

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1052
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION KAHE

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-2

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 20' 46.94958	ELEVATION:	60	METERS
GEODETIC LONGITUDE:	158 06 55.64920	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ θ ANGLE °
HI 3	5103	460,707.46	65,290.47	- 0 02 31

* 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
KAHE	121° 06' 43.5	121° 09' 15"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION KAHE

QH 146

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1053
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

FORM 325
 (1-18-69)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

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

NOTE	HEIGHT OF TELESCOPE ABOVE STATION MARK METERS, 1	HEIGHT OF LIGHT ABOVE STATION MARK METERS.	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
			BEARING	DISTANCE		DIRECTION
1b	SURFACE-STATION MARK					
7a	UNDERGROUND-STATION MARK					
				FEET	METERS	
desc.			MAKAKILO 1873 1931			0 00 00.0
desc.			R.M. 1	NE 64.35	19.615	19 29 27.0
desc.			R.M. 2	NW 70.28	21.423	270 11 34.0
desc.			BARBERS POINT HA CEM CORP PLANT	NW	(0.7 mile)	273 20 08.7
desc.			Azimuth Mark	N	(0.3 mile)	332 45 10.5

The station is located about 6 1/2 miles southeast of Nanakuli, 5 miles southwest of Ewa and 1/2 mile east of Barbers Point Light-house.

To reach the station from the junction of State Highway 75 and Interstate H-1, go west on the interstate for 5.1 miles to Cambell Industrial Park exit on the right. Turn right on the exit and cross back over the interstate on the overpass and follow Kalaeloa boulevard for 1.7 miles to Malakole Road. Turn right on Malakole Road for 0.25 mile to Hanua Street on the left. Turn left, south, on Hanua Street for 0.8 mile to a cross street and the azimuth mark on the left. Continue south on Hanua Street for 0.3 mile to a gate at the end of the asphalt street and the station just inside of the gate on the right.

The station mark is a standard disk, stamped BARBERS POINT 1969, set in the top of a 14-inch round concrete monument which is flush with the ground surface. It is 44 feet southwest of the west gate post of the gate mentioned above and 43.5 feet west of the center of a track road.

Reference mark 1 is a standard disk, stamped BARBERS POINT NO 1 1969, cemented in a drill hole in a cement pad which supports a man-hole cover. It is 21.5 feet east of the center of the asphalt street, 8.3 feet north-northeast of the east gate post and 3 feet northwest of the center of the man hole cover.

Reference mark 2 is a standard disk, stamped BARBERS POINT NO 2 1969, cemented in a drill hole in the top of the south rock wall of an irrigation canal. It is 53 feet west of the west end of the security fence and about the same elevation as the station.

The azimuth mark is a standard disk, stamped BARBERS POINT 1969, cemented in a drill hole in a concrete pad which supports a man-hole cover. It is in the northeast corner of the intersection, 22 feet east of the center of the street.

No measurement was made between reference marks due to heavy brush and security fence on line.

The key for the gate at the station was obtained from Cambell Estates office at 820 Fort Street, Suite 500, Honolulu.

*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.

USCGM-DC 27171-P-69

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BARBERS POINT
 STATE: HAWAII YEAR: 1969 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21° 18' 00.25933	ELEVATION: 1.5 METERS
GEODETIC LONGITUDE: 158 06 14.67476	5 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	g FOR Δ g ANGLE *
HI 3	5103	464,566.79	48,468.87	- 0° 02' 16"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
AZIMUTH MARK	173° 21' 38.0"	173° 23' 54"	5103

QH 147

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

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211582

STATION 1053

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

BARBERS POINT (continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: BARBERS POINT
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:

5 miles southwest of Ewa.

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

Station was not recovered. Station was reportedly in good shape before being covered with a 4-inch concrete slab of a newly organized used auto parts yard. Permission could be obtained to uncover station and protect with a handhole, if desired.

Reference Marks No. 1 and No. 2 and 1969 Azimuth Mark recovered in good condition. Reference Marks No. 1 and No. 2 recovered as described in description by C.A. Annis 1969.

Azimuth Mark, stamped AZIMUTH MARK 1969, was not recovered as described. It is in the northeast corner of the intersection, 30 feet east of the center of the street.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1054
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

RECOVERY NOTE, TRIANGULATION STATION

R
 NAME OF STATION: Barbers Point Lighthouse (New)
 ESTABLISHED BY: ** YEAR: 1933 STATE: Hawaii
 RECOVERED BY: H.J.S. 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. It is on the southwest point of Oahu Island at the south edge of the Campbell Park Industrial area. It is shown in the "Light List, Pacific Coast, 1961" as #3042 - white cylindrical concrete tower, built 1888, rebuilt 1933.

(11-7-66)

RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

R
 NAME OF STATION: Barbers Point Lighthouse, (New)
 ESTABLISHED BY: YEAR: 1933 STATE: Hawaii
 RECOVERED BY: D.G. Rushford YEAR: 1964 COUNTY: Honolulu

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

Station was recovered in good condition. It is a white, cylindrical, tapering, concrete tower with catwalk around top. The light is above the catwalk and has a small red ball on it's top. It is 80 feet from ground to red ball. There is a sign "ERECTED 1933" above door of tower. Located on the seashore at Barbers Point, at south end of Campbell Industrial Park, at the U.S. Coast Guard Station.

RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

R
 NAME OF STATION: BARBERS PT LIGHTHOUSE (NEW)
 ESTABLISHED BY: ** YEAR: 1933 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: Carl A. Annis YEAR: 1969 COUNTY: Honolulu

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

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

Intersection station recovered in good condition as described by H. J. S. in 1961.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION BARBERS POINT LIGHTHOUSE NEW

STATE HAWAII

YEAR 1933

THIRD

ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21° 17' 58.27519	ELEVATION	METERS
GEODETIC LONGITUDE: 158 06 32.12085		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE
HI 3	5103	462,919.90	48,269.78	- 0° 02' 22"

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

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

THESE DATA OBTAINED FROM ADJUSTMENT OF OCT 1971

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1055
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: BARBERS PT STANDARD OIL NW TOWER
 CHIEF OF PARTY: C.A. Annis YEAR: 1969 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object:
 The station is a short pipe with a ball on the top and the pipe is on top of the tower. The tower looks like a standpipe and is the northwest one of 2 similar towers on the Standard Oil Co. Refinery grounds, it is 189 feet high and 9 feet in diameter.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BARBERS PT STANDARD OIL NW TWR
 STATE: HAWAII YEAR: 1969 THIRD ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 18' 48.85766	ELEVATION	METERS
GEODETIC LONGITUDE:	158 06 59.68582		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (OR Δ θ) ANGLE *
HI 3	5105	460,317.05	53,375.37	- 0° 02' 33"

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

FORM C&GS-525b (12-69)

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
QH 149			

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1057
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

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

R

NAME OF STATION: Barbers Pt. NAS, Base Control Tower, Beacon
 ESTABLISHED BY: H.O.F. YEAR: 1957 STATE: Hawaii
 RECOVERED BY: H.J.S. 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.
 It is the center of the revolving aero beacon atop the control tower at the Naval Air Station. The control tower is located on the southeast corner of the administration building and on the north side of the runways.
 It is shown in the "Light List, Pacific Coast, 1961" as #3040 - Barbers Pt. Aero Lt.

FORM 525 (11-8-55) U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

R

NAME OF STATION: Barbers Pt. NAS, Base Control Tower Beacon
 ESTABLISHED BY: H.O.F. YEAR: 1957 STATE: Hawaii
 RECOVERED BY: D.G. Rushford YEAR: 1964 COUNTY: Honolulu

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

was recovered.
 Located on Barbers Point Naval Air Station, in the north angle of the intersection of the runways, 0.1 mile south from where Midway Drive reaches its southernmost point and turns from southeast to east-northeast.
 Station is the airport beacon, a rotating, alternate green and white light, mounted on the center of the control tower, which is set on the southeast end of the roof of the Base Operations Building. This building sets south across a taxiway from the Base Air Terminal.

RECOVERY NOTE ~~DESCRIPTION~~ OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: Barbers Point NAS Base Control Tower Beacon
 Established by: H.O.F. 1957 YEAR: 1973 STATE: Hawaii COUNTY: Honolulu
 CHIEF OF PARTY: G.W. Peterkin

Description, including sketch of object:

Station recovered as described by D.G. Rushford in 1964.

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

Described by

ESSA
 COAST AND GEODETIC SURVEY

NAME OF STATION: BARBERS PT NAS BASE CONT TR BN

STATE: HAWAII

YEAR: 1957

THIRD

ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21 ° 18' 48.59609	ELEVATION: METERS
GEODETIC LONGITUDE: 158 04 24.76854	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ IOR Δ θ I ANGLE *
HI 3	5103	474,965.08	53,340.20	- 0° 01' 36"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ IOR Δ θ 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 151			

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211582
STATION 1059
LATITUDE ° ' 10 ° ' 10 ° ' /
LONGITUDE ° ' 10 ° ' /

PALAIAlAl (continued)

RECOVERY NOTE, TRIANGULATION STATION

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

R

NAME OF STATION: PALAIAlAl
ESTABLISHED BY: W.H. Porter
YEAR: 1873
STATE: Hawaii
COUNTY: Honolulu
RECOVERED BY: P.O. Johnson
YEAR: 1967
STATE: Hawaii
COUNTY: Honolulu
BENCH MARK ALSO

HEIGHT OF TELESCOPE ABOVE STATION MARK 2.8 METERS
HEIGHT OF LIGHT ABOVE STATION MARK 8.99 FEET

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

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
MAKAKIIO	E	00	00	00.0
HONOLULU HOR-TAC HNT	SE	70	11	19.6
R.M. No. 3	SE	99	54	16
R.M. No. 2	W	236	30	52
Manawahua Pk., Radar Dome	NW	308	26	17.8
		4.069		
		5.853		
		13.348		
		19.204		

Station mark and reference mark number two were recovered and found in good condition. Reference mark number one was destroyed when a military installation was built near the station, probably during WW-2. A new reference mark, number three, was established. A complete description follows:
Station is located about 3-1/2 miles airline west of Kwa and 1 mile north of the west end of Barbers Point Naval Air Station, on Puu Palalal, at 692 feet elevation, about 1/4 mile northwest, above the P.C. and R. Quarry.
To reach station from the junction of State Highways 90 and 76 about 2 miles west of Waiapahu, go westerly on State Highway 90 for 5.0 miles to the quarry on right. (Key for locked gate may be obtained at quarry office). Follow main road up through quarry for 0.7 mile to T-junction at locked gate on left. Pass through gate and follow track road for 0.3 mile to gate. Pass through gate and continue for 0.1 mile to fork with metal gate on left fork. Pass through this gate and go uphill for 0.25 mile to end of road at power pole on ridge line. Walk southerly along ridge about 100 yards to station.
Station mark is a standard disk stamped "PALAIAlAl", cemented in a drill hole in bedrock projecting about 3 feet above surrounding area. (NOTE: The iron yoke of the Hawaii Territory survey signal sets so close to the top of the mark that it is not possible to see it a date is stamped on the disk.) The mark is at the north side of the top 1 of 4 concrete, fire-control buildings set in the south face of the hill.
Reference mark number two is a standard disk stamped "PALAIAlAl NO 2", cemented in a drill hole in a bedrock ledge; 12.7 feet west of the north-west corner of the building and 4.3 feet lower than station mark. The mark is usually covered with dirt and leaves.
Reference mark number three is a standard disk stamped "PALAIAlAl NO 3 1873-1927 1963", cemented in a drill hole in the northeast corner of the fire-control building; 12.3 feet northeast of a vent pipe projecting from the roof, 14 inches west of the corner, and 2.4 feet lower than station mark.

NOTE - One of these forms must be used for every station recovered.
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.
USCOM-DC 2175-888

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
WHIPP	SE	13.35	4.068	00 00 00.00
Reference Mark No. 3	W	19.23	5.861	148 41 43
Reference Mark No. 2				285 19 38

The station mark, reference mark No. 2 and reference mark No. 3 were recovered and found to be in good condition. The horizontal distance and direction to both reference marks was verified. A new and complete description follows:
The station is located on the southeast end of a crescent-shaped ridge, about 3-1/2 miles west of Kwa, 1 mile north of the west end of the Barbers Point Naval Air Station, 0.5 mile south of Makakilo and 1/4 mile northwest of a quarry.
To reach the station from the junction of State Highways 75 and 90 at the west edge of Waiapahu, go west and southwest on Highway 90 for 4.7 miles to a crossroad. Turn right and go westerly on Makakilo Drive for 0.4 mile to Palalal Street. Turn left and go south and west on Palalal Street for 0.75 mile to the end of the street. Continue ahead, following a graded road around a construction area for 0.3 mile to a dim track road on the left. Turn left and go east and south on the track road for 0.2 mile to the end of track travel. Back southeast along the top of the ridge for about 100 yards to the station mark, as described below.

The station mark is a standard disk, stamped PALAIAlAl 1927, cemented in a drill hole in outcropping bedrock. A Type "A" Hawaiian Territory survey signal has been built over the mark. The pipe that holds the signal was found to be eccentric by 6 millimeters. The mark is just north of the north one of four concrete fire control boxes. Reference mark No. 2 is a standard disk, stamped PALAIAlAl NO 2, cemented in a drill hole in outcropping bedrock. It is 4 feet lower in elevation than the station mark.
Reference mark No. 3 is a standard disk, stamped PALAIAlAl NO 3 1963, cemented in a drill hole in the top and northeast corner of the top one of four fire control boxes. It is 2 feet lower in elevation than the station mark.
Note: The route to the station may change due to construction in the area.

(continued on next page)

HORIZONTAL CONTROL DATA

By the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1059
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PALALAI
 STATE: HAWAII
 YEAR: 1873
 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 20' 38.01 095	ELEVATION:	150.0 METERS
GEODETIC LONGITUDE:	158 05 36.56169		492 FEET

STATE COORDINATES (FEET)			
STATE & ZONE	CODE	X	Y
HI 3	5103	468,702.21	64,383.60
β HORN Δ OF ANGLE \sim 0° 02' 02"			

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH*	CODE
EMA BEACH	290 24' 23.3	290 26' 26"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

OH 153

NO ORIGINAL TEXT

HAWAII, Hawaiian Government Survey, 1873;
 L. G. S., 1927)--Near S coast of Oahu, at the
 S end of the Waianae Range, on the peak of Puu Palalai. It is on
 the summit of a rocky cliff, on the W side and highest point of an
 extinct volcano, N of the main road between Honolulu and Waianae,
 and N of the railroad station of Gilbert. A road leading from
 the pump house, Oahu Sugar Company, at the SE foot of the Range, up
 through some pineapple fields goes to within 300 feet (in eleva-
 tion) of the station.
 The original mark, a redwood post and capn of stones, had
 been replaced by the U. S. G. with a concrete post 3 inches square
 and 18 inches long with nail in top. In 1927 the nail was re-
 placed with standard station-mark disk. (NOTE--Description con-
 sidering States marked with standard disk in concrete in out-
 cropping bedrock; but the replacement indicated most probable.)
 Reference marks, standard reference-mark disks with arrows
 pointing toward station, wedged in drill holes in outcropping bed-
 rock, are at the following distances and azimuths from station:
 No. 1, 9.043 meters (29.67 feet), 351°48'; No. 2, 5.555 meters
 (18.21 feet), 92°25'.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 (REV. FEB. 1961)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: Palalalai
 ESTABLISHED BY: Hawaiian G. S. Year: 1873 State: Hawaii
 RECOVERED BY: U. S. G. S. Year: 1953 County: Honolulu

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:
 Station found in good condition. Marked by Territory with a Type A
 signal and stamped PALALAI 1927.

* Name of chief of party should be inserted here. The office who actually visited the station should sign the name at the end of the recovery note.
 15-5442-9
 U. S. GOVERNMENT PRINTING OFFICE

(continued on next page)

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1059

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

PALAILAI (continued)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PALAILAI
 ESTABLISHED BY: H.G.S. YEAR: 1873 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3 1/2 miles west of Ewa.

R

Detailed statement as to the fitness of the original description, including marks found, stampings, changes made, and other pertinent facts:
 Station mark, reference marks 2 and 3 were recovered and found in good condition, as described in the 1963 recovery note by W.R.P.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
EWA BEACH				0 00 00.0
R.M. NO 3	SE	12.94	3.943	24 29 40
R.M. NO 2	W	19.08	5.815	161 01 06
Honolulu HNL VOR-TAC	E	(4 miles)		354 56 26.4

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PALAILAI
 ESTABLISHED BY: H.G.S. YEAR: 1873 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: G.W. Peterkin YEAR: 1973 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Approximately 3 1/2 miles west of Ewa
 HEIGHT OF TELESCOPE ABOVE STATION MARK 2.70 Meters HEIGHT OF LIGHT ABOVE STATION MARK FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
		DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION		
WHIPP 1967				00 00 00.00
Ewa Mill Stack 1925	E	Approx. 3.5 miles		105 16 38.0
R.M. 3	SE	13.37	4.075	148 42 17.1
R.M. 2	E	19.31	5.886	285 19 44.13

The station and reference marks 2 and 3 were recovered and found to be in good condition. The distance and directions to the marks was verified, however a small difference in the measurements to the reference marks was noted, however the original measurements appear to be accurate, due to the high winds experienced at this occupation. The 1967 description and to reach by P.C. Johnson is accurate and adequate.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1060
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

Gilbert (Oahu Island, L. G. Simmons, 1927).—Identical with station *Gilbert (U. S. E.)*, which was also used as a bench mark in the precise level net of Oahu, 1927. At Gilbert siding along Oahu Railway & Land Co., about 35 feet south of main track, and 80 feet toward Ewa from west switch stand, and just inside fence line. Marked by a United States Engineers' rectangular bronze plate set in 4-inch soil pipe, and stamped "Gilbert." Re-marked according to note 14A in 1929.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: GILBERT

STATE: HAWAII

YEAR: 1927

SECOND

ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21° 19' 56.31278	ELEVATION: 20.16 METERS
GEODETIC LONGITUDE: 158 06 12.58166	06.1 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	∠ OR Δ or ANGLE
HI 3	5103	464,775.41	60,178.42	- 0° 02' 16"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PALAILAI	219° 08' 20.4"	215° 10' 36"	5103

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

QH 154

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 536
 (REV. FEB. 1963)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: Gilbert

ESTABLISHED BY: L.G.S.

YEAR: 1927

STATE:

Hawaii

RECOVERED BY: U.S.G.S.

YEAR: 1953

COUNTY: Honolulu

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

Station found in good condition. Marked by Territory with a Type A signal and stamped GILBERT.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 536
 (REV. FEB. 1963)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: GILBERT

ESTABLISHED BY: L.G.S.

YEAR 1927

STATE: Hawaii

RECOVERED BY: H.O.F.

YEAR: 1955

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. Gilbert Siding, fence line, and west switch are now gone. A new description follows: 0.8 of a mile northwest along the Oahu Railway & Land Company abandoned railway tracks, from the crossing of the road leading down to the Honolulu Magnetic Observatory, 96 feet east of Hawaiian Power Co. pole No. 9, 36.5 feet south of the centerline of the abandoned track, and near the northwest corner of the old Gilbert farm. A permanent A type Territorial red and white survey signal was centered over the mark.

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 536
 (REV. FEB. 1963)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: GILBERT

ESTABLISHED BY: LGS

YEAR: 1927

STATE: Hawaii

RECOVERED BY: SLH

YEAR: 1972

COUNTY: Honolulu

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

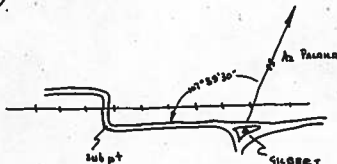
Station is on Oahu I., about 4 miles west of Ewa and about 2 miles north of Barbers Point, approximately 35 feet south of Oahu R.R. track and 180 ft east of intersection of RR track + dirt road. It is on a grassy triangle formed by road intersection and is a Type H A signal.

Instr Sta — GILBERT 1927

Az sta — PALAILAI

∠ Az — 107° 59' 30" (L)

Dist. — 56.0 meters



* 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.

(continued on next page)

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1060
 LATITUDE ° ' TO ° '
 LONGITUDE ° ' TO ° '
 DIAGRAM

GILBERT (continued)

FORM 5260
 (6-18-65)

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

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

HEIGHT OF TELESCOPE ABOVE STATION MARK 2.58 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
PALAILAI 1873-1927				00 00 00.0
R.M. No. 1	S	32.343	9.858	140 50 03
R.M. No. 2	WNW	38.857	11.844	248 31 32

Station was recovered and found in good condition, although the Hawaii Territory Survey "Type A" signal has settled and the target is slightly out of plumb. Two new reference marks, numbers one and two, were established. A complete description follows:

Station is located about 4 miles airline west of Ewa and 1 mile west-northwest from the western end of Barbers Point Naval Air Station, along the south side of the old railroad tracks, at a T-junction of power lines, at the northwest corner of a piggery, and 0.2 mile west of railroad bridge No. 28A.

To reach station from the junction of State Highways 90 & 75, about 1-1/2 miles west of Waipahu, go westerly on State Highway 90 for 5.7 miles to sign on left "JAMES CAMPBELL INDUSTRIAL PARK". Turn left and follow paved road for 0.3 mile to crossroad; turn right and go 0.45 mile to crossroad; turn left and go 0.4 mile to railroad tracks; cross tracks, turn right, and go west along south side of tracks for 0.25 mile to station.

Station mark is a 3 x 4-inch brass plate, stamped "U S ENG GILBERT", set in concrete in the top of a 4-inch iron pipe that projects 1 foot above the mass of concrete in which it is set. It is 38.3 feet south of center line of railroad tracks, 9.0 feet east of base of power pole guy-wire, 38.6 feet east-southeast of a power pole, in a small, grassy triangle, and directly under the east-west power line. The concrete floor of the Hawaii Territory Survey signal is 4 feet above ground and the metal target extends 7 feet above it.

Reference mark number one is a standard disk stamped "GILBERT NO 1 1927 1963", set in the top of a 12-inch-square, concrete monument that projects 4 inches above ground. It is 3 feet northwest of the fence, 16 feet southeast of center line of track road and at about same elevation as station.

Reference mark number two is a standard disk stamped "GILBERT NO 2 1927 1963", set in the top of a 12-inch-square, concrete monument that projects 2 inches above ground. It is 2.2 feet north of a power pole, 35 feet south of south rail of railroad, 16.0 feet southeast of a chiseled square on the southeast corner of a concrete culvert, with "BM 1 66.59" painted by it, and 11 feet east of center of cane field ditch.

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

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

USCOMM-DC 47173-P59

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: GILBERT
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: P.C. Johnson YEAR: 1967 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 4 miles west of Ewa

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

The station was recovered as described in the 1963 Recovery Note and all marks remain in good condition. The station was occupied for vertical angle observations only.

RECOVERY NOTE, TRIANGULATION STATION TRAVERSE

NAME OF STATION: GILBERT
 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: 4 miles west of Ewa

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

Station mark, reference marks 1 and 2 were recovered as described in 1963, and found to be in good condition.

A Geodimeter Traverse was made between GILBERT 1927 and PALAILAI 1873 1927.

Geodimeter distance 1653.440 meters or (5424.61) ft.

FORM CGS-526 (6-64)
 USCOMM-DC 3449-P59

U.S. DEPARTMENT OF COMMERCE
 ENVIRONMENTAL SCIENCE SERVICES 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 211582 STATION 1061
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION PALAILAI

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-5
 STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 20' 42.23527	ELEVATION	47	MEYERS
GEODETIC LONGITUDE:	158 04 48.60267	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	∠ FOR ∆ ∠ ANGLE *
HI 3	5103	472,717.31	64,807.34	- 0° 01' 45"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
PALAILAI	84° 36' 33.5"	84° 38' 19"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PALAILAI

QH 155

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1062
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION PALAILAI

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: ST MON

STATE: HAWAII

YEAR: 1969

SECOND ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 18' 59".65109	ELEVATION:	4	METERS
GEODETIC LONGITUDE:	158 06 07.70929	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ρ OR Δ ϕ ANGLE *
HI 3	5103	465,232.36	54,479.16	- 0° 02' 14"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
PALAILAI	196° 39' 15.4"	196° 41' 29"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION PALAILAI

QH 156

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1063
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

FORM 525
 (5-16-65)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: **NAVAIR** STATE: **Hawaii** COUNTY: **Honolulu**
 CHIEF OF PARTY: **Carl A. Annis** YEAR: **1969** DESCRIBED BY: **H. Ellwanger**

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK 1.8 METERS.†		HEIGHT OF LIGHT ABOVE STATION MARK 1.8 METERS.		
	1b SURFACE-STATION MARK,	7a 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	
	PALAILAI 1873 1927 BARBERS POINT BASE CONTROL TOWER BN 1957	N	(0.25 mile)		0 00 00.0
11b	RM 1	N	24.30	7.405	17 36 46.4
11b	RM 2	SW	23.37	7.122	32 55 12
					250 53 12

The station is located about 3-1/2 miles southwest of Ewa, 2-1/2 miles east of the Barbers Point Lighthouse, on Barbers Point Naval Air Station and at the edge of the beach.

To reach the station from the post office in Ewa, go westerly on Main Street for 0.85 mile to a side road on left, turn left and go south for 0.1 mile to Gate No. 2 of Barbers Point Naval Air Station. Pass through the gate, turn right and go westerly on Roosevelt Road for 0.6 mile to the intersection with Coral Sea Road. Turn left and go southerly and westerly on Coral Sea Road for 2.9 miles to a small park on the left, turn left and go south along the west side of the park for 0.05 mile to the station, just before reaching the beach.

The station mark is a standard disk stamped NAVAIR 1969, set in the top of a round concrete post projecting 3 inches. It is 23 feet north of where a small bluff breaks off to the beach, and 19 feet west of a baseball diamond backstop.

Reference Mark 1 is a standard disk stamped NAVAIR NO 1 1969, set in the top of a round concrete post flush with the ground. It is 46 feet north of the bluff and 17 feet northwest of the baseball diamond backstop.

Reference Mark 2 is a standard disk stamped NAVAIR NO 2 1969, set in the top of a round concrete post flush with the ground. It is 11 feet north of the bluff, and 41 feet southwest of the baseball diamond backstop.

No azimuth mark was set for this station.

The distance between the reference marks is 45.07 feet, or 13.739 meters.

*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.

USCGM-DC 37171-P-65

ADJUSTED HORIZONTAL CONTROL DATA

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

SOURCE: **G-14543**

GEODETTIC LATITUDE:	21° 18' 09.04796	ELEVATION:	4.0 METERS
GEODETTIC LONGITUDE:	158° 04' 18.47119		13 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ G1 ANGLE °
HI 3	5103	475,558.71	49,349.51	- 0° 01' 34"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ OR Δ G1 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETTIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PALAILAI	153° 54' 01.5	153° 55' 35"	5103

QH 157

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1064
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 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: AIR STATE: Hawaii COUNTY: Honolulu
 CHIEF OF PARTY: C.A. Annis YEAR: 1969 DESCRIBED BY: L.B. Gittings

NOTE. DESC.	HEIGHT OF TELESCOPE ABOVE STATION MARK METERS. ¹	HEIGHT OF LIGHT ABOVE STATION MARK METERS.	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
			OBJECT	BEARING	DISTANCE FEET METERS	DIRECTION ¹
12a	PALAILAI 1873 1927				0 00 00.0	
	R.M. 1		ESE	48.495 14.781	153 53 39	
	BARBERS PT NAS TOWER BN 1957		SW	(0.2 mile)	283 04 56.4	
desc.	R.M. 2		SW	59.395 18.105	290 58 09	
	R.M. 1 to R.M. 2			100.50 (30.632)		

Detailed description:
 The station is located about 2 1/4 miles southwest of Ewa, 2 miles northeast of Barbers Point Lighthouse, at Barbers Point Naval Air Station, just north of the southwest-northeast taxiway, and along the east side of an approach road to the runway.

To reach the station from the post office in Ewa, go west on the main street for 0.8 mile to a side road left. Turn left for 0.1 mile to Gate 2 of Barbers Point Naval Air Station. Pass through gate and turn right on Roosevelt Road for 1.25 miles to Rendova Street on the left. Turn left, south for 0.3 mile to a crossroad and where Rendova Street changes to Midway. Continue ahead, southwest, on Midway for 0.35 mile to the east edge of parking area and runway approach road on the left. Turn left, southeast, on approach road for 0.25 mile to the station on the left.

The station mark is a standard disk, stamped AIR 1969, cemented in a drill hole in bedrock which projects about 4 inches above the surface. It is 99.5 feet northwest of a stop sign and 11 feet northeast of the edge of the approach road.

Reference mark 1 is a standard disk, stamped AIR NO 1 1969, cemented in a drill hole in flush bedrock. It is 52 feet north of the stop sign and 3/4 feet northeast of the edge of the approach road.

Reference mark 2 is a standard disk, stamped AIR NO 2 1969, cemented in a drill hole in the northeast corner of a 5-foot square concrete pad which supports light number 9T-37. It is near the center of the approach road.

The control tower beacon may serve as an azimuth, but a five-foot stand is needed to see the beacon.

ADJUSTED HORIZONTAL CONTROL DATA

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

SOURCE: G-14543

GEODETIC LATITUDE:	21° 19' 07.71273	ELEVATION:	10.2 METERS
GEODETIC LONGITUDE:	158 03 54.08547		33 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	g OR Δ #1 ANGLE [*]
HI 5	5103	477,867.09	55,267.71	- 0° 01' 25"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH [*] (From south)	CODE
PALAILAI	133° 18' 07.1	133° 19' 32	5103

QH 158

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1065
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

(9-5-56) U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
 RECOVERY NOTE, TRIANGULATION STATION

Name of Station: MAKAKILO
 Established By: S.L.H. Year: 1957 State: Hawaii
 Recovered By: W.R.P. Year: 1960 County: Honolulu

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

Station was recovered. Reference marks 1 & 2 were established by this party. Following is a new routing to the station and description of the reference marks.

To reach from the Bank of Hawaii in Waipahu, go westerly on State Highway 90 for 3.7 miles to a side road right, turn right, northerly on black top road for 0.6 mile to a cross road, continue ahead on black top road for 1.1 miles to a locked gate, pass through gate and continue on black top road for 0.1 mile to a side road left, turn left, westerly on gravel road for 0.6 mile to the top of hill and station.

Reference mark 1 is a standard disk, stamped MAKAKILO NO 1 1960, cemented in a drill hole in outcropping bedrock. It is 11 feet east of the center of the gravel road.

Reference mark 2 is a standard disk, stamped MAKAKILO NO 2 1960, cemented in a drill hole in the top of a 9 X 8 foot concrete gun emplacement projecting 3 feet. It is 15 feet west of the center of the gravel road.

1960	OBJECT	BEARING	DISTANCE		DIRECTION
	RELAY (USN)		feet	meters	
	RM 1	E	20.80	6.340	131 32 43
	RM 2	S	19.40	5.912	220 24 25

R

NAME OF STATION: MAKAKILO

STATE: HAWAII

YEAR: 1957

FIRST

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 21' 45.36910	ELEVATION:	250.3 METERS
GEODETIC LONGITUDE:	158 04 42.70887		972 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ FOR Δ θ ANGLE*
HI 3	5103	475,277.85	71,580.83	- 0° 01' 43"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
PALATLAI	35° 09' 49.3	35° 11' 32"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QH 159

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

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

Comm-DC 28200

(continued on next page)

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1065

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

MAKAKILO (continued)

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

R

NAME OF STATION: **MAKAKILO**
 ESTABLISHED BY: **S. L. H.** YEAR: **1957** STATE: **HAWAII**
 RECOVERED BY: **H. J. S.** YEAR: **1961** COUNTY: **HONOLULU**

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
		KAPUAI NEW 1927	E	
RM NO. 1 1960				85 00 40
RM NO. 2 1960	SW	19.35	5.898	173 52 15

The station and both reference marks were recovered in good condition.

A new description follows:

The station is located on the highest point of Puu Makakilo, about 4 miles north of Barbers Point Naval Air Station, about 3 miles west of the intersection of State Highway 90 and Fort Weaver Road, and about 0.3 miles south of Palehua Road.

The station is the center of the pipe in a Type B Hawaiian Territory Survey Monument.

Reference mark 1 is a standard reference disk stamped MAKAKILO NO. 1 1960 set in a drill hole in outcropping bedrock and 11 feet east of the center of the road leading to the station.

Reference mark 2 is a standard reference disk stamped MAKAKILO NO. 2 1960 set in a drill hole in an old concrete foundation 3 feet high and is 15 feet west of the road leading to the station.

To reach the station from the junction of State Highways 76 and 90 about 1.8 miles west of Waipahu, go west on State Highway 90 for 2.0 miles to a blacktop road (Palehua Road) which turns right at a sign "Sites 6 & 7". Turn right and go 1.8 miles to a graded road left. Turn left on graded road for 0.6 miles to the top of the hill and the station on the right.

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

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

USCOMMA-DC 27177B-P8

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: **MAKAKILO**
 ESTABLISHED BY: **S.L.H.** YEAR: **1957** STATE: **Hawaii**
 RECOVERED BY: **W.R. Porter** YEAR: **1963** COUNTY: **Honolulu**

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
		PALAILAI 1873-1927		
Manawaima Pk., Radar Dome	NW		98 14 54.7	
Makakilo Aero Beacon	NW	97.439	29.699	113 08 17.8
R.M. No. 1	E	20.783	6.334	241 09 23
R.M. No. 2	S	19.355	5.900	330 02 06

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

Station is located, airline, about 4-1/2 miles southwest of Waipahu, 2-1/2 miles northwest of Ewa, and 1 mile northwest of State Highway 90; at about 972 feet elevation, on a hill known as Puu Makakilo, which has 2 old, concrete, observation posts and an aircraft warning beacon light on its summit.

To reach station from the junction of State Highways 90 & 76, about 1-3/4 miles west of Waipahu, go southwesterly on State Highway 90 for 2.0 miles to paved side road right, at sign "NIKE SITE 63 & 78". Turn right and go uphill for 1.8 miles to track road left by a stone culvert, and opposite a power transformer station. Turn left and follow track road for 0.55 mile to station on right side of road.

Station mark is a standard disk, unstamped, set in concrete about 8 inches below ground level. It is 10-1/2 feet northeast of the northerly 1 of the 2 concrete buildings, 7.8 feet northeast of the northeast corner of a 5 x 9-foot concrete box, and has a "Type B", Hawaii Territory Survey signal centered over it. The mark is visible through hand-hole under floor.

Reference mark number one is a standard disk stamped "MAKAKILO NO 1 1960", cemented in a drill hole in a 4-foot-diameter boulder that projects 6 inches above ground. It is 10 feet east of center line of road and about 6 inches higher than station mark.

Reference mark number two is a standard disk stamped "MAKAKILO NO 2 1960", cemented in a drill hole in the north end of the concrete building. It is 17 feet west of center line of road and about 3 feet higher than station mark.

Makakilo Aero Beacon is a 12-inch-diameter, red, cylinder-shaped light, mounted on top of the center of the roof of a 6-foot-square, wooden building that is painted white and orange. Peak of roof is 10 feet above ground. Base of light is 13.74 feet higher than station mark.

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

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

USCOMMA-DC 27177B-P8

(continued on next page)

HORIZONTAL CONTROL DATA

QUAD 211582 STATION 1065

MAKAKILO (continued)

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

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

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: MAKAKILO
 ESTABLISHED BY: S.L.H. YEAR: 1957 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: P.C. Johnson YEAR: 1967 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2-1/2 miles northwest of Ewa.

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 in good condition and as described in 1963, with the exception that the station mark is not a standard Coast and Geodetic Survey disk. Due to the Hawaii Territorial Survey type B monument over the mark, all the disk cannot be seen, therefore the origin of the mark could not be determined. But the center of the disk is marked with an X, not a triangle and dot as a standard disk would be.

Object	1967 Observations:		
	Bearing	feet	meters
BENCH MARK R 3			
RM 2	S	19.37	5.904
RM 1	E	20.78	6.334
RM 1 to RM 2		28.12	8.573

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: MAKAKILO
 ESTABLISHED BY: S.L.H. YEAR: 1957 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2-1/2 miles northwest of Ewa
 HEIGHT OF TELESCOPE ABOVE STATION MARK 6.2 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 5.5 FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
		PALAILAI 1873 1927 R.M. 1	E	
HONOLULU VORTAC HNL 1963 R.M. 2	SE	(4 miles)		241 10 20
R.M. 1 to R.M. 2	S	19.37	5.906	274 12 20.0
		28.13	8.574	330 01 45

Station mark and reference marks 1 and 2 were recovered as described and in good condition. The station mark, however, is not a Coast and Geodetic Survey Disk but, a Hawaii Territory Disk. The airway beacon that was mentioned in the 1963 description is no longer there. A complete description follows:

Station is located 4-1/2 miles southwest of Waipahu, 2-1/2 miles northwest of Ewa, 1 mile northwest of State Highway 90, at about 972 feet elevation on Puu Makakilo Hill.

R

To reach the station from the junction of State Highways 75 and 90, go westerly on State Highway 90 for 0.35 mile to the junction of State Highway 76 on the right, continue westerly on State Highway 90 for 1.95 miles to a crossroad, turn right and go north and westerly on a paved road, (passing under H-1 Freeway), for 1.75 miles to a bridge and a track road on the left; turn left and follow the track road for 0.55 mile to the top of the hill and the station.

The station is a Hawaii Territory Disk which is unstamped. It is cemented in a drill hole about 8 inches below the ground surface and has a "Type B" Hawaii Territory signal centered over it, 11 feet west of the center of a track road and 7.8 feet northeast of the northeast corner of a concrete box.

Reference mark 1 is a standard disk stamped MAKAKILO NO 1 1960, cemented in a drill hole in an outcrop which is 4 by 4 feet and flush with the ground surface, and 10 feet east of the center of a track road.

Reference mark 2 is a standard disk stamped MAKAKILO NO 2 1960, cemented in a drill hole in the top of a concrete bunker which is 7.5 by 8.5 feet and projects 2.5 feet above the ground surface, and 15 feet west of the center of a track road.

Note: No azimuth mark was established at this time.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: MAKAKILO
 ESTABLISHED BY: S.L.H. YEAR: 1957 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: G.W. Peterkin YEAR: 1973 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2 1/2 miles northwest of Ewa
 HEIGHT OF TELESCOPE ABOVE STATION MARK 1.80 Meters HEIGHT OF LIGHT ABOVE STATION MARK FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
		WHIPP 1967 R.M. 1		
Honolulu Vortac HNL R.M. 2	E	20.785	6.333	00 00 00.00
R.M. 1 to R.M. 2	SE	Approx. 4 miles		155 05 50.9
	S	19.36	5.901	188 09 03.95
		28.105	8.566	243 57 01.4

The station and reference marks 1 and 2 were recovered in good condition and as described by C.A. Annis in 1969. The 1969 to reach is adequate. The distance and directions to the reference marks was verified at this time and found to be accurate.

R

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1066
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Station	STATE SURVEY 9-3	State	Hawaii	County	Honolulu
Nearest town	Kanakuli		County	Honolulu	Chief of party
Distance and direction from nearest town	6.2 miles southeast				C. Symms
Character of mark	SS disk				Leveling date
Established by	State of Hawaii				July 1969
Detailed description		Section	T	R	Stamping
					9-3 1969

6.0 miles southeast along State Highway 90 from the post office at Manakuli, thence 0.2 mile southeast along the exit road of the freeway to the Campbell Industrial Park, in the top of the east concrete walk at the south end of Palailai Interchange bridge over Interstate Highway H I, 15.2 feet east of the center line of the north bound lanes of the highway, 4.8 feet north of the south end of the walk, 2.0 feet west of a metal handrail, 3.5 feet north of the north end of a metal guardrail, 0.9 foot east of the west edge of the walk, and about 1 foot higher than the road.
 NOTE: This mark is 0.45 mile west along Renton Road, thence 0.4 mile north along Kalaeloa Boulevard from bench mark K 14.

FORM C-63-638
 (Rev. 6-63)
 NATIONAL OCEAN SURVEY

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-3
 STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543

GEODETIC LATITUDE	21° 20' 06".17501	ELEVATION	30.85 METERS
GEODETIC LONGITUDE	158 05 31.75927		101.2 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ IOR Δ θ I ANGLE *
HI 3	5103	468,635.42	61,171.11	- 0° 02' 01"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From 1982b)	PLANE AZIMUTH (From 1982b)	CODE
MAKAKILO	204° 00' 07.0"	204° 02' 08"	5103

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

QH 160

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1067
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION MAKAKILO

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-6

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 22' 08.82973	ELEVATION:	71	METERS
GEODETIC LONGITUDE:	158 03 48.46730	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ ± ANGLE °
HI 3	5103	478,405.65	73,542.08	- 0 01' 23"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
MAKAKILO	69 ° 02' 46.6"	69 ° 04' 10"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION MAKAKILO

QH 161

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1068
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Description STATE SURVEY 9-8 State Hawaii County Honolulu
 Nearest town EWA Chief of party C. Symms
 Distance and direction from nearest town 1.25 miles northeast Leveling date July 1969
 Character of mark SS disk Stamping 9-8 1969
 Established by State of Hawaii
 Detailed description Section T R

0.8 mile northeast along Renton Road from the post office at Ewa, thence 0.45 mile north along Fort Weaver Road, across the road from the southeast corner of a lawn for the Ewa Clinic, in line with the center of a graveled road west to a field, 15.0 feet east of the center line of the road, 170.0 feet south of the extended center line of a road to Ewa Clinic, 4.0 feet east of the east edge of an asphalt road, 78.3 feet southeast and across the road from telephone pole 149, 17.5 feet west of the north corner of an "L"-angle in an irrigation canal, 21.8 feet northwest of a pole which projects about 10 feet bearing the numbers 2558 and 15T, and set in the top of a concrete post flush with the ground.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION STATE SURVEY 9-8
 STATE HAWAII YEAR 1969 SECOND ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 21' 23.72207	ELEVATION	17.01 METERS
GEODETIC LONGITUDE:	158 01 52.40491		55.8 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ FOR Δ θ ANGLE
HI 3	5103	489,374.77	68,987.44	- 0° 00' 41"

* 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
MAKAKILO	99° 08' 27.4"	99° 09' 06"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION MAKAKILO

QM 162

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1069
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

Kapuai New (Oahu Island, L. G. Simmons, 1927).—In southern part of Oahu, on the summit of Puu Kapuai, about 4 miles west of and a little south of Waipahu. The foot of the hill may be approached by a pineapple road, turning off the main Waianae road, to the north, a few hundred yards toward Waianae from the Ewa-Waianae junction of the main road. Marked according to note 2a, a standard disk in outcropping bedrock surrounded by a chiseled triangle. Reference marks set according to note 12a, standard reference disks in outcropping bedrock are at the following distances and azimuths from the station: No. 1, 6.618 meters (21.71 feet), 154° 58'; No. 2, 8.640 meters (28.35 feet), 263° 34'. Re-marked according to note 14A in 1929.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAPUAI NEW
 STATE: HAWAII YEAR: 1927 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE	21 22 46.58972	ELEVATION	319	METERS
GEODETIC LONGITUDE	158 04 30.52662	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ ± ANGLE
HI 3	5103	474,432.10	77,353.80	- 0° 01' 39"

* 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
WAIPAHU	259° 09' 20.6	259° 10' 59"	5103
MAKAKILO	11 16 45.2	11 18 24	5103

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

QH 163

FORM 326a
 (9-5-56) U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
 RECOVERY NOTE, TRIANGULATION STATION

Name of Station: KAPUAI NEW
 Established By: L.G.S. Year: 1927 State: Hawaii
 Recovered By: W.R.P. Year: 1960 County: Honolulu

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

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

To reach from the Bank Of Hawaii in Waipahu, go westerly on State Highway 90 for 3.7 miles to a side road right, turn right, northerly on black top road for 0.6 mile to a fork, take the right fork, northerly on graded road for 1.0 mile to a side road left, turn left on black top road for 1.1 mile to a side road right, continue ahead on black top road for 0.1 mile to a side road left, turn left, westerly on graded road for 0.3 mile to a reverse Y-fork, turn sharp right on graded road for 0.3 mile to a T-intersection, turn right on graded road for 0.2 mile to a locked gate, pass through gate and continue on graded road for 0.5 mile to a fork, take the left fork for 0.2 mile to the end of truck travel. From here pack easterly up hill to the top and station. About 1/4 hour pack.

Keys for locked gates in route to the station may be obtained at the following places. Oahu Sugar Company in Waipahu and at the Hawaii Meat Company in Honolulu.

1960	OBJECT	BEARING	DISTANCE	DIRECTION
	WAIPAHU UKA 1873 1927		feet meters	0 00 00.0
	RM 2	E	28.34 8.638	44 05 45
	RM 1	NW	21.71 6.618	295 34 14

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAPUAI NEW
 ESTABLISHED BY: L. G. S. YEAR: 1927 STATE: HAWAII
 RECOVERED BY: H. J. S. 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 both reference marks were recovered in good condition.

The station is the pipe in the center of the Type A Hawaiian Territory Survey Monument.

Reference Mark 1 is a standard reference disk stamped KAPUAI NEW NO 1 1960 set in a drillhole in bedrock.

Reference Mark 2 is a standard reference disk stamped KAPUAI NEW NO 2 1960 set in a drillhole in bedrock

The 1960 directions for reaching the station are adequate.

MAKAKILO 1957		00 00 00
RM NO 1	21.52 ft (6.599m)	143 39 53
RM NO 2	28.37 ft (8.647m)	252 15 47

(continued on next page)

JUN 1978

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

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211582 STATION 1069

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

KAPUAI NEW (continued)

FORM 524e
(9-18-69)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

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

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
		HEIGHT OF TELESCOPE ABOVE STATION MARK 2.6 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.		
EWA CHURCH 1873-1927	E	28.303	8.625	00 00 00.0
R.M. No. 2				03 43 36
Honolulu VOR-TAC HNL				62 13 07.2
Manawahua Pk., Radar Dome	WNW	21.640	6.595	208 23 23.9
R.M. No. 1	NNW			255 08 24

Station was recovered and all marks found in good condition. A road now goes to the station and a new route was used to reach station. A complete description follows:

Station is located, airline, about 4 miles west of Waipahu, 3-1/4 miles northwest of Ewa, and 1-1/2 miles northwest of State Highway 90, at about 1047 feet elevation, on Puu Kapuai. The hill is surrounded by sugar cane fields, and new cane has been planted up to within about 200 yards of the hilltop on the east slope. The top of the hill has a large, bulldozed clearing about 100 by 150 feet, with 2 red, shelter roofs setting in it. Each roof has a red, storage box under it, with "EXPLOSIVES" painted on it.

To reach station from the junction of State Highways 90 and 75, about 1-1/2 miles west of Waipahu, go north on State Highway 75 for 0.7 mile to crossroad. Turn left and follow power line road for 1.8 miles to T-road right, by power pole No. 60. Turn right and go 0.45 mile to fork. Take right fork and go 0.75 mile to fork. Take left fork and follow main road across ravine and then uphill for 1.4 miles to crossroad. Turn left and continue uphill for 0.05 mile to fork. Take right fork and go 0.15 mile to end of road at southeast end of clearing on hilltop, and station to left.

Station mark is a standard disk stamped "KAPUAI NEW", cemented in a drill hole in a red bedrock outcrop, 24 feet east of southeast corner of the clearing. A "Type A", Territory of Hawaii signal is centered over the mark; the concrete floor of the signal is 3 feet above ground and the metal target extends 7 feet above it.

Reference mark number one is a standard disk stamped "KAPUAI NEW NO 1", cemented in a drill hole in the center of a 4-foot-diameter, red boulder that projects 1 foot above ground. It is 1.9 feet lower than station mark.

Reference mark number two is a standard disk stamped "KAPUAI NEW NO 2", cemented in a drill hole in a red bedrock ledge about 16 feet square. The mark is 5 feet south from north end of ledge and 1 foot 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.

USCGM-DC 27179-P-69

FORM 524e
(9-18-69)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAPUAI NEW
ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii
RECOVERED BY: P.C. Johnson YEAR: 1967 COUNTY: Honolulu

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
		HEIGHT OF TELESCOPE ABOVE STATION MARK 2.62 METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.		
BENCH MARK R 3	NNW	21.63	6.592	00 00 00.00
Reference Mark No. 1				166 12 02
Reference Mark No. 2				274 50 28

The station mark, reference mark No. 1 and reference mark No. 2 were recovered and found to be in good condition. The horizontal direction to both reference marks and the horizontal distance to reference mark No. 2 was verified, but a discrepancy in the distance to reference mark No. 1 was noted. A new and complete description follows:

The station is located on property owned by the Oahu Sugar Company, about 4.3 miles west of Waipahu and 3.2 miles northwest of Ewa, on the top of a low hill that is under cultivation except for the summit.

To reach the station from the junction of State Highways 75 and 90 at the west edge of Waipahu, go west and southwest on State Highway 90 for 2.4 miles to a crossroad and sign "TIMBERLINE". Turn right and go northwest on an oiled road for 0.7 mile to a fork. Take the right fork and go north on a graded road for 0.1 mile to a fork. Take the right fork and go north on a bladed road for 0.1 mile to a locked gate and a fork. Pass through the locked gate and take the left fork uphill for 0.3 mile to a crossroad. Continue straight ahead, uphill, for 0.25 mile to a "T" road. Turn left and go south for 0.15 mile to a reverse fork. Continue straight ahead, west, and go uphill for 0.4 mile to a fork. Continue straight ahead and go north, uphill, for 0.1 mile to a fork. Take the right fork and go north for 0.1 mile to a crossroad. Turn right and go southeast for 100 feet to a fork. Take the right fork uphill, for 0.2 mile to a wire enclosure. Turn left and go southeast along the northeast side of the fence for 0.05 mile to the station mark.

The station mark is a standard disk, stamped KAPUAI NEW, cemented in a drill hole in outcropping bedrock. A Type "A" Hawaiian Territory Survey signal has been built over the station. The pipe that holds the signal was found to be eccentric by 8 millimeters.

Reference mark No. 1 is a standard disk, stamped KAPUAI NEW NO 1, cemented in a drill hole in a boulder that projects 6 inches. It is about 1.9 feet lower in elevation than the station mark.

Reference mark No. 2 is a standard disk, stamped KAPUAI NEW NO 2, cemented in a drill hole in a boulder that is flush on the south side and projects about 6 inches on the north side. It is about 1 foot lower in elevation than the station mark.

Note: Information on the locked gate and permission to go to the station may be obtained from the Oahu Sugar Company or the Waialua Water Company.

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

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

USCGM-DC 1

(continued on next page)

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1069
 LATITUDE ° ' TO ° '
 LONGITUDE ° ' TO ° '
 DIAGRAM

KAPUAI NEW (continued)

RECOVERY NOTE, TRIANGULATION STATION TRAVERSE

NAME OF STATION: KAPUAI NEW
 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: 4 miles west of Waipahu

R

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 1961, and found to be in good condition, however, there is a standard disk under the type "A" Hawaiian Territorial Survey Signal which is stamped KAPUAI NEW. A new to reach follows:

To reach the station from the junction of State Highways 75 and 90, go north on State Highway 75 for 0.8 mile to a side road on the left, turn left, west, on paved road for 1.9 miles to a side road on the right, turn right, north, on the paved road for 1.2 miles to a side road on the left, turn left, west, on a dirt road for 0.6 mile to a canal and a T-road, turn right and follow dirt road for 0.8 mile to fork, keep left fork and go southerly for 0.05 mile to a track road on the right, turn right, southwest on the track road uphill for 0.6 mile to the top of the hill and station on the left.

The distance and direction of reference marks were not checked at this date.

A Geodimeter Traverse was made between KAPUAI NEW 1927 and WAIPAHAU. Geodimeter distance 4,219.397 meters or (13,843.00ft)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KAPUAI NEW
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK ALSO
 RECOVERED BY: G.W. Peterkin YEAR: 1973 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Approx. 2 miles northeast of Makakilo
 HEIGHT OF TELESCOPE ABOVE STATION MARK 2.60 Meters 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	
MAKAKILO 1957				° ' "
R.M. 1	NW	21.62	6.588	00 00 00.00
R.M. 2	E	28.33	8.634	143 40 13.7
Honolulu Vortac HNL	SE	Approx. 3.5 miles		252 18 46.8
				310 44 52.6

The station and reference marks 1 and 2 were recovered and found to be in good condition as described by P.C. Johnson in 1967. There was a discrepancy noted in the horizontal direction to reference mark number 2, A 3 minute error was noted and the corrected value is indicated above.

The 1967 to reach is adequate to reach the station.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1071
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: WAIPAHU 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		METERS.	
	1b 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			
7a	OBJECT		BEARING	DISTANCE		DIRECTION
				FEET	METERS	
	EWA CHURCH 1873 1927					0 00 00.0
	WAIPAHU MILL STACK 1925		E	(1-3/4 miles)		03 06 16.4
desc.	R.M. 1		NNW	62.14	18.939	254 04 08
desc.	STATE SURVEY 9-9 (AZ MK) **		NNW	(0.55 mile)		257 17 23.11
desc.	R.M. 2		ENE	43.51	13.262	340 54 21

(** 16 positions)

The station is located about 5 miles north-northwest of Ewa Beach and 1 1/2 miles west of Waipahu at the intersection of Inter-State H-1 and State Highway 75.

To reach the station from the junction of Inter-State H-1 and State Highway 99, go west on the interstate for 1.8 miles to a bridge across a deep ravine. Continue west on the interstate for 1.1 miles to the station at the southwest corner of the overpass above State Highway 75.

The station mark is a standard disk, stamped WAIPAHU 1969, set in the top of a 12-inch round concrete monument which is flush with the ground surface. It is located at the southwest corner of the overpass bridge of the west bound lanes, 8.5 feet west-northwest of the southwest corner of the bridge and 2 feet north of a metal guard rail.

Reference mark 1 is a standard disk, stamped WAIPAHU NO 1 1969, cemented in a drill hole in the bridge abutment. It is near the west end of the north side of the west bound lanes bridge, 3.6 feet east of the west end and projects 1 foot above the surface of the highway.

Reference mark 2 is a standard disk, stamped WAIPAHU NO 2 1969, cemented in a drill hole in the bridge abutment. It is in the south side of the west bound lanes bridge, 33.5 feet east of the west end and projects 1 foot above the surface of the highway.

The azimuth mark is a standard State of Hawaii disk, stamped 9-9 1969, set in the top of a 9-inch square concrete post which is flush with the ground surface. It is about 0.05 mile south of a lone tree, 15 feet west of the center of State Highway 75 and 13 1/2 feet east of a 3-foot high rock wall. (To reach from the station go north on State Highway 75 for 0.55 mile to the mark on the left.)

Measurement between reference marks was not made because of heavy traffic on the interstate.

*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.

USCOMM-DC 27171-P89

ADJUSTED HORIZONTAL CONTROL DATA

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

SOURCE: G-14543

GEODETTIC LATITUDE:	21 ° 23' 12.38464	ELEVATION:	62.6 METERS
GEODETTIC LONGITUDE:	158 02 06.66633		205 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ α ANGLE *
HI 3	5103	488,029.15	79,951.73	- 0 00' 46"

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

TO STATION OR OBJECT	GEODETTIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
EWA CHURCH	260 19 27.8	260 20 14	5103
STATE SURVEY 9-9	157 36 50.9	157 37 37	5103

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1072
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 9-4
 CHIEF OF PARTY: Carl A. Annis YEAR: 1969 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object:

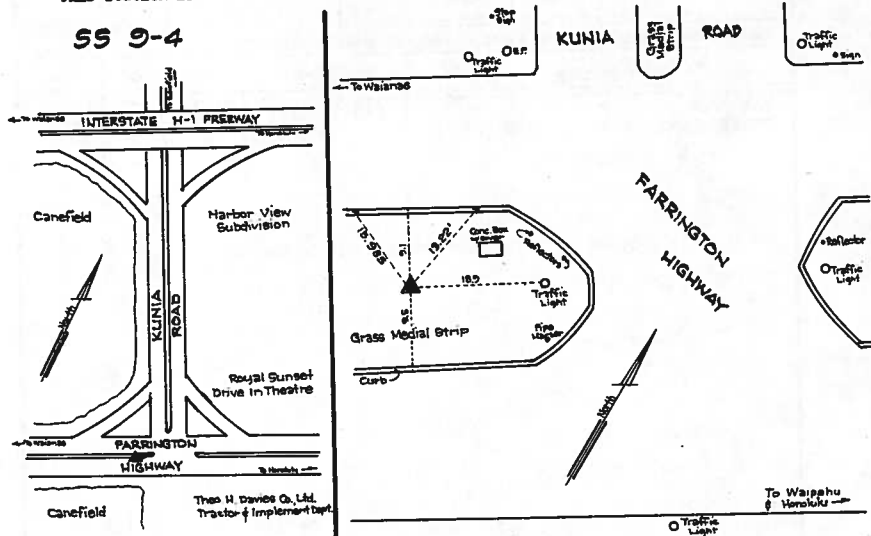
Station is located in District of Ewa, 1.3 miles westerly from the intersection of Farrington Highway and Depot Road in Waipahu Town and at the intersection of Kunia Road and Farrington Highway.

Station mark is a standard State Survey disk stamped "9-4 1969" in concrete monument, flush with ground level, in middle and near end of grassed medial strip of Farrington Highway, on the westerly side of its intersection with Kunia Road. Ties from station are: N 13.22 ft. and NW 15.985 ft. respectively to crosses cut in concrete curb of medial strip, NE 18.9 ft. to Traffic Light Standard.

Sub-surface mark is identical with station mark, in concrete monument 3.1 ft. below ground level and separated from top monument by a layer of sand.

Geodimeter connection was made between "WAIPAHU 1969" and State Survey "9-4 1969"

This station is also Bench Mark 9-4 (SS) of the 1969 First Order Levels.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-4
 STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE	21° 22' 46.22878	ELEVATION	18.28 METERS
GEODETIC LONGITUDE	158 01 44.15574		60.0 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (OR Δ θ) ANGLE °
HI 3	5103	490,156.07	77,312.18	- 0° 00' 38"

* 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
WAIPAHU	141° 07' 40.8	141° 08' 19"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAIPAHU

QH 166

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1073
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION WAIPAHU

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-9

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 23' 40.29924	ELEVATION:	108	METERS
GEODETIC LONGITUDE:	158 02 18.94233	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ ± ANGLE °
HI 3	5103	486,869.67	82,768.59	- 0° 00' 51"

* 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
WAIPAHU	337° 36' 46.2	337° 37' 37"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAIPAHU

QH 167

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1074
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION WAIPAHU

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-20
 STATE: HAWAII YEAR: 1969 SECOND -ORDER

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

GEODETIC LATITUDE:	21° 22' 40.27150	ELEVATION	9	METERS
GEODETIC LONGITUDE:	158 00 18.84333	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ IOR Δ ϕ 1 ANGLE *
HI 3	5103	498,219.06	76,710.22	- 0° 00' 07"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE ϕ IOR Δ ϕ 1 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From 1000h)	PLANE AZIMUTH * (From 1000h)	CODE
WAIPAHU	107° 38' 40.2	107° 38' 47"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAIPAHU

QH 168

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1075
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 9-21

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

Description, including sketch of object:

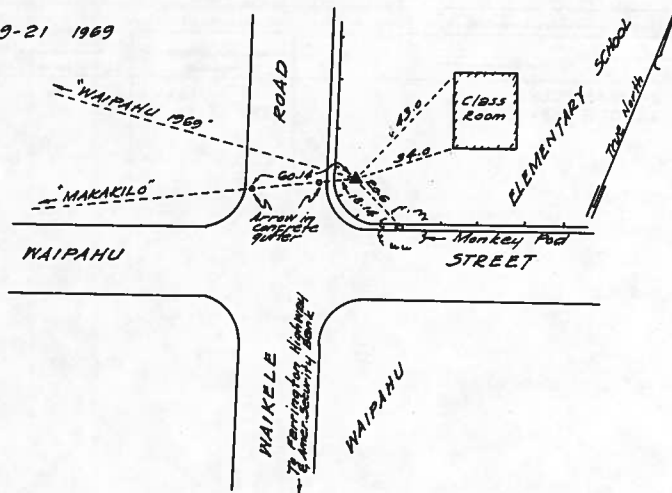
Station is located in Waipahu District, about 0.3 of a mile west of Waipahu Sugar Mill and 1400 feet north of the intersection of Farrington Highway and Waikale Road.

Station mark is a standard State Survey disk stamped "9-21 1968", in concrete monument, flush with ground, at the northeast corner of the intersection of Waipahu Street and Waikale Road in the Waipahu Elementary School grounds. Ties from station mark are: SW 18.14 ft. and 60.14 ft. to arrows in concrete street gutters of Waikale Road and on line to "MAKAKILO 1873 1931", SE 20.6 ft. to monkey pod tree and Northerly 43.0 ft. and Northeasterly 34.0 ft. to west corners of class room of school.

Underground mark is identical, 3 ft. 4 in. below ground level, in concrete monument and separated from upper monument with layer of sand.

Geodimeter connection was made between "WAIPAHU 1969" to State Survey "9-21 1969".

55 9-21 1969



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-21

STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETTIC LATITUDE:	21 23 18.46281	ELEVATION:	22 METERS
GEODETTIC LONGITUDE:	158 01 10.80722	NO CHECK	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE*
HI 3	5103	493,308.30	80,564.10	- 0° 00' 26"

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

TO STATION OR OBJECT	GEODETTIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
WAIPAHU	83° 22' 34.6"	83° 23' 00"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAIPAHU

QH 169

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1376
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 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: **EWA BEACH** STATE: **Hawaii** COUNTY: **Honolulu**
 CHIEF OF PARTY: **C.A. Annis** YEAR: **1969** DESCRIBED BY: **D.A. Bowling**

NOTE: 11b Desc	HEIGHT OF TELESCOPE ABOVE STATION MARK 22.9 METERS , ¹ HEIGHT OF LIGHT ABOVE STATION MARK 25.4 METERS		DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE STATION			
	UNDERGROUND-STATION MARK		DISTANCE		DIRECTION	
	OBJECT	BEARING	FEET	METERS		
12a	BARBERS POINT				0 00' 00.0	
12a	RM NO 2	NW	64.87	19.773	34 22' 57"	
17a	Azimuth Mark	NE	0.35 mile		144 51' 17.7"	
12a	RM NO 1	SSW	50.40	15.360	299 51' 19"	
	RM NO 1 to RM NO 2		85.21	25.970		

The station is located in the town of Ewa Beach, about 0.3 mile south of the center of town, in the south corner of Pohakea School grounds. To reach from the junction of Papipi Road and Fort Weaver Road (State Highway 76) in Ewa Beach, go south on Fort Weaver Road for 0.35 mile to a crossroad of North Road and Fort Weaver Road, turn left, northerly, on North Road for approximately 75 feet to the station on the left. Continue northerly on North Road for 0.35 mile to the azimuth mark on the right. Station mark is a standard disk stamped EWA BEACH 1969 set in the top of a round concrete monument which is flush with the surface of the ground. The underground mark is cemented in a drill hole in bedrock and is 2 feet below the station mark, it is 78 feet northeast of the center of State Highway 76, 49.4 feet northwest of a powerline pole, 74 feet northwest of the center of North Road. Reference mark 1, a standard disk stamped EWA BEACH NO 1 1969 set in a drill hole in bedrock flush with the surface of the ground and about the same elevation as the station. It is 52.4 feet northwest of the center of North Road, 33 feet north-northeast of the center of State Highway 76, and 14 feet east of a powerline pole. Reference mark 2, a standard disk stamped EWA BEACH NO 2 1969, set in drill hole in bedrock flush with the surface of the ground and about the same elevation as the station. It is 124.8 feet west of the center of North Road, 72.4 feet northwest of a powerline pole, 48 feet north-northwest of the center of State Highway 76. Azimuth mark, a standard disk stamped EWA BEACH 1969, set in a drill hole in bedrock which is flush with the surface of the ground. It is 27 feet southeast of the center of North Road, 21 feet southwest of the center of Grave Road and 19 feet northwest of a cyclone fence around canal.

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

USCOMM-DC 27171-P58

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **EWA BEACH**
 STATE: **HAWAII** YEAR: **1969** FIRST ORDER

SOURCE: **G-14543**

GEODETIC LATITUDE: 21° 18' 56.81079	ELEVATION: 1.6 METERS
GEODETIC LONGITUDE: 158° 00' 46.27699	5 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	# 10R Δ S1 ANGLE*
HI 3	5103	455,624.35	54,163.55	- 0° 00' 17"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
BARBERS POINT	79° 36' 16.1	79° 36' 33"	5103
AZIMUTH MARK	224° 27' 33.8	224° 27' 51"	5103

QH 170

JUN 1976
 U. S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1077
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 156 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION EWA BEACH

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 9-7
 STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 19' 48.12682	ELEVATION:	4	METERS
GEODETIC LONGITUDE:	158 01 00.54567	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (OR Δ) ± ANGLE °
HI 3	5103	494,275.48	56,314.22	- 0 00 22

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH ° (From south)	CODE
EWA BEACH	327 ° 54' 01.6	327 ° 54' 24	5103

POSITION DETERMINED BY TRAVERSE FROM STATION EWA BEACH

QH 171

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1078
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

PEARL HARBOR, WEST LOCH, TANK (Hawaii, C.K.G., 1932)--
 The tall water tank on a steel skeleton structure about 100 feet high, built in 1932, at the ammunition depot near the S shore of West Loch, Pearl Harbor. A conspicuous object from all directions. In 1932 the tank was painted red.

(11-8-55)

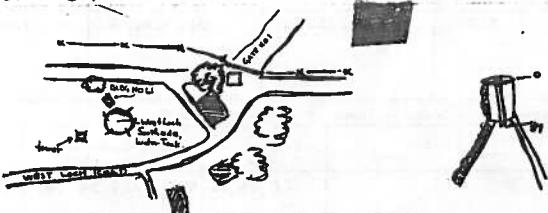
RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PEARL HARBOR WEST LOCH, SOUTHSIDE, WATER TANK
 ESTABLISHED BY: C.K.G. YEAR: 1932 STATE: Hawaii
 RECOVERED BY: S.L.H. YEAR: 1956 COUNTY: Honolulu

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

Station is on Oahu Island, about 2 1/2 miles northwest of Pearl Harbor Entrance, on south shore of West Loch, and 100 yards inside Gate No. 1 of West Loch Ammunition Depot on West Loch Road. It is an iron water tank, round, with flat top, painted blue-green and approximately 130 feet high. There is an enclosed ladder on SE leg leading to water tank (which is 37' high).



Form 526
 (11-8-55)

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

RECOVERY NOTE, TRIANGULATION STATION

R

Pearl Harbor,

NAME OF STATION: West Loch, southside water tank
 ESTABLISHED BY: C.K.G. YEAR: 1932 STATE: Hawaii
 RECOVERED BY: W.R. Porter YEAR: 1964 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.

Located about 3 miles east of Ewa, along the south side of the West Loch Channel, at the West Loch Ammunition Depot.

Station is center of elevated tank with rounded bottom and flat top, supported by 4 steel legs. The tank is now painted orange and white checkered pattern with very large squares, two squares vertically covering the height of the tank. Top of tank is about 130 feet above ground. There is a pair of red obstruction lights mounted on a bracket on top of a single, metal pole at center of top of tank.

RECOVERY NOTE, TRIANGULATION STATION

R

PEARL HARBOR

NAME OF STATION: WEST LOCH SOUTHSIDE WATER TANK
 ESTABLISHED BY: C. K. G. YEAR: 1932 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: Carl A. Annis YEAR: 1969 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

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

Recovered as described by W. R. Porter in 1964. The intersection station is in good condition.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PEARL HARBOR WEST LOCH TANK
 STATE: HAWAII YEAR: 1932 THIRD ORDER
 SOURCE: G-14543

GEODETIC LATITUDE:	21° 21' 19.99577	ELEVATION:	METERS
GEODETIC LONGITUDE:	158 00 29.89065		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ or ANGLE
HI 3	5103	497,174.52	68,610.48	- 0° 00' 11"

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

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

THESE DATA OBTAINED FROM ADJUSTMENT OF OCT 1971

QH 172

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1079
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

WAIPAHU MILL, STACK (Hawaii, E.R.H., 1925; L.G.S., 1927)--
 In S Oahu, at Waipahu, the higher of two stacks at sugar mill.
 Stack is light gray.

FORM 525
 (11-8-65)

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

R

NAME OF STATION: Waipahu Mill STACK
 ESTABLISHED BY: E.R.H. YEAR: 1925 STATE: Hawaii
 RECOVERED BY: D.G. Rushford YEAR: 1964 COUNTY: Honolulu

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

Station was recovered. The superintendent of the mill verified that it is the correct stack and it was also checked by angle at EWA CHURCH. Stack is tan, with a black section at the top. It is the higher of the two stacks, being 205 feet high (20 feet of the stack was removed a few years ago). Located at the Waipahu Sugar Mill in the town of Waipahu.

RECOVERY NOTE ~~DESCRIPTION~~ OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: Waipahu Mill Stack
 Established by: E.R.H. in 1925
 CHIEF OF PARTY: G.W. Peterkin YEAR: 1973 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object:

Station recovered as described by D.G. Rushford in 1964.

FORM CGS-525 (12-68)

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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WAIPAHU MILL STACK

STATE: HAWAII

YEAR: 1925

THIRD

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 23 ' 22.10701	ELEVATION:	METERS
GEODETIC LONGITUDE:	158 00 36.50128		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β (OR Δ) ANGLE *
HI 3	5103	496,550.44	80,931.49	- 0 ° 00 ' 13 "

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

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

THESE DATA OBTAINED FROM ADJUSTMENT OF OCT 1971

QH 173

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1080
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

**EWA MILL OLD STACK (Hawaii, E.R.H., 1925) -- In S Oahu,
 W of Pearl Harbor, at the Ewa Plantation sugar mill, the smaller
 and lower of two stacks. It is dark colored.**

DEPARTMENT OF COMMERCE
 U. S. COAST AND GEODETIC SURVEY
 FORM 536
 (REV. FEB. 1965)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: *Ewa Mill, Old Stack*
 ESTABLISHED BY: *ERH* YEAR: *1925* STATE: *Hawaii*
 RECOVERED BY: *JL Hollis* YEAR: *1956* COUNTY: *Honolulu*

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

*In S Oahu, W. of Pearl Harbor, in the town of Ewa,
 at the Ewa Plantation sugar mill, the smaller and lower
 of two stacks. It is painted alternating orange and
 white stripes with an open ladder on SW side.*

FORM 536
 (11-6-59)

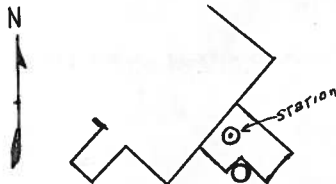
U.S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
**RECOVERY NOTE, TRIANGULATION STATION
 INTERSECTION**

R

NAME OF STATION: *Ewa Mill, old stack*
 ESTABLISHED BY: *E.R.H.* YEAR: *1925* STATE: *Hawaii*
 RECOVERED BY: *D.G. Rushford* YEAR: *1964* COUNTY: *Honolulu*

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

Station was recovered in good condition. It is the north one of two similar-appearing stacks at the Ewa Plantation sugar mill and is the lower and smaller of the two. The stack rises from the center of a lower, metal-roofed building extending southeast from the main large mill building. Both stacks are painted alternate red and white.



* 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 note.
 NOTE.—One of these forms must be used for every station recovered.

JC 343

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **EWA MILL OLD STACK**
 STATE: **HAWAII** YEAR: **1925** THIRD ORDER

SOURCE: **G-14543**

GEODETIC LATITUDE:	21° 20' 33.595	ELEVATION:	METERS
GEODETIC LONGITUDE:	158 02 18.258		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE °
HI 3	5103	486,925.74	63,930.59	- 0° 30' 50"

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

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

GH 174

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1081
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

EWA MILL STACK (Hawaii, E. R. H., 1925; L. G. S., 1927)--
 In S Oahu, W of Pearl Harbor, at the Ewa Plantation sugar mill,
 the larger and higher of two stacks. It is light gray in color,
 with black band at top.

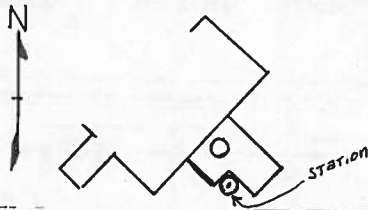
(11-8-55)

RECOVERY NOTE, TRIANGULATION STATION
 INTERSECTION

NAME OF STATION: Ewa Mill Stack
 ESTABLISHED BY: E.R.H. YEAR: 1925 STATE: Hawaii
 RECOVERED BY: D.G. Rushford YEAR: 1964 COUNTY: Honolulu

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

Station was recovered in good condition. It is the south one of two similar-appearing stacks at the Ewa Plantation sugar mill and is the larger and higher of the two. It sets at the southwest side of a lower, metal-roofed building extending southeast from the main large mill building. Both stacks are painted alternate red and white.

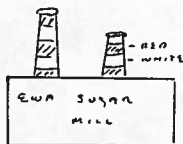


RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

NAME OF STATION: Ewa Mill Stack
 ESTABLISHED BY: E.R.H. YEAR: 1925 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: G.W. Peterkin YEAR: 1973 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: Located in the township of Ewa

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

The Ewa Mill Stack 1925 was recovered and found to be intact. It is the higher of two chimneys of the Ewa Sugar Mill. It is located in the center of the town of Ewa. It is painted alternately red and white.
 The point intersected was the center of mass at the top of the chimney.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: EWA MILL STACK

STATE: HAWAII

YEAR: 1969

THIRD

ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21° 20' 32.62543	ELEVATION:	METERS
GEODETIC LONGITUDE: 158 02 17.67002		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ ANGLE °
HI 3	5103	486,585.30	63,832.35	- 0° 00' 50"

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

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

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1083
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

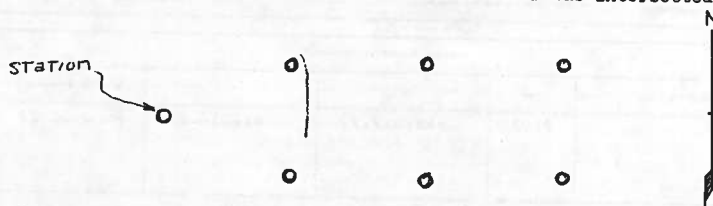
Form 555b
 (11-3-55)

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

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: Maili, USN Radio Station, West Tower of 7
 CHIEF OF PARTY: D.G. Rushford YEAR: 1964 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object: Located on west end of Oahu at the U.S. Naval Radio Station, which is about 1 mile east of Maili. Station is a tapering, skeleton-steel tower, 670 feet tall and painted alternate red and white. It is the westernmost tower in a group of 7 identical towers and is at the point of the pattern formed by the location of the towers. Center of tower was intersected.



(C.A. Annis, 1969)--Station recovered in good condition.
 Described by _____

Com-DC 3481f

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MAILI USN RADIO STA W TWR OF 7
 STATE: HAWAII YEAR: 1964 THIRD ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 25' 30.25332	ELEVATION:	METERS
GEODETIC LONGITUDE:	158 09 40.70585		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ρ OR Δ ANGLE*
HI 3	5103	445,133.49	93,889.56	- 0° 03' 32"

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

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

THESE DATA OBTAINED FROM ADJUSTMENT OF OCT 1971

QH 177

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1084
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

AND GEODETIC SURVEY
 FORM 535 b
 NAME OF STATION: **Manawahua Pk, Radar Dome** YEAR: 1963 STATE: Hawaii COUNTY: Honolulu

CHIEF OF PARTY: W.R. Porter

Description, including sketch of object: Located about 2-1/2 miles east of Nanakuli and 5-1/2 miles northwest of Ewa, on a hill of 2400 feet elevation, known as Puu Manawahua, near the southern end of the Waianae Range. Station is the large white radar dome, about 40 feet in diameter that sets on a platform on highest part of hill. There are small twin red warning lights mounted on top of dome, and also a short stub antenna. Point intersected was center of dome, marked by the antenna.

INTERSECTION RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: **Manawahua Peak Radar Dome**
 ESTABLISHED BY: W.R. Porter YEAR: 1963 STATE: Hawaii BENCH MARK(S) ALSO
 RECOVERED BY: G.M. Ward YEAR: 1970 COUNTY: Honolulu

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

4 1/2 miles northwest of Ewa
 Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:
 Station destroyed. Dome and radar antenna removed in March 1970. Building remains.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **MANAWAHUA PK RADAR DOME**
 STATE: **HAWAII** YEAR: 1963 THIRD ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 23 ' 22.80328	ELEVATION:	METERS
GEODETIC LONGITUDE:	158 06 28.15634		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ FOR Δ θ' ANGLE °
HI 3	5103	463,317.23	81,014.22	- 0° 02' 22"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
THESE DATA OBTAINED FROM ADJUSTMENT OF OCT 1971			
QH 178			

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1085
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: KOLEKOLE PASS USN TOWER

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

Description, including sketch of object:

The station is the top center of the tower, which is located in Kolekole Pass, just above a military guard gate. It is a three-legged steel tower painted gray, with a radar dish on the top. The tower is 120 feet high.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KOLEKOLE PASS USN TOWER

STATE: HAWAII

YEAR: 1969

THIRD

-ORDER

SOURCE G-14543

GEODETIC LATITUDE:	21° 28' 58.24216	ELEVATION:	METERS
GEODETIC LONGITUDE:	158 06 56.84237		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ ± ANGLE °
HI 3	5103	460,629.75	112,844.10	- 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

FORM C&GS-525b (12-68)
 115 COMM-DC 38280-P88

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

QH 179

DEC 1979
 U. S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY + NATIONAL GEODETIC SURVEY

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 Old Hawaiian Datum

QUAD 211582 STATION 1086
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

NO TEXT

ADJUSTED HORIZONTAL CONTROL DATA

ADJUSTMENT BY NGS

NAME OF STATION: 253+00 OBS BY HIDT
 STATE: HAWAII YEAR: 1970 THIRD ORDER

SOURCE: G-15752

GEODETIC LATITUDE:	21° 23' 52.00579	ELEVATION:	4 METERS
GEODETIC LONGITUDE:	158 09 45.24962	SCALED	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ θ1 ANGLE *
HI 3	5103	444,693.92	83,976.79	= 0° 03' 34"

* 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
100+23.38	312° 05' 33.3	312° 09' 07"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF SEP 1979

RL 171

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1087
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

Form 5236
 (11-8-58)

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

DESCRIPTION OF ~~TRANGULATION~~ STATION

NAME OF STATION: 7289V5

CHIEF OF PARTY: P.C. Johnson YEAR: 1967 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object:

To reach the station from the junction of State Highways 75 and 90 at the west edge of Waipahu, go west and southwest on State Highway 90 for 2.4 miles to a crossroad and sign, "TIMBERLINE". Turn right and go northwest on an oiled road for 0.7 mile to a fork. Take the left fork and follow the oiled road up the hill for 4.0 miles to a fork. Take the right fork and continue uphill for 0.6 mile to a road on the right. Turn right and go east, downhill, along a track road for 0.25 mile to the station.

A traverse connection was made to triangulation station WHIPP, distance being 21.806 meters, 71.55 feet, northwest of station WHIPP. The station is a plain bronze disk, stamped 7289V5 1967, cemented in a drill hole in a 20 x 50-foot concrete pad which is inside the larger one of two fenced enclosures. This point is set directly under the center of Van No. 97-23599.

Described by _____

Comm-DC 24313

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: 7289V5

STATE: HAWAII

YEAR: 1967

SECOND

ORDER

G-13983

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 22' 37.8912	ELEVATION:	511.3 METERS
GEODETIC LONGITUDE:	158 06 07.7255		1677 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	Ø OR Δ ± ANGLE *
HI 3	5103	465,245.10	76,481.31	- 0 02' 14"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
POSITION DETERMINED BY TRAVERSE FROM STATION WHIPP			
QF 489			

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1088
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DEPART: U.S. COAST AND GEOD. SURV. Form 525 Rev. Aug. 1965
 NCS BY DESCRIPTION OF TRIANGULATION STATION
 NAME OF STATION: BAH STATE: Hawaii COUNTY: Honolulu

CHIEF OF PARTY: D.M. Whipp YEAR: 1965 Described by: R.F. Hanson
 HEIGHT OF TELESCOPE ABOVE STATION MARK 1.5 METERS.1 HEIGHT OF LIGHT ABOVE STATION MARK METERS.

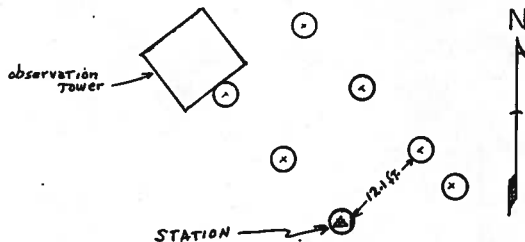
NOTE	HEIGHT OF TELESCOPE ABOVE STATION MARK	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION		DIRECTION		
		BEARING	DISTANCE			
		OBJECT	BEARING	DISTANCE	DIRECTION	
				feet	meters	
		MAKAKILO 1957		00 00	00.0	
		EWA CHURCH 1873-1927	ENE	60 55	03.3	
		Hickam AFB, Water Tower, 1957	ESE	89 36	54.1	

Station is located about 2-1/2 miles west of Ewa, 1 mile north of Barbers Point Naval Air Station, and 1/4 mile southeast of State Highway 90, at Fort Barrette, an old Coast Artillery Battery. It is on the northeast side of the area, on the top of a tree-covered hill, at the southeast side of a concrete, observation tower.

To reach station from the junction of State Highways 90 & 76, about 2 miles west of Waipahu, go southwest on State Highway 90 for 4.1 miles to paved crossroad and sign "NAS BARBERS POINT". Turn left and go south for 0.15 mile; turn sharp right on macadam side road and go 50 yards to gate on left. Pass through gate and follow road along left side of area, inside of fence, for 0.1 mile to station on right, on low hill above entrance to underground building.

Station mark is the 1-inch-diameter center bolt in the iron top on an octagonal, concrete, ventilator shaft, which is 1 of several arranged in 2 rows projecting through the hilltop from the rooms below. The bevelled end of the bolt has "BAH 1965" stamped around it.

Station ventilator shaft is the one at the southeast end of the southwest row of the two rows. It is 4.3 feet north of a 6-foot-tall, 2-inch diameter, iron pipe, 26.5 feet southeast of the exact center of the southeast side of the observation tower, and 12.1 feet southwest of the second shaft from the southeast end of the northeast row.



Refer to notes in manuals of triangulation and state publications of triangulation. 1 Direction-angle measured clockwise, referred to initial side.
 2 Report meter only, when no trigonometric leveling is being done.
 16-50282-1 U. S. GOVERNMENT PRINTING OFFICE

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BAH
 STATE: HAWAII YEAR: 1965 THIRD ORDER
 SOURCE: G-12664

GEODETTIC LATITUDE:	21° 20' 22.958	ELEVATION	43 METERS
GEODETTIC LONGITUDE:	158 04 37.773	SCALED	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ IOR Δ θ I ANGLE °
HI-3	5103	473,740.12	62,861.76	- 0 01 41

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

TO STATION OR OBJECT	GEODETTIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
MAKAKILO	176 56 13.2	176 57 54	5103

QF 483

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

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1089
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: BARBERS PT CEMENT PLANT OBSTR LT

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

Description, including sketch of object:

The station is the red light on top a small house on top of the round cement bins, located, on the southwest side of the island of Oahu at Barbers Point and it is 200 feet high.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BARBERS PT CEMENT PLT OBSTR LT

STATE: HAWAII

YEAR: 1969

THIRD -ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 18 09.90277	ELEVATION:	METERS
GEODETIC LONGITUDE:	158 06 37.84867		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ρ 10R Δ ϕ 1 ANGLE $^{\circ}$
HI 3	5103	462,379.09	49,443.37	- 0 02 25

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

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

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

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1090
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

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

(11-8-85)

R

NAME OF STATION: Barbers Pt. NAS, S-radio Tower of 3
 ESTABLISHED BY: H.O.F. YEAR: 1957 STATE: Hawaii
 RECOVERED BY: H.J.S. 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.
 The tower is the southerly of 3 red and white painted skeleton steel towers which support radio antennas. The tower is obstruction lighted and has a catwalk on top. The legs are set in three pyramidal concrete bases.

Form 528
 (11-8-85)

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

R

NAME OF STATION: Barbers Pt. NAS, S Radio Tower of Three
 ESTABLISHED BY: H.O.F. YEAR: 1957 STATE: Hawaii
 RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

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

Located in southwest Oahu, along the northeast side of Barbers Point Naval Air Station. The south one of three identical towers set in triangle pattern about 400 feet apart, with large, grey building at center. Tower is of structural steel construction, 3-legged, about 150 feet high, painted alternate orange and white, with small, rectangular platform on top. Tower legs are mounted on large concrete bases, with "TOWER 1", stenciled on them.

* 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: BARBERS PT NAS S RADIO TOWER OBS BY HTS
 STATE HAWAII YEAR 1957 THIRD ORDER

SOURCE: G-11968

GEODETIC LATITUDE:	21° 19' 42.967	ELEVATION:	METERS
GEODETIC LONGITUDE:	158 03 46.052		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ θ ANGLE *
HI 3	5105	478,628.07	58,824.53	- 0° 01' 22"

* 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

QF 226

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1091
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

Burns (Oahu Island, L. G. Simmons, 1927).—
 In Waianae district, on the second ridge north of Waianae, on the summit of a small rise in the ridge halfway between stations *Kepuhi New* and *Keaau 2*, and on same general ridge as these two. (See descriptions thereof.) Marked by United States Engineers' rectangular brass plate set in concrete in 5-inch pipe embedded in ground.

Form 525
 (11-8-65)

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

NAME OF STATION: BURNS
 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 recovered in good condition.

A complete description

follows:

Station is located about 3-1/2 miles northwest of Waianae and 1 mile east of the coastline, on a knoll at about 1720 feet elevation along the ridge running east from Kepuhi Point. It is between stations KERUHI NEW and KEAAU 2, which are on the same ridge.

To reach station from center of Makaha Village, go northwest on Farrington Highway for 2.2 miles to a Hawaiian Telephone Co. building on right at base of ridge. Pack northerly up point of ridge, between building and highway, to crest of ridge and station KEPUHI NEW. Go easterly along ridge about 1/2 mile to station.

Station mark is a 3 x 4-inch brass plate stamped US ENGRS ELEV, with a 1/4 inch hole in center, set in concrete in the top of a 5-inch soil pipe that projects 1 1/2 inches from ground. It is in brush on crest of hill, 4 feet northwest of the ridge trail.

* 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 34914

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BURNS
 STATE: HAWAII YEAR: 1927 THIRD ORDER

SOURCE: G-SP156

GEODETIC LATITUDE: 21 ° 29 ' 35.085	ELEVATION: 524 METERS
GEODETIC LONGITUDE: 158 13 00.895	SCALED FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (OR Δ) ANGLE *
HI 3	5103	426,253.29	118,616.18	- 0° 04' 46"

* 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

QI 380

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 Old Hawaiian Datum

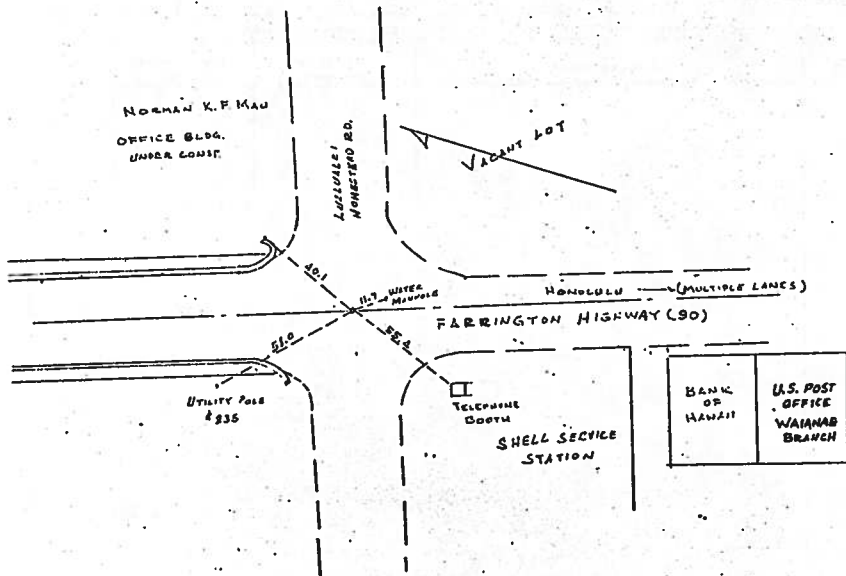
QUAD 211582 STATION 1092
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF SURVEY MARK

NAME OF STATION: Farrington Hwy. STATE: Hawaii COUNTY: Honolulu
 Lualualei Homestead Road
 NEAREST TOWN: Waianae
 ESTABLISHED BY: State of Hawaii DATE: 1970
 DESCRIBED BY: J. Ishihara SURFACE MARK: 1/4 Inch Brass Pin

Station is located 0.1 mile northwest from the Post Office in Waianae, at the intersection of Highway 90 and Lualualei Homestead Road.

Station mark is a 1/4 inch brass pin set in concrete in the middle of the intersection of Highway 90 and Lualualei Homestead Road and level with the road. Ties to station are: SW 40.1 feet from the end of a concrete curb on the northeast side of the intersection, NW 11.7 ft. from a water man hole, NE 55.4 ft. from the northeast corner of a telephone booth and SE 58.0 ft. from utility pole #235.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: FARRINGTON LUALUALEI HOMESTEAD OBS BY HIOT
 STATE: HAWAII YEAR: 1970 THIRD ORDER
 SOURCE: G-15752

GEODETIC LATITUDE:	21° 26' 41.14540	ELEVATION:	4 METERS
GEODETIC LONGITUDE:	158 11 22.18496	SCALED	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ 10R Δ 01 ANGLE*
HI 3	5103	435,554.12	101,053.35	- 0' 04' 09"

* 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
PUU O HULU MAKAI	338° 47' 28.2	338° 51' 38"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF SEP 1979

RL 141

JUN 1578
 U. S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
 NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1093
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

Honouliuli (Oahu Island, Hawaiian Government Survey, 1873).—On high ground, now included in the Ewa plantation, about 500 feet west of the shore of West Loch, Pearl Harbor. Marked by a granite post. In 1910 reported by O. B. French as being in cane field, and undoubtedly lost.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: HONGULIULI
 STATE: HAWAII YEAR: 1875 ORDER: THIRD

SOURCE: G-SP156

GEODETIC LATITUDE:	21 ° 22' 21.558	ELEVATION:	14	METERS
GEODETIC LONGITUDE:	158 01 29.347	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ 10R Δ θ ANGLE *
HI 3	5103	451,555.27	74,826.70	- 0° 00' 33"

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

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

QI 298

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1094
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

Kapu (Oahu Island, O. B. French, 1910).—On highest point of ridge of Waianae Mountains about ½ mile north of Von Hott's house. From Honolulu or Ewa Mill a good road reaches to within 2 miles of the house, with trail remainder of the way. A foot trail from the house to and beyond the station is cut on or near the top of the ridge, crossing several lower summits before reaching the station which is on the south end of a short rounding ridge. The north end of this ridge is very steep, and the trail is cut along its west side, the first place where it is so made after leaving the house. Marked by a ¼-inch drillhole in a rotten rock in place.

Form 526
 (11-6-55)

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

R

NAME OF STATION: KAPU
 ESTABLISHED BY: O.B.F. YEAR: 1910 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:

The point on south end of ridge was identified, but no rock with drill hole could be found. A 20-inch diameter, wooden antenna pole was set into the ground on this point long ago and then later sawed off and a 2-foot-high stub remains in the ground. It is believed that the station was destroyed when the pole was set. The entire ridge is now covered with large eucalyptus trees and bamboo. The station is presumed destroyed.

* 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: KAPU
 STATE: HAWAII YEAR: 1910 THIRD ORDER

SOURCE: G-SP156

GEODETIC LATITUDE:	21 ° 24 ' 25.463	ELEVATION:	844	METERS
GEODETIC LONGITUDE:	158 06 02.006	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE *
HI 3	5105	465,752.62	87,334.95	- 0° 02' 12"

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

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

01 573

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1095
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

Kaua (Oahu Island, L. G. Simmons, 1927).—In western part of Oahu, on the peak of Puu Kaua in the Waianae Range. The easiest ascent to the station is made by following the ridge on the eastern side of the range, which is at right angles to the range, and leads directly to the peak. Marked according to note 0a, a standard disk set in concrete in top of a 5-inch soil pipe projecting 8 to 12 inches above surface of ground. Reference mark is a standard reference disk set in concrete in top of 5-inch soil pipe projecting 8 to 12 inches above surface of ground; it is 6.073 meters (19.92 feet) from station in azimuth 10° 46'. Re-marked according to note 14X in 1929.

FORM 528
 (11-8-58)

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

R

NAME OF STATION: KAUA
 ESTABLISHED BY: LGS YEAR: 1927 STATE: Hawaii
 RECOVERED BY: USNHO YEAR: 1951 COUNTY: Honolulu

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

There is every evidence that station has been lifted out of the ground and then placed back roughly in original position. In western part of Oahu, on the peak of Puu Kaua in Waianae Range. The easiest ascent to the station is made by following the ridge on the eastern side of the range, which is at right angles to the range, and leads directly to the peak. Marked according to note 0a, a standard disk set in concrete in top of a 5-inch soil pipe projecting 8 to 12 inches above surface of ground. Reference mark is a standard reference disk set in concrete in top of 5-inch soil pipe projecting 8 to 12 inches above surface of ground; it is 6.073 meters (19.92 feet) from station in azimuth 10° 46'. Re-marked according to note 14X in 1929.

* 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 343 14

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAUA
 STATE: HAWAII YEAR: 1927 SECOND ORDER
 SOURCE: G-SP156

GEODETIC LATITUDE:	21° 26' 40.713	ELEVATION	953	METERS
GEODETIC LONGITUDE:	158 06 05.232	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE*
HI 3	5103	465,496.61	100,981.92	- 0° 02' 14"

* 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

Q1 290

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1095

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

KAUA (continued)

FORM 524a
 (9-15-65)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

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

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
PAHEEHEE NEW 1927				00 00 00.0
MAKAHA 1927				13 44 35.1
MAILI 1874-1927				90 12 12.1
R.M. No. 1	S	19.992	6.095	277 09 07

Station was recovered and both marks found in good condition, although there has at one time been some slight erosion which has resulted in a concrete collar around the station pipe now being clear of the ground about 2 inches. The surface of the hilltop is now well matted with grass and fern roots and there appears to be no danger of further erosion. The settling that has occurred is likely the result of the disturbing of the ground cover when the station was built. An angle check was made on 4 old stations, indicating that the station is in its original location.

A complete description follows:

Station is located about 7 miles northwest of Waipahu and 6 miles southwest of Wahiawa, on the summit of Puu Kua, at 3127 feet elevation along the crest of the Waianae Range, 2-1/2 miles south of Kolekole Pass.

To reach station from the junction of State Highways 90 & 75, 1-1/2 miles west of Waipahu, go north on State Highway 75 for 4.9 miles to the 16th tee of a golf course on right, and pineapple field road on left. Go left, paralleling the highway, for 0.05 mile; turn left and follow main road along draw through pineapple fields for 0.6 mile; turn sharp left and go 0.05 mile to fork at sign "3092"; take right fork uphill through field for 0.7 mile to fork. Take right fork, leaving the field and going up into canyon, for 0.2 mile to locked gate (obtain key from Forest Service). Pass through gate and continue for 0.3 mile; turn sharp left and go up grade for 0.25 mile to right-angle bend of road, where old grade continues ahead. This is end of truck travel. Pack west on good trail up old grade for about 300 yards to junction with the Honouliuli Contour Trail at about 1750 feet elevation. Turn right and go about 160 yards to hairpin left turn around end of ridge. Leave the contour trail and go left on trail up ridge to crest of main range, then left about 1/4 mile to station.

Station mark is a standard disk stamped "KAUA 1927", set in cement in the top of a 5-inch soil pipe that projects 1 foot above ground. It is in a small open spot in the fern-covered hill, on north side of the large lehua trees.

Reference mark number one is a standard disk stamped "KAUA NO 1", set in cement in the top of a 5-inch soil pipe that projects 1 foot.

*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.

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1096
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Kepuhi (Oahu Island, Hawaiian Government Survey, 1875; O. B. French, 1910).—On projecting point near north side of Makaha Bay, west of government road, on a stone platform said to be an ancient "heiau." Marked by concrete post.

Form 528
 (11-8-55)

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

R

NAME OF STATION: **KEPUHI**
 ESTABLISHED BY: **HAW. Gov. Surv.** YEAR: **1875** STATE: **Hawaii**
 RECOVERED BY: **F. J. Tucker Jr** YEAR: **1965** COUNTY: **Honolulu**

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

The station is gone. Kepuhi Point has been worn off considerably by wave action, and has a large, bare, jumbled rock area about 4 feet lower than original ground level. Angles turned to 3 adjacent stations, with the instrument set at the water's edge, show that the station point is gone.

*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.

CGSD-DC 34314

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **KEPUHI**

STATE: **HAWAII**

YEAR: **1875**

THIRD

ORDER

SOURCE: **G-SPI56**

GEODETIC LATITUDE:	21° 28' 52.257	ELEVATION	METERS
GEODETIC LONGITUDE:	158 13 43.896		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	∠ OR Δ OR ANGLE *
HI 3	5103	422,185.99	114,500.55	- 0° 05' 02"

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

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

QI 379

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1097
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

Kum (Oahu Island, L. G. Simmons, 1927).—In western part of Oahu, in the Waianae Range, on first prominent knoll with rock comb along the top, north of Kolekole Pass. Marked according to note 2, standard disk station mark in outcropping bedrock. Reference marks, note 12a, standard reference disks in outcropping bedrock, are at the following distances and azimuths from station: No. 1, 5.138 meters (16.86 feet), 113° 07'; No. 2, 21.68 meters (71.10 feet), 359° 54'. Re-marked according to note 14X in 1929.

NOTE 32a
 (11-8-85)

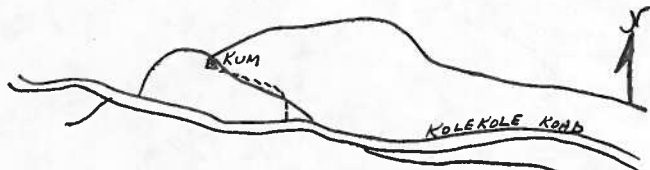
RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KUM
 ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii
 RECOVERED BY: U.S. Army YEAR: 1961 COUNTY: Honolulu

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

Station mark somewhat bruised on top but still legible. A one inch pipe has been erected over the point to allow the point to be used as an azimuth 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.

Comm-DC 34314

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KUM

STATE: HAWAII

YEAR: 1927

SECOND

—ORDER

SOURCE: G-SP156

GEODETIC LATITUDE:	21 ° 28 ' 52.946	ELEVATION	780	METERS
GEODETIC LONGITUDE:	158 07 16.041	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ θ ANGLE *
HI 3	5103	458,817.61	114,329.10	- 0 ° 02 ' 40 "

* 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
MAILI	208 21 20.0	208 24 00	5103

QI 285

(continued on next page)

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

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211582 STATION 1097

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

KUM (continued)

FORM 526a
(9-18-69)

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

R

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

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
		METERS		
MAILI 1874-1927				00 00 00.0
R.M. No. 3	ENE	14.800	4.512	55 53 33
R.M. No. 2	S	71.142	21.684	151 33 27
Mailli, NRS Radio Tower(W 1 of 7)	SW			185 23 25.8
R.M. No. 4	WNW	17.686	5.392	268 30 57

Station mark and reference mark number two were recovered in good condition; the station mark is very slightly battered but legible. Reference mark number one has been destroyed by deterioration of the soft rock ledge. The poor location of reference mark number two makes it almost useless for recovery use, so two new reference marks, numbers three and four, were established. A complete description follows:

Station is located about 4 miles west-southwest of Schofield Barracks, on the summit of Puu Kumakalii, the sharp-tipped point of 2572 feet elevation that sets about 0.35 mile west of the summit of Kolekole Pass.

To reach station from Lyman Gate at Schofield Barracks, go westerly on Lyman Road, later becoming Kolekole Pass Road, for 5.0 miles to summit of pass. Turn right on track road and go 0.2 mile to end of road on ridge above a large, white cross. Pack westerly up very steep ridge to station. A 45-minute pack.

Station mark is a standard disk stamped "KUM 1927", cemented in a drill hole in a bedrock outcrop on highest point of hill. The outcrop has been painted red.

Reference mark number two is a standard disk stamped "KUM NO 2", cemented in a drill hole in a bedrock outcrop that projects 2-1/2 feet above ground. It is on the ridge line, 35.7 feet lower than station mark.

Reference mark number three is a standard disk stamped "KUM 1927 NO 3 1964", cemented in a drill hole in bedrock on southeast point of hill-top. It is 3.5 feet lower than station mark.

Reference mark number four is a standard disk stamped "KUM 1927 NO 4 1964", cemented in a drill hole in a small bedrock ledge on ridge-line to west. It is 2-1/2 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.

USCOMA-DC 37173-P89

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

HORIZONTAL CONTROL DATA

by the
 NATIONAL GEODETIC SURVEY
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1098
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: MAILI US NAVAL RADIO STA CEN MAST OF 3

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

Description, including sketch of object:

The station is the red light on top of the mast, located on the Naval Radio Station Reservation one-half mile northwest of the gate. It is a three-legged steel structure 300 feet high in the center of a triangle formed by three other towers that are not as high as this tower. It is painted in alternate stripes of red and white.

FORM CGS-525b (12-68)

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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MAILI USN RADIO CEN MAST OF 3

STATE: HAWAII YEAR: 1969

THIRD ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 25 59.86075	ELEVATION:	METERS
GEODETIC LONGITUDE:	158 09 48.96978		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ FOR Δ θ ANGLE °
HI 3	5103	444,355.81	96,877.78	- 0 03 35

* 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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1099
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

FORM 526a
 (9-18-65)

U. S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

R

RECOVERY NOTE, TRIANGULATION STATION

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

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
LAHILAHI 1927				00 00 00.0
R.M. No. 1	E	10.332	3.150	141 27 30
Nanakuli, Kaiser Cement Plant, Tank	SE			180 52 46.5
R.M. No. 2	W	12.436	3.791	320 50 40

The old station, consisting of a 1-inch drill hole at the center of a cross, in a flat rock, was recovered. Because of the many boulders at the site it is believed that a cairn was previously built over the mark. The station was re-marked with a standard disk and two reference marks were established. A complete description follows:

Station is located on the summit of Puu Maililii, a brushy hill of about 723 feet elevation that sets on the east side of State Highway 90, at the north end of the village of Maili.

To reach station from the post office in Waianae, go north on State

Highway 90 for 0.05 mile; turn right and go east on Lualualei Homestead Rd. for 1.2 miles to fork. Take right fork and go downgrade 0.1 mile; turn right and follow farm drive for 0.1 mile to buildings and end of truck travel. Pack westerly up along ridge line about 1/2-mile to top and station.

Station mark is a standard disk stamped "MAILILII 1927 1965", cemented in a drill hole in the 7 x 16-inch, flat, exposed surface of a large rock, flush with surrounding rocks. It is directly in line with the southeast boundary fence of the U.S. Naval Radio Station area and is at the intersecting point of several property lines.

Reference mark number one is a standard disk stamped "MAILILII 1927 NO 1 1965", cemented in a drill hole in a 2-foot boulder that projects 1 foot above ground. It is along the ridge line, at same elevation as station.

Reference mark number two is a standard disk stamped "MAILILII 1927 NO 2 1965", cemented in a drill hole in a 2-foot-square boulder that projects 2 feet above ground. It is along the ridge line, at west end of boulder area and at about same elevation as 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.

USCGM-DC 27179-P59

NAME OF STATION: MAILILII

STATE: HAWAII YEAR: 1927 SECOND -ORDER

SOURCE: G-12664

GEODETIC LATITUDE:	21 ° 26' 08.063	ELEVATION:	220 METERS
GEODETIC LONGITUDE:	158 10 48.144	SCALED	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ 10R Δ ρ1 ANGLE *
HI 3	5103	438,766.14	97,711.52	- 0 03 57

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE ϕ 10R Δ ρ1 FORMULA NEGLECTING THE SECOND TERM.

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

QF 535

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1100
 HAWAII
 LATITUDE 21° 00' TO 21° 30'
 LONGITUDE 158° 00' TO 158° 30'
 DIAGRAM NF 4-11 OAHU

Makaha (Oahu Island, L. G. Simmons, 1927).—In western part of Oahu, about 1¼ miles north of Waianae, on first ridge north of Waianae leading west from Waianae Range on a prominent rise in ridge, very near halfway along the ridge from the western end to where it becomes precipitous. Marked according to note 2, a standard disk station mark in outcropping bedrock. Reference marks, note 12a, standard reference disks in outcropping bedrock, are at the following distances and azimuths from station: No. 1, 3.556 meters (11.67 feet), 97° 51'; No. 2, 15.132 meters (49.65 feet), 229° 36'. Re-marked according to note 14X in 1929.

FORM 520a
 (9-18-69)

U.S. DEPARTMENT OF COMMERCE
 COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

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

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
1927 DISTANCES AND AZIMUTHS				
R.M. No. 1		11.67	3.556	97 51
R.M. No. 2		49.65	15.132	229 36
-----1964 DISTANCES-----				
R.M. No. 1		11.662	3.555	
R.M. No. 2		49.611	15.122	

Station was re-covered and all marks found in good condition. A complete description follows:

Station is located about 1-1/2 miles north of Waianae on the prominent ridge north of the town, at a point about 1312 feet elevation.

To reach station from the post office in Waianae, go northwest on Farrington Highway for 1.7 miles; turn right and go northeast on Maiuu Rd. for 0.3 mile to T-junction of Kaulawaha Rd. at point of ridge. From here pack northeast on trail up point of ridge and follow it along ridge

crest for about 1 mile to station. (A 1-hour pack).

Station mark is a standard disk stamped "MAKAHA 1927", cemented in a drill hole in a bedrock outcrop that projects 1-1/2 feet above ground.

Reference mark number one is a standard disk stamped "MAKAHA NO 1", cemented in a drill hole in a small bedrock ledge that extends out 2 feet from the hill line and projects 1 foot on the low side.

Reference mark number two is a standard disk stamped "MAKAHA NO 2", cemented in a drill hole in a triangular, 2-foot bedrock outcrop that projects 6 inches above ground. It is 2 feet south of the ridge trail at about same elevation as station mark, and hidden by brush and grass.

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

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

USCGM-DC 2717b-P88

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **MAKAHA**
 STATE: **HAWAII** YEAR: 1927 SECOND ORDER

SOURCE: **G-SP156**

GEODETIC LATITUDE: 21° 28' 13.827	ELEVATION: 400 METERS
GEODETIC LONGITUDE: 158 11 27.875	SCALED FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE °
HI 3	5103	435,027.99	110,405.67	- 0° 04' 12"

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

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

QI 291

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

HORIZONTAL CONTROL DATA

by the
 National Ocean Survey
 OLD HAWAIIAN DATUM

QUAD 211582 STATION 1101
 HAWAII
 LATITUDE 21 ° 00' TO 21 ° 30'
 LONGITUDE 158 ° 00' TO 158 ° 30'
 DIAGRAM NF 4-11 OAHU

SEE STATION MAKAKILO

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MAKAKILO AERO BEACON
 STATE: HAWAII YEAR: 1963 THIRD -ORDER

SOURCE: G-12664
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 21' 50.157	ELEVATION:	METERS
GEODETIC LONGITUDE:	158 04 43.244		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	β OR Δ OR ANGLE °
HI 3	5103	473,227.31	71,660.35	- 0 ° 01' 43"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
POSITION DETERMINED BY TRAVERSE FROM STATION MAKAKILO			
QF 564			