west of Camp Erdman. On a section of coral bedrock shoreline, on the north coast of Oahu.
To reach the station from the post office in Waialua. Go south on Goodale Avenue for 0.5 mile to a fork. Take the right fork, and go west on State Highway 99 for 7.0 miles to Camp Erdman on the right, continue west on the coast road for 2.7 miles to a dim track road on the right. Turn right and go north on track road for about 200 yards to shore line and the station.

Station is a standard reference mark disk stamped BATH NO 3 1932 1963. It is cemented in a drill hole in the coral shore line. It is 9 feet southeast of the southeast corner of a 35 X 50-foot indentation in the shore line, which is 6-feet deep.

A Geodimeter Traverse was made between BATH RM 3 and PAD.
Geodimeter distance 728.973 Meters or (2,391.62 ft.).

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

scribed by

ESBA
COAST AND GEODETIC SURVEY

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BATH RM 3

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 34' 51.28078	ELEVATION:	2.67 METERS
GEODETIC LONGITUDE:	158 15 55.98826		8.8 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE
HI 3	5103	409,771.92	150,546.61	- 0° 05' 52"

* 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
PAD	34° 33' 33.3	34° 39' 25"	5103

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

QH 072

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1048
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Designation STATE SURVEY 6-13 State Hawaii County Honolulu
Nearest town Waialua County Honolulu Chief of party C. Symms
Distance and direction from nearest town 9.85 miles west Leveling date July 1969
Character of mark SS disk Stamping 6-13 1969
Established by State of Hawaii
Detailed description

Section T R
0.5 miles south along Goodale Avenue from the post office at Waialua, thence 8.0 miles west along State Highway 99, thence 1.35 miles west along a dirt and rock road, on a ridge, on the north side of a cut for the track road nearest the ocean, in line with a row of power line poles, in the top of the center of a 3- by 3-foot boulder projecting 1.0 foot above the ground, 18 feet north of the center line of a track road, about 50 yards south of the ocean, about 8 feet higher than the road and 70 feet above the ocean.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 6-13

STATE: HAWAII

YEAR: 1969

SECOND ORDER

SOURCE: G-14543
NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 34' 55.74303	ELEVATION:	12.70 METERS
GEODETIC LONGITUDE:	158 15 14.20876		41.7 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ FOR Δ θ1 ANGLE *
HI 3	5103	413,715.90	150,990.29	- 0 ° 05' 36 "

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ FOR Δ θ1 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
PAD	65 ° 27' 41.8	65 ° 33' 18 "	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PAD

QH 073

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211581 STATION 1049
HAWAII
LATITUDE 21° 30' TO 22° 00'
LONGITUDE 158° 00' TO 158° 30'
DIAGRAM NF 4-11 OAHU

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 532
Rev. Aug. 1964

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: HIKE 2 STATE: Hawaii COUNTY: Honolulu

CHIEF OF PARTY: W.R. Porter YEAR: 1963 Described by: R.F. Hanson

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK	1.5 METERS	HEIGHT OF LIGHT ABOVE STATION MARK	METERS
1A 7a	Surface-station mark, Underground-station mark	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION		
OBJECT		BEARING	DISTANCE	DIRECTION
			feet	meters
LUCK 1932				00 00 00.0
R.M. No. 1		ENE	19.482	5.932
Camp Erdman, Flagpole		E		147 31 02
R.M. No. 2		WSW	19.465	5.933
				178 41 37.3
				327 38 11

Station is located along the north coast of Oahu, about 3 miles airline east of Kaena Point and 3/4 mile west of Camp Erdman, in a brushy strip between two dirt roads, and on top of a 16-foot outbank overlooking the north, lower road.

To reach station from the post office in Waialua, go south on Goodale Avenue for 0.5 mile; take right fork and go west on State Highway 99 for 6.1 miles to end of paved road; continue ahead, on graded road along coastline, for 0.85 mile to Camp Erdman gate on right. Continue ahead on main road along power line for 0.8 mile to power pole No. 243 on left, and station on right, 0.1 mile before reaching corral on left. Station mark is a standard disk, stamped "HIKE 2 1963", set in the

top of a 10-inch-square, concrete monument that projects 3 inches above ground. It is 145 feet north of power pole No. 243, 120 feet north of center line of upper, main road, 47 feet south of center line of lower road, 19 feet south of edge of 16-foot outbank, 3.5 feet northwest of a white witness post, and 228 feet east of a junction where the upper and lower roads join.

Reference mark number one is a standard disk, stamped "HIKE 2 NO 1 1963", brazed to the top of a 1-1/2-inch, iron pipe that is set in cement and projects 5 inches above ground. It is 13 feet south from edge of the outbank, 2 feet north of the base of a small, rock and grass hummock, and about 6 inches lower than station mark.

Reference mark number two is a standard disk, stamped "HIKE 2 NO 2 1963", brazed to the top of a 1-1/2-inch, iron pipe that is set in cement and projects 6 inches above ground. It is 25 feet south from edge of the outbank, in grass area at north edge of brush, and at about same elevation as station mark.

RECOVERY NOTE, TRIANGULATION STATION TRAVERSE

NAME OF STATION: HIKE 2
ESTABLISHED BY: W.R.P. YEAR: 1963 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: C.A.A. YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 7 miles west of Waialua

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 as described in 1963, and found to be in good condition.

A Geodimeter Traverse was made between HIKE 2 1963 and PAD.
Geodimeter Distance 3400.363 Meters or (11,155.91 ft.).

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: HIKE 2

STATE: HAWAII

YEAR: 1963

SECOND

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 34' 57.21418	ELEVATION:	12.62 METERS
GEODETIC LONGITUDE:	158 14 15.69665		41.4 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ: ANGLE °
HI 3	5103	419,238.60	151,130.01	- 0° 05' 15"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
LUCK	92° 40' 21.1"	92° 45' 36"	5103
PAD	76 39 19.6	76 44 34	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970
POSITION DETERMINED BY TRAVERSE FROM STATION PAD
AND CHECKED BY ADDITIONAL OBSERVATIONS

QH 074

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

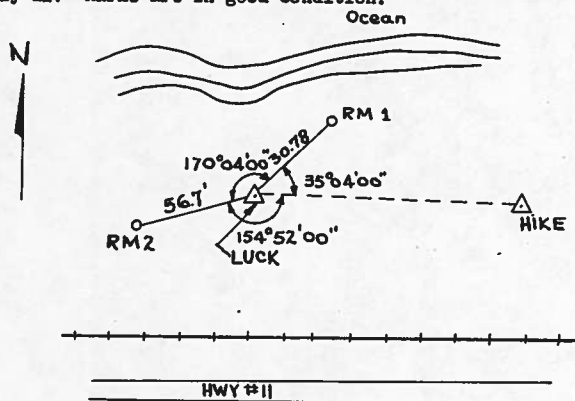
QUAD 211581 STATION 1050
HAWAII
LATITUDE 21 ° 30' TO 22 ° 00'
LONGITUDE 158 ° 00' TO 158 ° 30'
DIAGRAM NF 4-11 OAHU

LUCK (Hawaii, H.A.P., 1932)--Station is 2.5 miles E of Kaena Point, on the rough coral rock along shore, E of a small draw with a deposit of sand near its mouth. Station and R.M.s 1 and 2 are standard disks set in concrete in depressions in outcropping bedrock.

OBJECT	DISTANCE	DIRECTION
HIKE	meters	0°00'00"0
R.R. track	75	70
R.M. 2	17.28	154 52 40
High-water line	16	250
R.M. 1	9.45	324 54 10

Height of signal above station mark - 3 meters.
Height of instrument above station mark - 1.5 meters.

(477th FA Obsn.Bn., 1946)--Station is 2.5 miles E of Kaena Point, on the rough coral rock along shore and E of a small draw, about 3500 yards W of the W end of air strip, and 100 yards N of Highway 11. Marks are in good condition.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: LUCK

STATE: HAWAII

YEAR: 1932

SECOND

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 34' 58.36276	ELEVATION:	2.89 METERS
GEODETIC LONGITUDE:	158 14 42.01651		9.5 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ 10R Δ § 1 ANGLE °
HI 3	5103	416,754.68	151,249.76	- 0° 05' 24"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PAD	72 ° 09' 36.3	72 ° 15' 01 "	5103
HIKE	270 39 07.0	270 44 31	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970
POSITION DETERMINED BY TRAVERSE FROM STATION PAD
AND CHECKED BY ADDITIONAL OBSERVATIONS

QH 075

(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 211581 STATION 1050

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

LUCK (continued)

FORM 326a
(5-15-55)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: LUCK
ESTABLISHED BY: H.A.P. YEAR: 1932 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK		1.5 METERS,		HEIGHT OF LIGHT ABOVE STATION MARK		METERS.	
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION							
OBJECT	BEARING	DISTANCE		DIRECTION			
		FEET	METERS				
-----1932 DISTANCES AND DIRECTIONS-----							
HIKE				00	00	00.0	
R.M. No. 2			17.28	154	52	40	
R.M. No. 1			9.45	324	54	10	
-----1963 DISTANCES AND DIRECTIONS-----							
R.M. No. 2	SW	56.700	17.281	154	52	50	✓
R.M. No. 1	NE	30.775	9.379	324	55	34	

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

Station is located about 2-1/2 miles airline east of Kaena Point and 1-1/4 miles west of Camp Erdman, on a low, flat, dark grey, smooth-appearing rock point along the north coast of Oahu.

To reach the station from the post office in Waialua, go south on Goodale Avenue for 0.5 mile; take right fork and go west on State Highway 99 for 8.1 miles to end of paved road; continue ahead on graded road for 0.85 mile to Camp Erdman on the right; continue ahead for 1.3 miles to power pole No. 249 on left and large, concrete water trough in pasture on left. Take right fork, following rough track road northerly for 0.05 mile to end of road overlooking the rock point. From here walk about 75 yards northeast to station.

Station mark is a standard disk stamped "LUCK 1932", cemented in a drill hole in bedrock near center of the rock point. It is 20 yards south of water line, 75 yards east of the south point of a small cove, about 100 yards north of old railroad bed, and about 175 yards north from power pole No. 249.

Reference mark number one is a standard disk stamped "LUCK NO 1", cemented in a drill hole in bedrock at about same elevation as station. It is 20 feet south from water line, and has orange paint, and a 12-inch, white circle painted around it.

Reference mark number two is a standard disk stamped "LUCK NO 2", cemented in a drill hole in bedrock at about same elevation as station. The rock around the mark is painted orange, and a 12-inch, white circle is painted around it.

RECOVERY NOTE, TRIANGULATION STATION TRAVERSE

NAME OF STATION: LUCK
ESTABLISHED BY: H.A.P. YEAR: 1932 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: C.A.A. YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 7 1/2 miles west of Waialua

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

Station mark and reference mark 1, were recovered as described in 1963 and found to be in good condition. Reference mark 2 has been destroyed.

A Geodimeter Traverse was made between LUCK 1932 and PAD.
Geodimeter distance 2,670.013 Meters or (8,759.78 ft.).