

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1051
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK STATE SURVEY 4-2

Location Waimanalo State Hawaii County Honolulu
Distance and direction from nearest town 0.5 mile southeast Chief of party C. Symms
Character of mark US traverse station disk Leveling date May 1969
Established by State Of Hawaii Stamping 4-2 1969
Section T M

0.5 mile southeast along State Highway 72 from the post office at Waimanalo, 0.3 mile southeast of the main entrance to Waimanalo Beach Park, in the northeast corner at the east end of the park, 15.2 feet south of a 4-inch ironwood tree, 53.8 feet northeast of a 7-inch ironwood tree, 168.0 feet north of the center line of the highway, 141.7 feet north of telephone pole 278, 15.0 feet northeast of the northeast corner of a concrete park table set in concrete, 28.4 feet north-northwest of the north-northwest corner of a concrete park table set in concrete, and set in the top of a concrete post 0.1 foot underground.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION STATE SURVEY 4-2

STATE HAWAII

YEAR 1969

SECOND

ORDER

SOURCE G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE: 21° 19' 56.73446	ELEVATION: 4.90 METERS
GEODETIC LONGITUDE: 157° 41' 39.58943	48.4 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	BUR Δ Δ ANGLE °
HI 3	5103	604,034.55	60,613.05	+ 0 06' 40"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
TANK RM 1	100° 29' 16.5	100° 22' 36"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION TANK RM 1

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 211573 STATION 1052
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

See Station TANK RM 1

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-4

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543
NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 20' 09.55861	ELEVATION:	55	METERS
GEODETIC LONGITUDE:	157 43 24.38019	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ ϕ ANGLE *
HI 3	5103	594,125.70	61,585.99	+ 0° 06' 02"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
TANK RM 1	272° 00' 20.9	271° 54' 19"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION TANK RM 1

QG 052

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 211573 STATION 1053
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

FORM 525
(6-10-66)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

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

NOTE:	HEIGHT OF TELESCOPE ABOVE STATION MARK 1.3 METERS,† HEIGHT OF LIGHT ABOVE STATION MARK 1.0 METERS.
desc	SURFACE-STATION MARK, DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT
code	UNDERGROUND-STATION MARK OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION
	OBJECT BEARING DISTANCE FEET METERS DIRECTION
12a	WAIMANALO RIDGE 1952 1969 ENE 36.85 11.230 0 00 00.0
	R.M. 1 ESE (3 1/4 miles) 90 19 44
12a	Makapuu Pt Coast Guard Radio Mast W 16.38 4.994 133 11 03.0
	R.M. 2 W 16.38 4.994 302 22 02
	No measurement between reference marks due to ridge between.

Station is located about 4 1/2 miles northeast of Aiea Hina, 1 1/2 miles southwest of the Waimanalo Post Office, 1 1/2 miles west of the Koolua Range Nike Site and on the southeast point of a ridge at an elevation of about 1600 feet.

To reach from the intersection of West Hind Drive and Kalamianalo Highway in Aiea Hina, go east on the highway for 3.6 miles to Lunalilo Home Road, turn left and go north on Lunalilo Home Road for 1.1 miles to a dirt road left. (This route is through a proposed housing project.) Turn left and follow dirt road westerly for 0.3 mile crossing Kuapa Pond to a fork, keep the left fork for 0.2 mile to a side road right, turn right around the end of a ridge for 0.15 mile to a crossroad, continue ahead for about 50 feet to a fork, keep the right fork and follow narrow jeep road up steep grade and along the crest of the ridge for 1.8 miles to the top of a high point on the ridge with a steep cutbank on the right and a bladed area on the left and the end of truck travel. The road is washed out just below this point. Pack uphill, following jeep road for about 45 minutes to the top of ridge and the end of the road and station.

Station mark is a standard disk, stamped KALUANUI RIDGE 1969, cemented in a drill hole which is surrounded by an irregular mass of concrete. It is flush with the ground surface and is on the highest point and the most westerly point of the ridge.

Reference mark 1 is a standard disk, stamped KALUANUI RIDGE NO 1 1969, cemented in a drill hole in an outcrop which projects about 3.0 feet above the road and is on the north edge of the ridge and about the same elevation as the station.

Reference mark 2 is a standard disk, stamped KALUANUI RIDGE NO 2 1969, cemented in an outcrop which projects 1.2 feet on the west side and is flush on the east side. It is about 4.0 feet lower in elevation than the station.

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

USCOMA-DC 27171-P88

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KALUANUI RIDGE
STATE: HAWAII YEAR: 1969 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21° 19' 11.57176	ELEVATION: 482.2 METERS
GEODETIC LONGITUDE: 157° 42' 32.75081	1582 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (UW Δ) (°) ANGLE °
HI 3	5103	599,017.57	55,743.91	+ 0° 06' 21"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE $\theta = \Delta \alpha \sin \Delta \alpha$ FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
WAIMANALO RIDGE	145° 32' 54.4	145° 26' 34"	5103

QG 053

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 211573 STATION 1054
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: KOOLAU RANGE NIKE SITE RADAR ANTENNA

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

Description, including sketch of object:

The station is a radar antenna on the south side of the Nike site, the point intersected was the antennas axis. The Koolau Range Nike Site Radar is located 4 miles northeast of Diamond Head and on the east end of the Koolau Range.

INTERSECTION RECOVERY NOTE, TRIANGULATION STATION

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

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

10 miles east of Honolulu

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 March 1970. Building remains.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KOOLAU RING NIKE SITE RADAR ANT

STATE: HAWAII YEAR: 1969 THIRD ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 19' 24.92071	ELEVATION:	METERS
GEODETIC LONGITUDE:	157° 41' 01.45852		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	B' OR Δ B' ANGLE *
HI 3	5103	607,646.63	57,107.45	+ 0° 06' 54"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE B' OR Δ B' 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 211573 STATION 1055
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

Waimanalo (Oahu Island, L. G. Simmons, 1927).—In southeastern Oahu, on the summit of the Koolau Range, about 3¼ miles east-southeast of the Waimanalo sugar mill. Reached by driving to the summit of the Makapuu Lighthouse road from Honolulu, which is at the foot of Koko Crater, thence following this ridge to the north up to the summit of the Koolau Range, when the station will be found on the highest part of the first peak to the left (west). Marked according to note 6a, a standard disk station mark set in concrete in tile embedded in earth. Reference marks were as follows: No. 1, note 12a, standard reference disk in outcropping bedrock, 12.643 meters (41.48 feet) from station in azimuth 187° 54'; No. 2, note 13a, standard reference disk in concrete in tile, 4.684 meters (15.37 feet) from station in azimuth 313° 45'. A forest reserve pipe is 1.533 meters (5.03 feet) from station in azimuth 185° 08'. Re-marked according to note 14X in 1929.

WAIMANALO (Hawaii, L.G.S., 1927; H.A.P., 1931)
--Station and reference marks recovered in good condition. Station is marked with block of concrete 10 inches square with 2-1/2-inch pipe set in center, extending about 2 feet. Signal is placed in this socket pipe.

Form 528
(11-8-55) U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
RECOVERY NOTE, TRIANGULATION STATION

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

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

Station was not recovered.
Reference mark 1 recovered as described. Two fragments of cast iron pipe were found which may have contained reference mark 2. An octagonal concrete slab about 12 foot across occupies the summit of the hill, probably accounts for the loss of the station. A standard target was placed in a pipe at one corner of the slab by the U.S.E.

Form 528
(11-8-55) U. S. DEPARTMENT OF COMMERCE - COAST AND GEODETIC SURVEY
RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: WAIMANALO
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 is gone. There is now an army radar station on the summit of the hill. In preparation for construction of the radar station the hilltop was cut down.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WAIMANALO

STATE: HAWAII

YEAR: 1927

SECOND

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 19' 25.393	ELEVATION:	421	METERS
GEODETIC LONGITUDE:	157 41 05.012	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE °
HI 3	5103	607,310.55	57,154.43	+ 0 06 53 "

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

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

QI 286

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 211573 STATION 1056
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

FORM 525
(6-18-65)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: WAIMANALO 2 STATE: Hawaii COUNTY: Honolulu
CHIEF OF PARTY: G. A. Annis YEAR: 1969 DESCRIBED BY: G. D. Banks

NOTE, dsgg- none	HEIGHT OF TELESCOPE ABOVE STATION MARK 1.5 METERS, HEIGHT OF LIGHT ABOVE STATION MARK 1.2 METERS.	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
		OBJECT	BEARING	DISTANCE FEET METERS	DIRECTION
dssc.		MAKAPUU POINT RM 3	SW	(4.0 miles)	0 00 00.0
dssc.		CKE Vortec Koko Head	W	26.91	89 33 08.7
dssc.		R.M. 2	SE	13.29	155 03 02
dssc.		R.M. 1	SE	4.059	359 09 14
		No measurement between reference marks due to ridge between.			

Station is located about 5 3/4 miles northeast of Aiea, 3 1/2 miles southeast of Waimanalo, 2.0 miles northwest of the Makapuu Pt. Lighthouse and on a prominent point about 0.2 mile east of a Nike Site Installation.

To reach from the post office in Waimanalo, go southeast on Kalaniana'ole Highway (72) for 2.6 miles to Sea Life Park on the right, continue southeast then southwest on the highway for 2.6 miles to a gravel side road on the right and sign "Horseback Riding 1/2 mile Koko Head Stables". Turn right and go northwest on gravel road for 0.6 mile to a paved road on the left, continue on the gravel road for 0.1 mile to a crossroad, turn left and go west for 0.1 mile to a wire mesh gate on the right and sign "This is a Military Road ETC.". Pass through the gate and go northerly on a narrow, paved road for 2.0 miles to a military installation on the right, continue north on the road for 0.05 mile to a concrete drainage ditch on the right and the end of truck travel. Pack easterly along the north side of a fence, then south to the southeast corner of the fence, then southeast, uphill, for about 150 yards through brush to the highest point of hill and station. 20 minute pack.

Station mark is a standard disk, stamped WAIMANALO 2 1969, cemented in a drill hole in outcrop. It is on the highest part of the hill.

Reference mark 1 is a standard disk, stamped WAIMANALO 2 NO 1 1969, cemented in a drill hole in bed rock. It is about the same elevation as the station.

Reference mark 2 is a standard disk, stamped WAIMANALO 2 NO 2 1969, cemented in a drill hole in an outcrop which is flush on the southeast and west sides and projects about 3 feet on the north side. It is about 6 feet lower than the station.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WAIMANALO 2
STATE: HAWAII YEAR: 1969 FIRST -ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 19' 18.57139	ELEVATION:	380.0 METERS
GEODETIC LONGITUDE:	157 40 43.15537		1247 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	B OR Δ B' ANGLE *
HI 3	5103	609,378.47	56,470.30	+ 0 07 01 "

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
MAKAPUU POINT RM 3	295 ° 47' 58.6	295 ° 40' 58 "	5103

QG 056

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1057
HAWAII
LATITUDE 21° 30' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Makapuu Point (Oahu Island, Hawaiian Government Survey, 1872; L. G. Simmons, 1927).—On southeast coast of Oahu, on Makapuu Point, on a small saddle just south of its highest point, and above and west of the residence of the lighthouse keepers. Originally described as being marked by a copper bolt set in the rock and a cairn of rocks. In 1910 the cairn of rocks was standing and the mark not examined. In 1925 the remains of cairn were found, in center of which were the remains of old signal pole. Lower end of pole was in a natural crevice of the flat rock, in bottom of which was found bolt leaded into rock. But this bolt was of iron, not of copper. Original description probably in error. In 1927 the station was re-marked according to note 1c, a standard disk station mark being set in an irregular mass of concrete which was poured over the old bolt. Reference marks set in 1927, note 12a, standard reference disks in outcropping bedrock, are at the following distances and azimuths from station: No. 1, 16.753 meters (54.96 feet), 75° 09'; No. 2, 11.750 meters (38.55 feet), 326° 39'. Re-marked according to note 14A in 1929.

(Hawaiian Territorial Survey, 1929).—On SE coast of Oahu, on Makapuu Point, on a small saddle just S of its highest point, and above and W of the residence of the lighthouse keepers. Originally described as being marked by a copper bolt set in the rock and a cairn of rocks. In 1910 the cairn of rocks was standing and the mark not examined. In 1925 the cairn of rocks was standing in center of which were the remains of an old signal pole. Lower end of pole was in a natural crevice of the flat rock, in bottom of which was found bolt leaded into rock. But this bolt was of iron, not of copper. Original description probably in error. In 1927 the station was re-marked. A standard disk station mark set in an irregular mass of concrete which was poured over the old bolt.

Reference marks set in 1927, standard reference disks set in outcropping bedrock, are at the following distances and azimuths from station: No. 1, 16.753 meters (54.96 feet) 75° 09'; No. 2, 11.750 meters (38.55 feet) 326° 39'.

Type A monument was built over station in August 1929.
Elevation not changed.

MAKAPUU POINT (Hawaii, Hawaiian Government Survey, 1872; H.A.P., 1931).—Station and reference marks recovered in good condition. A U.S. Army observation post has been built on the highest point of the hill, about 50 meters N of the station.

(B.H.Rigg, 1942).—Platform was replaced by Thomas Evans of the Territorial Survey Department. Mr. Evans had used the station many times before the permanent concrete platform was destroyed by the Army Engineers in January 1942. He is sure that the original marks are still in place. The station was visited, measurements checked, and the standard bronze disks were inspected. They were found stamped and at the distances and directions described by Mr. Evans. The original description was in error. The marks and the concrete surrounding them appear to be weathered enough to substantiate this claim. This office was not informed until after the platform was replaced.

(Hawaiian Territorial Survey, 1942).—The target was dismounted and the concrete block and base destroyed by the U.S.E. some time in January 1942, but the station marker as set in August 1929 was not disturbed.

A new concrete base and pipe was set over the station by a detachment from the U.S.E. supervised by Assoc. Cadastral Engineer T.J.K. Evans of the Territorial Survey Department.

Mr. Evans found the two reference points referred to in the description of 1929 but apparently that description is in error.

No elevations were taken.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MAKAPUU POINT

STATE: HAWAII

YEAR: 1872

SECOND

—ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 18' 41.46280	ELEVATION:	157.3 METERS
GEODETIC LONGITUDE:	157° 39' 20.19585		647 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ α ANGLE °
HI 3	5103	617,230.46	52,742.61	+ 0° 07' 31"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
WAIMANALO 2	115° 31' 15.7"	115° 23' 45"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF OCT 1971

POSITION DETERMINED BY TRAVERSE FROM STATION MAKAPUU PT RM 3

AND CHECKED BY ADDITIONAL OBSERVATIONS

QG 057

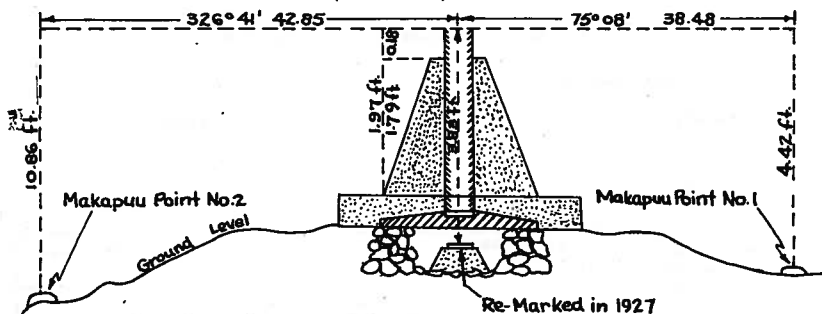
HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1057

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

MAKAPUU POINT (Continued)



RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: MAKAPUU POINT
ESTABLISHED BY: HGS YEAR: 1872 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KOKO HEAD 3 1927	WSW	38.453	11.721	00 00 00.0
R.M. No. 1	SE	42.851	13.063	280 02 01
R.M. No. 2				

Station was recovered and all marks found in good condition. An angle check was made, which shows that the station is at the original point. Information from the files of the Hawaii State Survey Office indicates that the Type B signal was destroyed by Army Engineers in 1942, but the station mark was not disturbed. No records could be found in their files to substantiate the 1944 report that the station had been destroyed, and it is believed that this is in error. The distances to the reference marks differ greatly from those given in 1927 description, but check very closely with the 1942 description, and it is believed that the 1927 measurements are in error.

A complete description follows:

Station is located about 3-1/2 miles southeast of Waimanalo, on Makapu Head, on U.S. Coast Guard property, at about 647 feet elevation, in a slight saddle between the two knolls that form the hilltop. Both knolls have old concrete buildings on them, and the north knoll is the highest point of the hill.

To reach station from the post office in Waimanalo, go southeast on State Highway 72 for 3.8 miles; turn sharp left on narrow, hard-surfaced road, and go 1.3 miles to end of road at Coast Guard buildings. With a 4-wheel-drive truck, go 0.1 mile up rocky, rough, track road to station.

Station mark is a standard disk stamped "MAKAPUU POINT 1927", set in concrete about 1.5 feet below ground surface. It is 33.5 feet northeast of entrance of building on south knoll. A "Type B", Hawaii Territory Survey signal is centered over the mark.

Reference mark number one is a standard disk stamped "MAKAPUU POINT NO 1", cemented in a drill hole in a bedrock ledge on west edge of hill. It is 19.5 feet west-northwest of northwest corner of concrete building and 0.9 foot lower than station mark.

Reference mark number two is a standard disk stamped "MAKAPUU POINT NO 2", cemented in a drill hole in a bedrock ledge on east slope of the hill. It is 38 feet east of the northeast corner of the concrete building and 7.3 feet lower than station mark.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: MAKAPUU POINT
ESTABLISHED BY: H.G.S. YEAR: 1872 STATE: Hawaii BENCH MARK ALSO ☐
RECOVERED BY: C.A.A. YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3-1/2 miles southeast of Waimanalo
HEIGHT OF TELESCOPE ABOVE STATION MARK 5 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 4 FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
WAIMANALO 2				0 00 00.0
R.M. 2	SE	42.85	13.063	211 06 46
R.M. 3 (Traverse Distance)	SW	43.74	13.326	275 33 02.2
R.M. 1	WSW	38.46	11.722	319 36 48

The station mark and both reference marks were recovered as described and found to be in good condition. Reference mark 3 was established at this time and occupied. The State of Hawaii requested a control point in the near area of reference mark 3, to see over the edge of the hill to the southwest. A new description follows.

The station is located about 3-1/2 miles southeast of Waimanalo and 1/2 mile north of the coast line on the top of a ridge on U.S. Coast Guard property.

To reach the station from the post office in Waimanalo, go southeast on State Highway 72 for 3.6 miles to a gate on the left. (There is a phone at the south end of the gate where you have to call the Coast Guard Station for permission to enter.) Turn sharp left, passing through gate, and follow narrow asphalt road for 1.25 miles to the end of the asphalt road at the Coast Guard Station. This is the end of truck travel for most vehicles but a jeep can be driven to within 75 yards of the station by going west from the Coast Guard Station on the remains of an old road for about 0.1 mile to the top of a ridge. Bear right, north, along east side of ridge for about 150 yards to a point about 75 yards east of the station.

The station mark is a standard disk, stamped MAKAPUU POINT 1927, set in concrete about 1.5 feet below the surface and has a concrete monument over it. It is 33 feet northeast of the entrance of the concrete bunker.

Reference mark 1 is a standard disk, stamped MAKAPUU POINT NO 1, cemented in a drill hole in a bedrock ledge on the west edge of the hill. It is 19.5 feet northwest of the northwest corner of the concrete bunker.

Reference mark 2 is a standard disk, stamped MAKAPUU POINT NO 2, cemented in a drill hole in bedrock on the east slope of the hill. It is 38 feet east of the northeast corner of the bunker.

Reference mark 3 is a standard disk, stamped MAKAPUU POINT NO 3 1872 1969, cemented in a drill hole in the roof of the old concrete bunker. The concrete roof is 15 feet by 24 feet and about 7 feet higher than the station mark.

No measurements between reference marks due to rough terrain.

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

FORM CGS-526 (11-66)
USCOMM-OC 50291-PSS

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

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1058
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

FORM 685A
(1-8-58)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, BENCH MARK

Bench Mark
Designation R 2 State Hawaii County Honolulu
Nearest town Waimanalo County Honolulu Chief of Party W.R. Porter
Distance and direction from nearest town 3.4 miles southeast Recovery Date November, 1962
Character of mark Bronze disk Stamping R 2
Established by U.S. Coast and Geodetic Survey
Present condition Good
Detailed report 3.4 miles southeast along State Highway 72 from the post office in Waimanalo, on north slope of rock bluff, 86 feet north of east end of stone wall at an observation point, directly in line with 2 power poles along highway to left, where it changes direction from north to west, and cemented in a drill hole in a bedrock ledge that projects about 8 feet above ground on the lower side and is flush with the ground on the higher, south, side.

RECOVERY NOTE, BENCH MARK

Bench Mark
Designation R 2 State Hawaii County Honolulu
Nearest town Waimanalo Described in 2 Hawaii-1 Chief of party C. Symms
Distance and direction from nearest town 3.4 miles southeast Recovery date April 1969
Character of mark C&GS bench mark disk Established by C&GS Stamping R 2
Also horizontal control point ☐ Present condition Good
feet of corner of 1/4, SEC, T, R
Detailed report: This mark was recovered in good condition and as described.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BENCH MARK R 2

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 18' 45.14400	ELEVATION:	43.83 METERS
GEODETIC LONGITUDE:	157 39 35.98226		143.8 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	B OR Δ 91 ANGLE
HI 3	5103	615,736.55	53,110.80	+ 0° 07' 25"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
MAKAPUU POINT RM 3	285° 32' 22.9	285° 24' 58"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION MAKAPUU PT RM 3

QG 058

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 211573 STATION 1059
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

STATE SURVEY 4-1

Designation State Hawaii County Honolulu
Nearest town Waimanalo County Honolulu
Distance and direction from nearest town 2.95 miles southeast
Character of mark SS traverse station disk
Established by State of Hawaii
Detailed description

2.95 miles southeast along State Highway 72 from the post office at Waimanalo, at the entrance to the Makapuu Beach Park, directly across the highway from the entrance to the Sea Life Park, in the top of a lava rock outcrop, 112.5 feet east-northeast of the center line of the highway, 30 feet east-northeast of the center line of the park road, 73.3 feet north of the east corner of a large lava rock rest room and shower building, 15.9 feet northeast of an iron pole with a "NO PARKING" sign, and about 2 feet higher than the road.

FORM CGS-638
(6-68)
USCOMM-DC 60289-PSS

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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-1

STATE: HAWAII

YEAR: 1969

SECOND

—ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 18' 58.66119	ELEVATION:	15.18 METERS
GEODETIC LONGITUDE:	157 39 50.59269		49.8 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ θ ANGLE °
HI 3	5103	614,352.54	54,471.73	+ 0° 07' 20"

* 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
MAKAPUU POINT RM 3	301° 52' 01.3	301° 44' 42"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION MAKAPUU PT RM 3

AND CHECKED BY ADDITIONAL OBSERVATIONS

QG 055

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1060
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

FORM 525
(6-18-69)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: MAKAPUU POINT RM 3 STATE: Hawaii COUNTY: Honolulu
CHIEF OF PARTY: C.A. Annis YEAR: 1969 DESCRIBED BY: L.B. Gittings

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK 1.7 METERS,†		HEIGHT OF LIGHT ABOVE STATION MARK 1.5 METERS.		
desc	SURFACE-STATION MARK,	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT			
none	UNDERGROUND-STATION MARK	OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
	OBJECT	BEARING	DISTANCE		DIRECTION
			FEET	METERS	
	WAIMANALO 2				0 00 00.0
desc	R.M. 1	NW	30.99	9.445	36 35 31
desc	MAKAPUU POINT 1872 1927 (Trav. Dist.)	NE	43.74	13.3326	95 37 43.4
desc	R.M. 2	E	46.41	14.145	152 18 29

The station is located on the top of an old concrete bunker on U.S. Coast Guard property, about 3 1/2 miles southeast of Waimanalo and 1/2 mile north of the coast line. This station was established to see other stations to the southwest that will not see from MAKAPUU POINT 1872 1927.

To reach the station from the post office in Waimanalo, go southeast on State Highway 72 for 3.6 miles to a gate on the left. (There is a phone at the south end of the gate where you have to call the Coast Guard Station for permission to enter.) Turn sharp left, passing through gate, and follow narrow asphalt road for 1.25 miles to the end of the asphalt road at the Coast Guard Station. This is the end of truck travel with most vehicles but a jeep can be driven to within 75 yards of the station by going west from the Coast Guard Station on the remains of an old road for about 0.1 mile to top of ridge. Bear right, north, along east side of ridge for about 150 yards to a point about 75 yards east of the station.

The station mark is a standard reference mark disk, stamped MAKAPUU POINT NO 3 1872 1927 1969, cemented in a drill hole in the roof of an old concrete bunker. The concrete roof is 15 feet by 24 feet and is about 200 feet south of the highest point.

Triangulation station MAKAPUU POINT 1872 1927 and both reference marks for this station were used for reference marks and a traverse was made between MAKAPUU POINT RM 3 and the old station.

Reference mark 1 is a standard disk, stamped MAKAPUU POINT NO 1, cemented in a drill hole in a bedrock ledge on the west edge of the hill. It is 19.5 feet northwest of the northwest corner of the concrete bunker.

Reference mark 2 is a standard disk, stamped MAKAPUU POINT NO 2, cemented in a drill hole in bedrock on the east slope of the hill. It is 38 feet east of the northeast corner of the concrete bunker.

Triangulation station MAKAPUU POINT 1872 1927 is a standard disk stamped MAKAPUU POINT 1927, set in concrete about 1.5 feet below the surface and has a concrete monument over it. It is 33 feet northeast of the entrance of the concrete bunker.

B.M. R 2 can serve as an azimuth mark. The mark is a standard bench mark disk stamped R 2, set in drill hole in bedrock. It is 0.2 mile northeast of the gate mentioned above, 86 feet north of a power pole with transformer on it and 15 feet lower than the rock wall of an observation point.

*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 211-1-69

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MAKAPUU POINT RM 3
STATE: HAWAII YEAR: 1969 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 18' 41.09292	ELEVATION:	199.2 METERS
GEODETIC LONGITUDE:	157° 39' 20.43712		654 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S HOR Δ 91 ANGLE
HI 3	5103	617,207.72	52,705.24	+ 0° 07' 31"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE S HOR Δ 91 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
BENCH MARK R 2	105° 32' 28.5	105° 24' 58"	5103

QG 060

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1061
HAWAII
LATITUDE 21° 30' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

MAKAPUU POINT LIGHT (Hawaii, L.G.S., 1927; H.A.P., 1931)
-The Superintendent of Lighthouses
states that this light was established in 1909 and there has been
no change to the final since that date.

(O.W.S., 1931)--Station is large white concrete light tower,
about 200 feet above the water, on Makapuu Point. Plainly visible
at sea. Station was not visited.

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

NAME OF STATION: MAKAPUU POINT LIGHT
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:

This station was recovered in good condition as described by O.W.S. in 1931.
It is shown in the "Light List, Pacific Coast, 1961" as "#2770 - White cylindrical
concrete tower, built in 1909".

FORM 526
(11-8-65)

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

NAME OF STATION: Makapuu Point Light
ESTABLISHED BY: L.G.S. YEAR: 1927 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:

Station recovered and found in good condition. It is located
on Makapuu Point, about 600 feet northeast from the U.S. Coast Guard
buildings, and is 420 feet above sea level. Center of light is
46 feet above ground and the red ball atop the red, conical roof
over the light is 60 feet above ground.

RECOVERY NOTE, TRIANGULATION STATION INTERSECTION

NAME OF STATION: MAKAPUU POINT LIGHT
ESTABLISHED BY: L.G.S. YEAR: 1927 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 W. R. Porter in 1963.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MAKAPUU POINT LIGHT

STATE: HAWAII

YEAR: 1927

THIRD

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 18' 47.00424	ELEVATION:	METERS
GEODETIC LONGITUDE:	157° 39' 08.94397		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	B OR Δ & ANGLE *
HI 3	5103	618,293.16	53,304.07	+ 0° 07' 35"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE B 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

QG 061

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 211573 STATION 1062
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: MAKAPUU PT COAST GUARD RADIO MAST

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

Description, including sketch of object:

The station is the red light on top of the mast, which is located four miles northeast of Diamond Head and on the Makapuu Point Coast Guard Station. It is a four-legged steel mast, a Directional Navigation Aid, Call Letter 2, painted red and white and is 125 feet high.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MAKAPUU PT CG RADIO MAST

STATE: HAWAII

YEAR: 1969

THIRD

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 18' 43.04794	ELEVATION:	METERS
GEODETIC LONGITUDE:	157 39 14.80306		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	g OR Δ g: ANGLE *
HI 3	5103	617,740.03	52,903.66	+ 0 07' 33"

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

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

QG 062

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

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1063
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

BLOW (Hawaii, H.A.P., 1931)--On the SE side of Oahu, 1-1/2 miles NE of Hanauma Bay, 1/2 mile NE of the "Blowhole", 126 meters E of a fence marking the W boundary of a ranch, 33 meters S of the center line of a paved highway, on a low, black, rocky point, the first point E of the sand beach E of the "Blowhole."

Reference mark is on the highest rock in the vicinity.
Station and reference mark are bronze disks set in drill holes in outcropping bedrock.
Witness mark is a pipe set in concrete, extending 1-1/4 feet.

OBJECT	DISTANCE	DIRECTION
KOKO CRATER	meters	0°00'00"0
Ref.Mk.	39.20	159 40 55
High-water line	26	230
Witness mark	52.38	320 52 25

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: BLOW
ESTABLISHED BY: H.A.P. YEAR: 1931 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK		METERS		HEIGHT OF LIGHT ABOVE STATION MARK		METERS	
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				
KOKO HEAD 3 1927	-----	1931	DISTANCE AND DIRECTION-----	00 00 00.0			
R.M. No. 1			39.2	189 34 01			
			-----	1963	DISTANCE AND DIRECTION-----		
R.M. No. 2	NW	51.242	15.618	83 11 45			
R.M. No. 1	NE	128.500	(39.187)	189 33 47			

Station mark and reference mark were both recovered in good condition. Station mark was under sand and was located by distance and angle check from the reference mark, the arrow of which points seaward, about 90 degrees off from station mark. The iron pipe witness mark was searched for by distance and angle, but was not found. A new reference mark, number two, was established. A complete description follows:

Station is located on southeast Oahu, about 1 mile east of Koko Crater and 1/2 mile northeast of "The Blowhole", (on the first black rock point northeast of it).

To reach from the post office in Waimanalo, go southerly on Kalanianaʻole Highway for 5.4 miles; take left fork, onto hard-surfaced, beach road, and go 0.2 mile to station on left.

Station mark is a standard disk, stamped "BLOW 1931", cemented in a drill hole in lava rock about 4 inches below sand level. It is 87 feet southeast of edge of old, washed-out road, 135 feet southeast of center-line of new beach road, 30 inches east of the east edge of a 4-foot-diameter prominent black rock outcrop that projects 18 inches and is the only rock in the immediate vicinity, 25 feet northwest from edge of black bedrock beach-line, and 440 feet east-northeast of an iron pin cemented in a drill hole in bedrock at the extreme west end of the black lava rock section of the beach. (This iron pin is believed to be the marker of the City Park Boundary).

Reference mark number one is a standard disk stamped "BLOW 1931", cemented in a drill hole in the south edge of a prominent, 20-foot-diameter black rock outcrop that is the highest point along the rock beach. The mark is about 3 feet above mean high water line. (The arrow points 90° off).

Reference mark number two is a standard disk stamped "BLOW NO 2 1931 1963", cemented in a drill hole in a 3 x 5-foot, jagged-topped section of black rock that projects from 2 to 5 inches from the sand. It is 42 feet southeast of the center line of the old road, 87 feet southeast of the center line of the new road, 2.5 feet higher than station mark, and set near the east end of the rock.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BLOW

STATE: HAWAII

YEAR: 1931

FIRST

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 17' 23.70416	ELEVATION:	1.91 METERS
GEODETIC LONGITUDE:	157 40 18.00568		6.3 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ 10R Δ #1 ANGLE °
HI 3	5103	611,780.50	44,885.10	+ 0° 07' 09"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
MAKAPUU POINT RM 3	214° 52' 48.6	214° 45' 39"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QG 063

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1063
LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

BLOW (Continued)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: BLOW
ESTABLISHED BY: H.A.P. YEAR: 1931 STATE: Hawaii BENCH MARK(S) ALSO: XX
RECOVERED BY: C. Symms YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: About 5 1/2 miles southeast of Waimanalo

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

The station, R.M. 1 and 2 were recovered in good condition and all leveled over in 1969.
To reach from the post office at Waimanalo, go 5.35 miles southeast along State Highway 72, thence 0.2 mile southwest along the south-east road through Koko Head Beach Park.
The station is a C&GS triangulation station disk, stamped BLOW 1931, directly seaward from the southwest corner of a paved parking lot, in the top of a lava rock outcrop which projects about 1 foot above the ground, 135.0 feet southeast of the center line of the road, R.M. 1 is a C&GS reference mark disk, stamped BLOW NO 1 1931. in the top along the south edge of a lava rock outcrop, the highest rock in the beach area, 129.5 feet northeast of the station.
R.M. 2 is a C&GS reference mark disk, stamped BLOW NO 2 1931 1963. in the top of a lava outcrop, 51.3 feet northwest of the station.
Note: The arrow is pointing seaward instead of at the station.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: BLOW
ESTABLISHED BY: H.A.P. YEAR: 1931 STATE: Hawaii BENCH MARK ALSO: ☐
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 5 1/2 miles east of Aina Haina.
HEIGHT OF TELESCOPE ABOVE STATION MARK 4.0 FEET. HEIGHT OF LIGHT ABOVE STATION MARK FEET.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
MAKAPUU POINT R.M. 3				° 00 00' 0"
R.M. 1	NE	128.53	(39.176)	28 52 47
CKH Vortao Koko Head	SW	(2 1/2 miles)		200 59 28.0
R.M. 2	NW	51.25	15.621	282 30 33
R.M. 1 to R.M. 2		151.18	(46.080)	

Station mark, reference marks 1 and 2 were recovered and found in good condition. The distance and direction to both reference marks checked the 1963 data. A new and complete description follows:

Station is located about 5 1/2 miles east of Aina Haina, 5 1/4 miles southeast of Waimanalo, 3/4 mile east of Koko Head Crater and 50 feet north of the shore line of the ocean.

To reach from the traffic light and intersection of West Hind Drive and Highway 72 (Kalanianaʻohi Highway) in Aina Haina, go east on the highway for 3.8 miles to Lunalilo Home Road on the left, continue east on the highway for 0.7 mile to the top of the grade and side road on the right, continue on the highway for 1.6 miles to the entrance to the Blow Hole parking lot on the right, continue east on the highway for 0.8 miles to the east entrance to a beach park on the right, turn right for about 50 feet then right again and follow paved road westerly for 0.2 mile to the southwest end of a parking area on the right and the station as described.

Station mark is a standard disk, stamped BLOW 1931, cemented in a drill hole in the top of the lava rock which forms the shore line. It is flush with the surface and 118.0 feet southeast of the southwest corner of a paved, parking area.

Reference mark 1 is a standard disk, stamped BLOW NO 1 1931, cemented in a drill hole in lava rock which projects about 5 feet at the highest point. The mark is about 5 feet west and 2 feet lower than the highest point. It is about the same elevation as the station.

Reference mark 2 is a standard disk, stamped BLOW NO 2 1931, cemented in a drill hole in lava rock which is flush with the surface. It is 67.0 feet southeast of the southwest corner of the parking lot and about 1 foot higher than the station.

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1064
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 3-13

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

Description, including sketch of object:

Station is located on southeast coast, in Koko Head area, 0.3 mile east of the intersection of Kalaniana'ole Highway and Hanalei Bay Park entrance, on south side of first sharp curve to the left of Kalaniana'ole Highway.

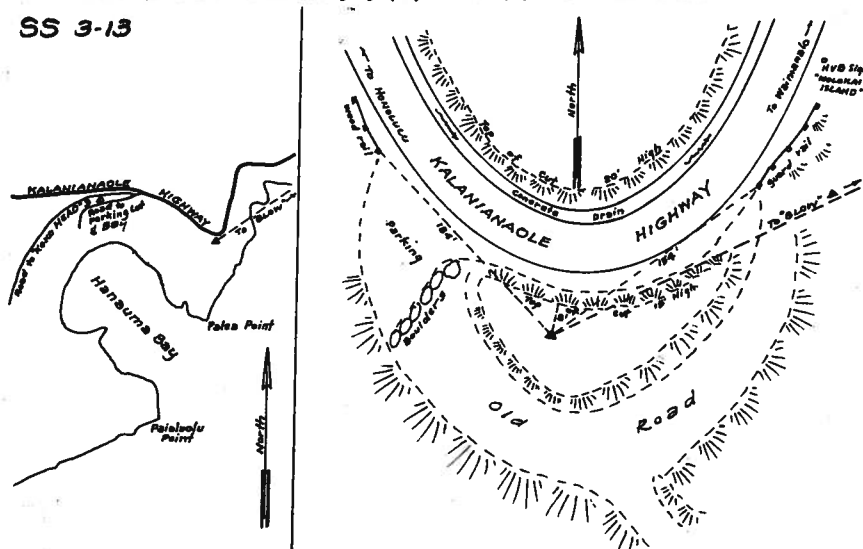
Station mark is a standard State Survey disk stamped "3-13 1969" in concrete monument projecting 6-inches above ground level. Station is on road cut between Highway and blocked-off old road. A small parking area is on the west side of station. Ties from station are: N 8.0 ft. to top edge Highway cut (15 ft. high), NE 154 ft. to end post of Highway guard rail, NW 18.4 ft. to end post of Highway guard rail.

Sub-surface mark is identical in concrete monument 2.4 ft. below ground level and separated from top monument by a layer of sand.

Geodimeter connection was made between "BLOW 1931" and State Survey "3-13 1969".

This station is also Bench Mark 3-13 (SS) of the 1969 First Order Levels.

SS 3-13



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 3-13

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 16' 33.94944	ELEVATION:	60.97 METERS
GEODETIC LONGITUDE:	157° 41' 30.04761		200.0 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE °
HI 3	5103	604,977.29	39,851.12	+ 0° 06' 43"

* 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
BLOW	233° 36' 45.5	233° 30' 03"	5103

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

QG 064

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1065
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

COVE (Hawaii, H.A.P., 1931)--Station is 1.2 miles SSW of Makapuu Point, 2-1/4 miles NE of Hanalei Bay, on the Davis Ranch, 220 meters S by E from the Davis house, on a low, rocky point (Kaloka Point), and SW of a narrow cove indenting the shoreline.

Station and R.M. 1 are standard disks set in drill holes in outcropping bedrock.

Witness mark is a 10-foot pinnacle on SW side of entrance to the cove, with cement patty on top with arrow pointing to the station.

R.M. 1 is 2 meters SE of SE corner of rock ruin.

OBJECT	DISTANCE	DIRECTION
KOKO CRATER	meters	0°00'00.00
R.M. 1	15.69	15 13 50
High-water line	20	140
Witness mark	54.70	178 20 10
High-water line	15	260

Height of signal above station mark - 5 meters.

Height of instrument above station mark - 1.8 meters.

COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: COVE
ESTABLISHED BY: H.A.P. YEAR: 1931 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

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

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
MAKAPUU POINT 1872-1927				00 00 00.0
R.M. No. 1	W	51.411	15.671	248 50 39
R.M. No. 2	NNW	21.582	6.579	322 17 43

Station mark and reference mark number one were recovered in good condition. Witness mark, a cement patty on top of rock pinnacle, is gone. A new reference mark, number two, was established. A complete description follows:

Station is located on the southeast shore of Oahu, on Kaloka Point, about 4 miles airline southeast of Waimanalo, 1 mile south-southwest of Makapuu Head and 1/2 mile east of the Mauka-Kai Golf Course.

To reach station from the post office in Waimanalo, go southeast on State Highway 72 for 5.2 miles to end of long, right curve of highway, where a stone wall extends into the ocean from the end of a wire fence line. From here pack easterly on old road along beach for about 1/4 mile to station.

Station mark is a standard disk stamped "COVE 1931", cemented in a drill hole in a slight depression at the center of a 10-foot, black bedrock outcrop that projects 1 foot on the southwest side and 3 feet on the northeast side. It is on the low rise along the south side of a long lagoon; 45 feet northwest of the northeast end of brown, curving, smooth-topped, 2-foot-high, sandstone ledge that is quite prominent because of the surrounding black lava rock. This formation is 75 feet long and is at the water's edge.

Reference mark number one is a standard disk stamped "COVE NO 1", cemented in a drill hole in a lava rock outcrop that projects 1-1/2 feet. It is about 3 feet higher than station mark.

Reference mark number two is a standard disk stamped "COVE NO 2 1931 1963", cemented in a drill hole in bedrock along the same group of rocks the station is in. It is 9 feet southeast of the northwest end of the rock point and about 2 feet lower than station mark.

(Continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: COVE

STATE: HAWAII

YEAR: 1931

SECOND

-ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 17' 47.09604	ELEVATION:	2 METERS
GEODETIC LONGITUDE:	157 39 39.99910	NO CHECK	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S IOR Δ S1 ANGLE *
HI 3	5103	615,369.72	47,252.94	+ 0° 07' 23"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From mark)	PLANE AZIMUTH (From mark)	CODE
MAKAPUU POINT	198° 50' 50.4	198° 43' 27"	5103
BLOW	56 42 35.6	56 35 12	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QG 065

JUN 1978
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY National Geodetic Survey

COVE (Continued)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1065

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

RECOVERY NOTE, TRIANGULATION STATION TRAVERSE

R

NAME OF STATION: COVE /
ESTABLISHED BY: H.A.P. / YEAR: 1931 / STATE: Hawaii / BENCH MARK(S) ALSO ☐
RECOVERED BY: C.A.A. / YEAR: 1969 / COUNTY: Honolulu /
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2 miles northeast of Maunaloa /

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:
The station, and reference marks were recovered as described, and in good condition. The distance and direction to reference marks 1 and 2 were not checked at this time.
A Geodimeter Traverse was made between COVE 1931 and BLOW 1931. /
Geodimeter distance 1310.605 Meters or (4299.83) Ft.

QUAD 211573 STATION 1066
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NE 4-11 OAHU

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 211573 STATION 1067
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

KOKO HEAD 2 (Hawaii, E.R.H., 1925; H.A.P., 1931)
- Found iron bolt set in concrete and surrounded
by small pile of rocks. Position checked by topography within 4
meters. Station is about 4 meters W of a rude trail leading up
the ridge.

Form 338
(11-8-65)

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

R

NAME OF STATION: KOKO HEAD 2
ESTABLISHED BY: E.R.H. YEAR: 1925 STATE: Hawaii
RECOVERED BY: D.M. Whipp YEAR: 1965 COUNTY: Honolulu

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

Station was searched for by distance and angle from KOKO HEAD 3 but
could not be found. The hill was flattened when a VOR installation
was built on it and the station was probably destroyed at that time.

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

COM-DC 34314

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KOKO HEAD 2
STATE: HAWAII YEAR: 1925 SECOND ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 16' 07.534	ELEVATION:	197	METERS
GEODETIC LONGITUDE:	157 42 20.381	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ ϕ ANGLE *
HI 3	5105	600,221.79	37,176.74	+ 0 ° 06' 24 "

* 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

QC 067

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1068
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

Koko Head 3 (Oahu Island, L. G. Simmons, 1927).—In southeastern Oahu, about 140 yards south along the ridge from old Koko Head station which is on the highest point in the ridge of Koko Head proper. (See description thereof.) Station is approached from the north end of ridge. Station marked according to note 6a, standard disk station mark set in concrete in tile. The old *Koko Head* station (1872), marked by a 2 by 3 inch brass plate marked "U. S. Engrs." set in concrete in a 6-inch iron pipe, is 128.57 meters (421.82 feet) from station in azimuth 196° 47'. Reference mark, note 13a, a standard reference disk in concrete in tile, is 21.135 meters (69.34 feet) from station in azimuth 144° 23'. Re-marked according to note 14A in 1929.

KOKO HEAD 3 (Hawaii, L.G.S., 1927; L.G.S., 1928)
--Recovered old mark consisting of a standard bronze disk set in concrete in a 5-inch cast-iron pipe near the S end of the Koko Head ridge.

(H.A.P., 1931)--Recovered as described in good condition. The SW corner of an army observation post is 63.4 meters N. 2° W. (mag.).

Reference mark recovered in good condition.

FORM 526a
(6-18-63)

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **KOKO HEAD 3**
ESTABLISHED BY: **L.G.S.** YEAR: 1927 STATE: **Hawaii**
RECOVERED BY: **W.R. Porter** YEAR: 1963 COUNTY: **Honolulu**

HEIGHT OF TELESCOPE ABOVE STATION MARK 2.6 METERS.		HEIGHT OF LIGHT ABOVE STATION MARK METERS.		
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
WAIALAE 1927				00 00 00.0
R.M. No. 2	SE	24.751	7.545	210 32 28
R.M. No. 3	S	21.621	6.590	251 55 40

Station mark was recovered in good condition. Reference mark number one has been destroyed; the concrete-filled soil pipe was found, but the top has been broken off and the disk is gone. A complete description follows:

Station is located at the southeast end of Oahu, on the southwest end of Koko Head, at end of asphalt road and at about 642 feet elevation.

To reach station from the traffic light at the intersection of West Hind Drive and Kalaniana'ole Highway in Aiea Haina, go east on Kalaniana'ole Highway for 3.7 miles to junction with Lunalilo Home Rd. on the left. Continue ahead on the highway for 0.75 mile to top of grade and side road right. Turn right, take the right one of two asphalt roads, (left one goes down to Hanauma Bay) and go upgrade for 0.3 mile to locked gate (key may be obtained from F.A.A. office at International Airport). Pass through gate and continue upgrade and along top of hill for 1.0 mile to end of asphalt road and station on right.

(Continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **KOKO HEAD 3**
STATE: **HAWAII**

YEAR: 1927

FIRST

—ORDER

SOURCE: **G-14543**

GEODETIC LATITUDE:	21° 15' 58.18466	ELEVATION:	195.2 METERS
GEODETIC LONGITUDE:	157 42 24.45648		640 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ R: ANGLE °
HI 3	5103	599,838.06	36,232.68	+ 0 06' 23"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
DIAMOND HEAD 2	88° 09' 07.5	88° 02' 45"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QG 068

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1068
LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

KOKO HEAD 3 (Continued)

Station mark is a standard disk stamped "KOKO HEAD 3 1927", set in the top of a 5-inch, cast-iron pipe filled with concrete and projecting 8 inches above ground. It is 21 feet north of old concrete pillbox, 68 feet north of a wooden antenna pole, and about 600 feet southwest of the F.A.A. VOR installation. A "Type A", Hawaiian Territorial Survey signal is centered over the mark, with the concrete floor 4 feet above ground.

Reference mark number two is a standard disk stamped "KOKO HEAD 3 NO 2 1927 1963", cemented in a drill hole in the northeast corner of the concrete roof of the old pillbox. It is at same elevation as station.

Reference mark number three is a standard disk stamped "KOKO HEAD 3 NO 3 1927 1963", cemented in a drill hole in the concrete rim of the roof entrance to the pillbox. It is 1 foot higher than station mark.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KOKO HEAD 3 /
ESTABLISHED BY: L.G.S. / YEAR: 1927 / STATE: Hawaii / BENCH MARK(S) ALSO ☐
RECOVERED BY: C.A. Annis / YEAR: 1969 / COUNTY: Honolulu /
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3 1/2 miles southeast of Aiea /

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. The recovery note for 1963 was checked and found to be correct. No measurement between Reference Marks due to location.

OBJECT	BEARING	DISTANCE	DIRECTION
		FEET METERS	0 00 00.0
DIAMOND HEAD 2 /	N /		117 18 08.6
CHK Vor-tac Koko Head /	SE /	24.80 / 7.562	241 50 56
R.M. NO 2 /	S /	21.66 / 6.601	283 12 22
R.M. NO 3 /			

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KOKO HEAD 3
ESTABLISHED BY: L.G. Simmons YEAR: 1927 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: J.V. Tester YEAR: 1973 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

R

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

This station was recovered and found to be as described in 1963. All marks remain in good condition.

Call. F.A.A.
Airways Facilities Sector
839-4051
120 Lagoon Drive
Call John Giannajopolis
839-2550

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1069
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

KULIOUOU (Hawaii, L.G.S., 1928)--A standard bronze disk (Territory Survey) set in a drilled hole in bedrock and surrounded by a platform of rocks cemented together, on ridge above the Charles Lucas home at the New Ranch on Waiālae road. Station is about 50 yards back from S end of ridge and near the line dividing the Niu and Kuliouou districts.

(H.A.P., 1931)--On a ridge marking the E side of Niu Valley, on land belonging to Niu Dairy, about 27 meters SW of the W one of two small radio tripods, and 40 meters NNW of station Lucas. Marked according to Note 14A with a Territorial disk.

Form 526
(11-8-58)

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

NAME OF STATION: KULIOUOU
ESTABLISHED BY: L.G.S. YEAR: 1928 STATE: Hawaii
RECOVERED BY: H.J.S. YEAR: 1962 COUNTY: Honolulu

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

The station was recovered.

It lies north of the village of Kuliouou, on a rocky, grass covered ridge, just east of Niu Estates Development, and about 40 meters south of a Bureau of Water Supply reservoir. It is marked by a Type A Hawaiian Territory Monument. The disk was not examined.

To reach from Honolulu Post Office, go east along Kalanianaʻole Highway 8.6 miles to the entrance to Niu Estates. Turn left, (north) along Halemaumau Ave. for one block. Turn right on Mahimahi Street to Bureau of Water Supply gate (key may be secured at Beretania Street Pumping Station). Pass thru gate up steep hill to reservoir and station.

Form 526a
(11-8-58)

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

NAME OF STATION: KULIOUOU
ESTABLISHED BY: L.G.S. YEAR: 1928 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK 2.61 METERS, HEIGHT OF LIGHT ABOVE STATION MARK METERS.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KOKO HEAD 3 1927				00 00 00.0
LUCAS 1925	SSE	140.578	(42.848)	23 51 25.2
R.M. No. 2	NW	18.471	5.631	198 44 11
Niu Water Tank	N	92.171	28.094	243 37 41.5
R.M. No. 1	NE	22.322	6.804	278 16 14

Station mark was recovered and found in good condition. Two reference marks were established. A complete description follows:

Station is located about 1-1/2 miles airline east of Aiea Haina and 135 yards north of Kalanianaʻole Highway, on the summit of a brushy hill of about 150 feet elevation at the south side of a municipal water tank.

To reach station from the traffic light at the intersection of West Hind Drive and Kalanianaʻole Highway at the south end of Aiea Haina, go easterly on Kalanianaʻole Highway for 1.4 miles; turn left and go 0.05 mile on Halemaumau Street; turn right and go 0.15 mile on Mahimahi Street to locked gate on steep, concrete driveway just above house at 5863 Mahimahi Street. Continue up steep driveway for about 100 yards to end of road at water tank. Pack southeast about 20 yards up onto brushy hill and station.

(Continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KULIOUOU

STATE: HAWAII

YEAR: 1928

THIRD

- ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 17' 11.83024	ELEVATION:	49.7 METERS
GEODETIC LONGITUDE:	157 44 02.70377		163 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	8° OR Δ 01 ANGLE
HI 3	5103	590,532.83	43,647.02	+ 0° 05' 48"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE 8° OR Δ 01 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
KOKO HEAD 3	308° 38' 38.6	308° 32' 51"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QG 065

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1069

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

KULIOUOU (Continued)

Station mark is a Hawaii Territorial Survey disk, unstamped, cemented in a drill hole in a flat bedrock outcrop that projects 4 inches above ground. It is 43-1/2 feet south of south side of water tank and 20 feet south of small cliff on south side of high panax row. There is a Territory of Hawaii Survey "Type A" signal centered over the mark. The floor of the signal is 4 feet above the mark and a red and white target extends 7 feet above the floor.

Reference mark number one is a standard disk stamped "KULIOUOU NO 1 1928", cemented in a drill hole in a lava bedrock outcrop 6 feet south of edge of hill and at same elevation as station mark.

Reference mark number two is a standard disk stamped "KULIOUOU NO 2 1928", cemented in a drill hole in a lava bedrock outcrop 6 feet south of edge of hill and about 1 foot higher than station mark.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KULIOUOU
ESTABLISHED BY: L.O.S. YEAR: 1928 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1 1/2 miles east-northeast of Aina Hina.

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 by W. R. Porter in 1963. The to reach is adequate.

This station was used for Geodimeter traverse only.

1969 OBSERVATIONS

OBJECT	BEARING	FEET	METERS	DIRECTION
KONO HEAD 3 1927				0 00 00.0
R.M. 2	NW ✓	18.46 ✓	5.626 m.	198 40 58 ✓
KUPAUA (Geod. Trav.)	N ✓	833.92 ✓	254.178 m.	230 09 34.0 ✓
R.M. 1	NE ✓	22.31 ✓	6.799 m.	278 16 13 ✓

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 211573 STATION 1070
HAWAII
LATITUDE 21 ° 30' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

ADJUSTED HORIZONTAL CONTROL DATA

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
OFFICE 555 D

DESCRIPTION OF TRIANGULATION TRAVERSE STATION

NAME OF STATION: Niu, Water Tank YEAR: 1963 STATE: Hawaii COUNTY: Honolulu

CHIEF OF PARTY: W.R. Porter

Description, including sketch of object: Station is located about 1-1/2 miles east of Aina Haina and 2 miles northwest of Koko Head, on the end of a ridge, about 135 yards north of State Highway 72. It is a concrete tank, 95 feet in diameter and 23 feet high, painted pale green (standard water dept. color). On the center of the flat roof of the tank there is an octagon-shaped house, 12 feet across at the base and tapering in slightly at the top 9 feet above tank roof. a 3-foot-diameter, metal ventilator sets on the middle of the house roof and a 14-inch-long, metal point projects from the middle of the ventilator top. Point intersected was the metal point.

The tank sets in a large cut on the ridge, and is not visible except in the immediate vicinity.
Metal point on roof is 92.171 feet north of station KULIOUOU 1928 and roof of tank is about 10 feet higher than the station.

U. S. GOVERNMENT PRINTING OFFICE 16-66391-1

Described by _____

NAME OF STATION: NIU WATER TANK

STATE: HAWAII

YEAR: 1963

THIRD

-ORDER

SOURCE: G-12664

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 17' 12.731	ELEVATION:	50	METERS
GEODETIC LONGITUDE:	157 44 02.501	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (OR Δ) ANGLE °
HI 3	5103	550,551.85	43,737.93	+ 0 05 48

* 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

POSITION DETERMINED BY TRAVERSE FROM STATION KULIOUOU

QG 070

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1071
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

Lucas (Oahu Island, E. R. Hand, 1925).—In southeast Oahu, about 2 miles west of Wailupe Naval Radio Station, on edge of ridge between Kuliouou and Niu valleys, where abrupt cliff meets the seaward slope. Marked by standard brass disk.

LUCAS (Hawaii, E.R.H., 1925; H.A.P., 1931)
--Recovered in good condition as described. Station KULIOUOU is 40 meters NNW. The S end of the rock wall marking the E boundary of the Lucas property is about 10 meters N of the station. A fair trail leads up the W side of the ridge from NIU LONGITUDE STATION, following a 2-1/2-inch water pipe.

(R.D.H., 1943)--Station was described in Publication 156 as being 2 miles W of Wailupe Naval Radio Station. This should be corrected to read 2 miles E of Wailupe Naval Radio Station (at present occupied by the Coast Guard).

Form 32
(11-5-61)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: LUCAS
ESTABLISHED BY: E.R.H. YEAR: 1925 STATE: Hawaii
RECOVERED BY: H.J.S. YEAR: 1962 COUNTY: Honolulu

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

Station was recovered.
It lies north of the village of Kuliouou, on the edge of the cliff, about 80 meters south of the Bureau of Water Supply Reservoir at Niu Estates.

It is marked by a standard triangulation disk, not stamped, set in concrete in bedrock.

To reach from Honolulu Post Office, go east along Kalaniana'ole Highway 8.6 miles to the entrance to Niu Estates. Turn left, (north) along Halemaumau Ave. for one block. Turn right on Mahimahi Street to Bureau of Water Supply gate (key may be secured at Beretania Street Pumping Station). Pass thru gate up steep hill to reservoir, then pack south about 80 meters to edge of cliff and station.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: LUCAS
ESTABLISHED BY: E.R.H. YEAR: 1925 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:

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

Station is located about 1-1/2 miles airline east of Aina Haina and 90 yards north of Kalaniana'ole Highway on brushy hill just above cliff.

To reach station from the traffic light at the intersection of West Hind Drive and Kalaniana'ole Highway at the south end of Aina Haina, go easterly on Kalaniana'ole Highway for 1.4 miles; turn left and go 0.05 mile on Halemaumau Street; turn right and go 0.15 mile on Mahimahi Street to locked gate on steep, concrete driveway just above house at 5863 Mahimahi Street. Continue up steep driveway for about 100 yards to end of road at water tank. Pack southeasterly about 20 yards up onto brushy hill and station KULIOUOU 1928, then continue southeasterly down slope about 45 yards to station.

Station mark is a standard disk, unstamped, cemented in a drill hole in a bedrock ledge 20 feet northwest of cliff edge and 10 feet above it, 40 feet northwest of a prominent, rocky point that extends out from the cliff-line, directly across Kalaniana'ole Highway from the garage at 5857 address, 42.848 meters (horizontal distance) south-southeast of station KULIOUOU 1928, and 36 feet lower than KULIOUOU 1928.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: LUCAS

STATE: HAWAII

YEAR: 1925

SECOND

ORDER

SOURCE: G-12664

GEODETIC LATITUDE:	21 ° 17' 10.602	ELEVATION:	6	METERS
GEODETIC LONGITUDE:	157 44 02.022	SCALED		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ 108 Δ § 1 ANGLE °
HI 3	5103	590,597.51	43,523.20	+ 0° 05' 48"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE § 108 Δ § 1 FORMULA NEGLECTING THE SECOND TERM.

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

QF 533

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1072
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

Niu longitude (Oahu Island, E. J. Brown, 1927).—On southern coast of Oahu, at Niu, about 7½ miles east of Honolulu, on the Charles Lucas dairy ranch, 100 meters west of the Lucas residence, and 4 meters north of a stone wall on the north side of road. Marked by a standard bronze tablet set in concrete. Tablet is stamped "Niu Longitude 1927."

NIU LONGITUDE (Hawaii, E.J.B., 1927; H.A.P., 1931)
--A brick and stone pier was found, but no disk. A reference mark was found 13.1 meters N. 20° W. marked "Niu 1926 Longitude." Station is about 4 meters NE of gate.

A small lagoon lies across the road and is 26 meters S. 65° E. High-water line is 55 meters S. 15° E. Station LUCAS is 127 meters NE.

The station is about 200 meters E of the Niu Dairy barn.

(R.D.H., 1943)--Station is in the N side of the pavement of Kalanianaʻole Highway about 9 miles E of the Federal Building (post office) in Honolulu.

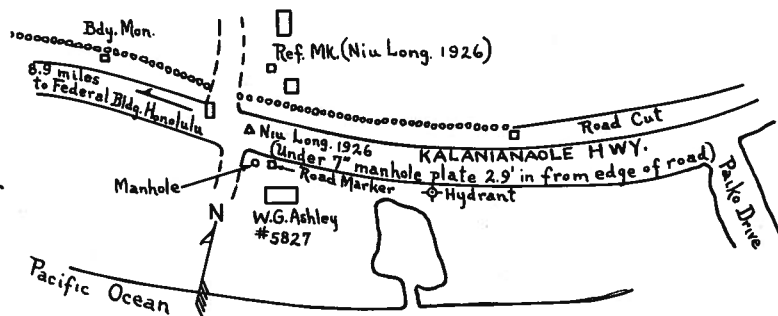
Station mark is a standard disk, marked "NIU LONGITUDE 1926," set in a manhole with a 7-inch coverplate about 6 inches below the surface of the highway. It is 2.9 feet in from the N edge of the pavement and 12.2 feet N of the center line of the road. The tarvia covering of the highway covered the manhole plate at the time of the search and had to be scraped off in order to find the manhole.

The reference mark "NIU LONGITUDE 1926" described in Lushene's recovery note of 1933 was recovered in good condition. No other reference marks were recovered. Since no distances or directions to these old reference marks were given in previous descriptions it is possible they may still be in existence but covered by undergrowth or fill from the relocation of the highway in 1934.

The Charles Lucas dairy ranch is still located in the vicinity of the station but the Lucas residence was evidently torn down when the road was relocated and some wooden houses occupied by Japanese now lie N of the station. The station is across the road from the home of W.G. Ashley at 5827 Kalanianaʻole Highway.

Careful measurements to various permanent objects were taken so that they might serve as witness marks for future recovery. Distances from "NIU LONGITUDE 1926" to various objects taken in a clockwise direction follow:

OBJECT	DISTANCE
To reference mark "NIU LONGITUDE 1926" (Azimuth from N - 0°00'00")	feet 73.28
To road boundary monument NE of station at base of stone wall	127.64
To center of top nut of water hydrant SE of station across road	109.58
To center of wooden road marker (NRH-61-180.00) across road	41.15
To center of large manhole plate across road	44.97
To road boundary monument NW of station at base of stone wall	65.51
To NW corner (farthest) of culvert on W side of road entrance	32.9



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: NIU LONGITUDE

STATE: HAWAII

YEAR: 1927

SECOND

ORDER

SOURCE: G-12664

GEODETIC LATITUDE: 21° 17' 08.430	ELEVATION: 6 METERS
GEODETIC LONGITUDE: 157 44 05.785	SCALED FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ or ANGLE
HI 3	5103	590,242.00	43,303.44	+ 0 05 46

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

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

QI 317

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1072
LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

NIU LONGITUDE (Continued)

RECOVERY RECOVERY OF TRIANGULATION STATION

NAME OF STATION: NIU LONGITUDE YEAR: 1957 State: Hawaii | COUNTY: Honolulu
Established by: (Ter. of Hawaii, E.J.B., 1927)
CHIEF OF PARTY: H. O. Fortin
Recovered by:

Description, including sketch of object: The station was found as described in 1943 (R.D.H.) with the following additions and deletions:

The station is about 8.9 miles E of the Federal Building in Honolulu along the Kalanianaʻole Highway and 200 meters E of the Paonakeiki Dairy Farm. Accurate measurements taken from the list of witness marks were very instrumental in recovering the station, which was found about four inches below a hard tarvia covering of the highway, necessitating a good hour to uncover. The disc was found in perfect condition with "NIU LONGITUDE 1926", plainly stamped upon it, set in a manhole with a 7-inch cover plate about 6 inches below the surface of the highway.

Careful measurements to various permanent objects were taken so that they might serve as witness marks for future recovery. Distances from "NIU LONGITUDE 1926", as per sketch, to various objects taken in a clockwise direction, follow:-

- To point A - Top of east end of 18" circular culvert, underneath road leading to house No. 5828 (J. S. Carrilho) - 110.7 ft.
- To point B - NW corner (farthest) of culvert on west side of road entrance to house No. 5836 (Wm. Moriyama), 32.9 ft.
- To point C - SE and closest corner of house No. 5836, 78.8 ft.

To R.M. "NIU LONGITUDE 1926" - (Azimuth from N.-0°00'00.7") - 73.28 ft. (This R.M. was searched for but not found in 1957. More diligent search might reveal it).

To point D - Center of top of nut on water hydrant SE of station across road, 109.58 ft.

To point E - Center of old wooden road marker (NRH-61-180.00) across road, 41.15 ft.

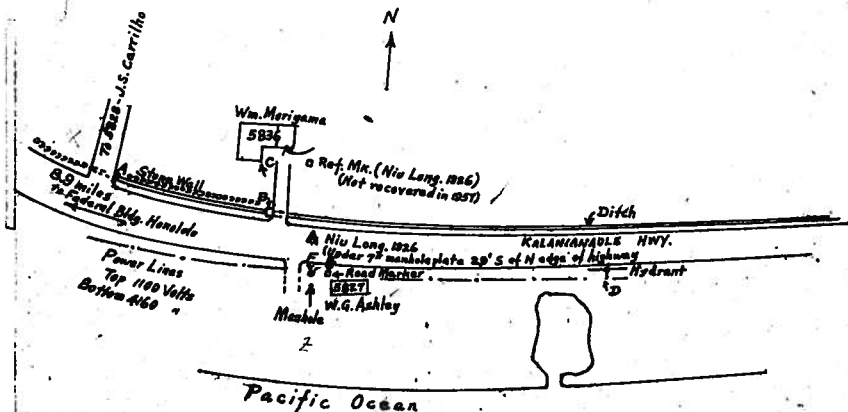
To point F - Center of large manhole plate across road - 44.97 ft.

The two road boundary monuments, one NE of station at base of stone wall 127.64 ft. and one NW of station at base of stone wall 65.51 ft. were not recovered.

The mark is 2.9 feet South from the North edge of the pavement, and 12.2 feet North of the center line of the highway.

The R.M. 13.1 meters N. 20°W. marked "NIU 1926 Longitude", was not searched for.

Two power lines carrying 1100 and 4160 volts run along the south side of the highway.



FORM 1
(11-5)

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

NAME OF STATION: NIU LONGITUDE
ESTABLISHED BY: H.J. Brown YEAR: 1927 STATE: Hawaii
RECOVERED BY: D.M. Whipp YEAR: 1965 COUNTY: Honolulu

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

The station was not searched for but is probably intact. Several of the reference points listed in the description were identified and could be used if recovery were necessary. The station is not used by any agencies for control, the view in all directions is blocked by high trees, and the highway has been converted to 4-lane, carrying heavy traffic.

* 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

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 211573 STATION 1073
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

FORM 525
(10-10-69)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

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

NOTE.	HEIGHT OF TELESCOPE ABOVE STATION MARK	HEIGHT OF LIGHT ABOVE STATION MARK	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	BEARING	DISTANCE		DIRECTION
					FEET	METERS	
1	none	5	WAITMANALO 2	SE	(2 1/4 miles)	0 00' 00.0	
2	none	1	CKH Vertac Koko Head	SE	27.16	8.278	70 06 00.4
12a			R.M. 1	S			85 58 01
12b			KULIOUOU 1928 (Geod. Trav. Azimuth Mk.)	SW	20.48	6.244	121 08 31.6
12c			R.M. 2				164 13 18

Station is located about 1 1/2 miles east-northeast of Aina Haina, 1/3 mile northeast of the Miu Shopping Center, 250 yards north of a concrete water tank at a point on a north-south ridge which is about 300 feet in elevation.

To reach the station from the intersection of West Hind Drive and Kalaniana'ole Highway (State Highway 72) in Aina Haina, go east on the highway for 1.35 mile to Halemaumau Street on the left, turn left on Halemaumau Street for 0.05 mile then right, east, on Mahimahi Street for 0.15 mile to where Mahimahi Street curves to the left and a concrete drive continues east, continue east on the concrete drive for 0.05 mile to a locked gate, pass through the gate and continue north and east up steep winding road for 0.1 mile to the west side of a concrete water tank and the end of truck travel and station KULIOUOU 1928 (Azimuth mark) on a point just south of the water tank. Pack north up steep ridge for about 250 yards to the station. A 10 minute pack.

Station mark is a standard disk, stamped KUPAUA 1969, cemented in a drill hole in a large outcrop which is flush with the surface. It is on the highest point of the first knoll on the ridge north of the water tank.

Reference mark 1 is a standard disk, stamped KUPAUA NO 1 1969, cemented in a drill hole in an outcrop which projects about 1 foot on the east side and is flush on the west side. It is on the east edge of the ridge.

Reference mark 2 is a standard disk, stamped KUPAUA NO 2 1969, cemented in a drill hole in the top of an outcrop which projects about 1 foot on the west side and about 4 inches on the east side. It is on the west edge of the ridge.

Azimuth mark is an Hawaii Territorial Survey disk, unstamped, cemented in a drill hole in an outcrop which projects about 4 inches above the ground surface. There is a Territory of Hawaii Survey Type A signal centered over the mark. The floor of the signal projects about 4 feet above the mark.

Distance between R.M. 1 and R.M. 2 is 30.57 ft. 9.318 m.

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

USCGM-DC 27171-P89

ADJUSTED HORIZONTAL CONTROL DATA

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

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 17' 20.09329	ELEVATION:	99.2 METERS
GEODETIC LONGITUDE:	157 44 02.88815		325 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S. OR Δ G. ANGLE °
HI 3	5103	590,513.98	44,480.72	+ 0° 05' 48"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
AZ MK KULIOUOU	358° 48' 06.7	358° 42' 19"	5103

QG 073

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1074
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 3-8

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

Description, including sketch of object:

Station is located in the district of Miu, 1.5 miles east of Wailupe Fire Station, 0.1 mile east of Halemaunua Street, on the southside shoulder of Kalaniana'ole Highway and near the westside of Miu Stream Bridge.

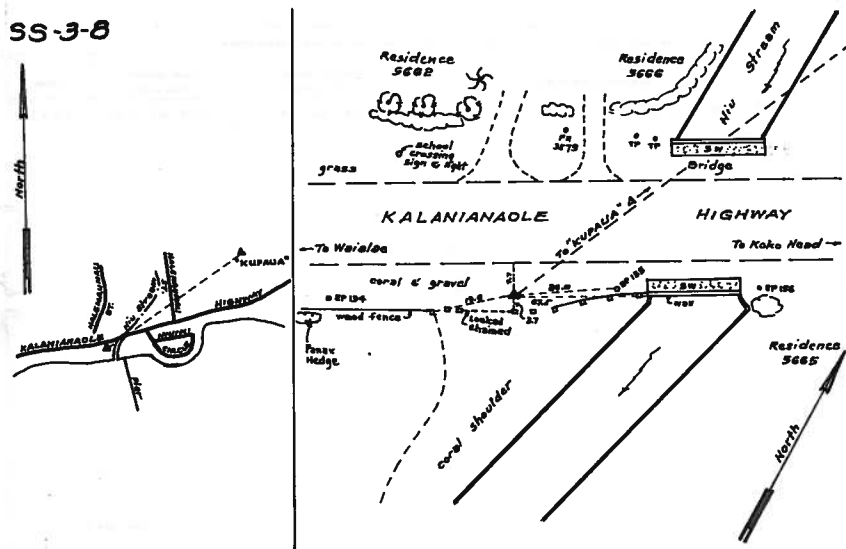
Station is a standard State Survey disk stamped "3-8 1969" in concrete monument flush with ground level. Ties from station are: N. 7.7 ft. to south edge pavement of Kalaniana'ole Highway, E. 24.0 ft. to Elect. Pole No. 155, E. 47.5 ft. to seaward edge of bridge wall, S. 3.7 ft. to concrete post on east end of chain-gate and W. 19.6 to end of property line wooden fence.

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

Geodimeter connection was made between "KAPAUA 1969" and STATE SURVEY "3-8".

This station is also Bench Mark 3-8 (SS) of the 1969 First Order Levels.

SS-3-8



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 3-8

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

G-14543
NO

OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 17' 02.62655	ELEVATION:	1.55 METERS
GEODETIC LONGITUDE:	157° 44' 27.34167		5.2 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ FOR Δ θ: ANGLE °
HI 3	5103	588,204.30	42,714.53	+ 0° 05' 39"

* 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
KUPAUA	232° 41' 21.7	232° 35' 43"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION KUPAUA

QG 074

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

See Station KUPAUA

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1075
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 3-10

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

G-14543

SOURCE: NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 17' 21.08739	ELEVATION:	7	METERS
GEODETIC LONGITUDE:	157 44 24.36205	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR \angle °
HI 3	5103	588,483.02	44,577.64	+ 0° 05' 40"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
KUPAUA	272° 49' 35.6	272° 43' 56"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION KUPAUA

QG 075

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 211573 STATION 1076
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

STATE SURVEY 3-12 DESCRIPTION OF BENCH MARK

Designation: State Hawaii, County Honolulu
Nearest town: Aina Haina, County Honolulu
Distance and direction from nearest town: 5.0 miles southeast
Character of mark: SS traverse disk
Established by: State of Hawaii
Detailed description: Section .7, .R

4.65 miles southeast along State Highway 72 from the junction of West Hind Drive at Aina Haina, thence 0.35 mile west-southwest along a paved road, 0.05 mile southwest of a metal gate, in the top and center along the west side of a 6½ by 8-foot concrete building (the top of the building is about level with the ground), 40 feet west-southwest of the center line of the road, 14.2 feet north-northwest of a telephone pole, 4.0 feet northwest of the southeast corner of the concrete roof of the building, 4.0 feet southeast of the northwest corner of the concrete roof of the building, 6.3 feet southwest of the edge of the northeast face of a concrete structure with a metal door, and level with the surface of the ground.

FORM CG5-433
(6-68)
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 3-12

STATE: HAWAII

YEAR: 1969

SECOND ORDER

SOURCE: G-14543
NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 16' 37.08600	ELEVATION:	72.89 METERS
GEODETIC LONGITUDE:	157 42 02.07730		239.1 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	± HOR Δ ± ANGLE °
HI 3	5103	601,947.36	40,161.77	+ 0 ° 06' 31"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
KUPAUA	110 ° 48' 09.8"	110 ° 41' 39"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION KUPAUA

QG 076

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1077
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

KUAPA (Hawaii, L.G.S., 1928)--A standard bronze disk (Territory Survey) set in a drilled hole in bedrock on summit of knoll at S end of ridge just E of the Kamahameha School and N of Kuapa pond.

(H.A.P., 1931)--On the N side of Kuapa Pond, on the E one of two ridges (Kaluanui Ridge) leading down to the lake on a knob at the N end of the ridge. Marked by Note 14A.

(11-8-84)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KUAPA
ESTABLISHED BY: L.G.S. YEAR: 1928 STATE: Hawaii
RECOVERED BY: H.J.S. YEAR: 1962 COUNTY: Honolulu

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

The station was recovered.
It lies on the south end of Kaluanui Ridge, north of Kuapa Pond, on a brush covered ridge and east of a small park. It is marked by a Type A, Hawaiian Territory Survey Monument. The disk was not examined.
To reach the station from Honolulu Post Office, go east along Kalanianaʻole Highway 10.7 mi to Lunalilo Home Road, just east of Kuapa Pond. Turn left (north) on Lunalilo Home Road for 1.3 miles. Turn left (west) across levee for 0.35 miles to the west side of Kuapa Pond. Turn left (south) for 0.4 mile to a jeep trail leading west. Follow trail about 0.1 mile to fork. From here, station lies directly west on ridge.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KUAPA
ESTABLISHED BY: L.G.S. YEAR: 1928 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK		METERS.		HEIGHT OF LIGHT ABOVE STATION MARK		METERS	
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				
MAUNALUA 1928				00	00	00.0	
R.M. No. 1	NNE	22.799	6.949	05	29	45	
R.M. No. 2	ESE	14.595	4.449	109	46	33	

Station mark was recovered and found in good condition. Two reference marks were established. A complete description follows:
Station is located about 3-1/4 miles airline east-northeast of Aina Haina, on a hill of about 165 feet elevation on the extreme south end of Kaluanui Ridge.

To reach station from the traffic light at the intersection of West Hind Drive and Kalanianaʻole Highway in Aina Haina, go easterly on Kalanianaʻole Highway for 4.4 miles; turn left and go northeast on Lunalilo Home Road for 1.4 miles; turn left and go west on graveled road for 0.35 mile; take left fork, straight ahead through gate, for 0.05 mile to fork in Kaiser equipment yard. Take left fork and go southwest for 0.35 mile to fork at end of power line. Take right fork, around end of ridge, for 0.2 mile to track road T-intersection and end of truck travel. Park westerly about 125 yards to top of hill and station.

Station mark is a Territory of Hawaii Survey disk, unstamped, cemented in a drill hole in flat bedrock. It is about 0.2 mile northwest of the northwest side of Kuapa Pond and 135 feet south of a power line pole that sets on the ridge.

(Continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KUAPA
STATE: HAWAII

YEAR: 1928

SECOND

-ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 17' 32.78935	ELEVATION:	50	METERS
GEODETIC LONGITUDE:	157° 42' 28.17336	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (OR Δ) & ANGLE °
HI 3	5103	599,468.84	45,777.59	+ 0° 06' 22"

* 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
MAUNALUA	188° 42' 36.5	188° 36' 15"	5103
KUPAUA	81° 51' 56.3	81° 45' 34"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

POSITION DETERMINED BY TRAVERSE FROM STATION KUPAUA

AND CHECKED BY ADDITIONAL OBSERVATIONS

QG 077

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 211573 STATION 1077

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

KUAPA (Continued)

Reference mark number one is a standard disk stamped "KUAPA NO 1 1928", cemented in a drill hole in a low, bedrock ledge. It is 6 feet east of crest of hill, 10 feet north of a group of boulders that are about 4 feet higher than the mark, and is about 1 foot lower than station mark.

Reference mark number two is a standard disk stamped "KUAPA NO 2 1928", cemented in a drill hole in the center of a large, black, bedrock outcrop about 16 feet long, 6 feet wide, and projecting 3 feet above ground. The mark is about 6 inches lower than station mark.

NOTE: A Hawaii Territorial Survey "Type A" signal is centered over the station mark. The floor of the signal is 3-1/2 feet above ground.

RECOVERY NOTE, TRIANGULATION STATION TRAVERSE

R

NAME OF STATION: KUAPA /
ESTABLISHED BY: L.G.S. /
RECOVERED BY: G.A.A. /
YEAR: 1928 /
STATE: Hawaii /
COUNTY: Honolulu /
BENCH MARK(S) ALSO ☐
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3 1/4 miles east-northeast of Aina Haina /

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

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

A Geodimeter Traverse was made between KUAPA 1928 and KUPAUA 1928.

Geodimeter distance 2,757.919 meters or (9,048.18 ft.)

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1078
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

MAUNALUA (Hawaii, L.G.S., 1928)--A standard bronze disk (Territory Survey) set in bedrock, a few feet S of summit of a prominent knoll on ridge directly N of Koko Head and Kuapa pond, and E of the Kamehameha School farm.
Station is 2500 feet N of station KUAPA on knoll at S end of ridge.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: MAUNALUA
ESTABLISHED BY: L.G.S. YEAR: 1928 STATE: Hawaii
RECOVERED BY: H.J.S. YEAR: 1962 COUNTY: Honolulu

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

The station was recovered.
It lies on Kaluanui Ridge, north of Kuapa Pond, and northeast of Hawaii Kai on a brush covered ridge. It is marked by a Type B, Hawaii Territory Survey marker. The disk could not be examined by this party.
To reach the station from Honolulu Post Office, go east along Kalaniana'ole Highway 10.7 mi to Lunalilo Home Road, just east of Kuapa Pond. Turn left (north) on Lunalilo Home Road for 1.3 miles. Turn left (west) across levee for 0.35 miles to the west side of Kuapa Pond. Turn left (south) for 0.4 mile to a jeep trail leading west. Follow trail about 0.1 mile to fork. Take right fork north up draw for 0.6 miles to station site on knoll to west.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: MAUNALUA
ESTABLISHED BY: L.G.S. YEAR: 1928 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK		METERS		HEIGHT OF LIGHT ABOVE STATION MARK		METERS	
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				
KUAPA 1928	WSW	19.89	6.062	00	00	00.0	
R.M. No. 2	N	21.650	6.599	63	27	24	
R.M. No. 1	NNE	12.140	3.701	182	48	41	
RIDGE 1910				206	07	21.2	

A Hawaiian Territorial Survey "Type C" signal was recovered in good condition. The original description states that the station was marked with a Hawaiian Territorial Survey disk, however a check could not be made because of the signal. Station RIDGE 1910 is also on this knoll. Two reference marks, numbers one and two, were established. A complete description follows:

Station is located about 3-1/2 miles airline east-northeast of Aina Haina and 1/2 mile west of the head of Kuapa Pond, on a rocky knoll of about 525 feet elevation, on Kaluanui Ridge, about 50 yards west of old bulldozed road.

To reach station from the traffic light at the intersection of West Hind Drive and Kalaniana'ole Highway in Aina Haina, go easterly on Kalaniana'ole Highway for 3.7 miles; turn left and go northeast on Lunalilo Home Road for 1.4 miles; turn left and go westerly on graveled road for 0.35 mile to fork; take left fork, through gate, for 0.05 mile to fork in Kaiser equipment yard. Take left fork and go 0.35 mile along power line to fork at last pole in the line. Take right fork, passing around lower end of ridge, and go 0.2 mile to track road T-junction. Take right fork and go 0.05 mile to steep grade. Pack northerly on old road for about 0.4 mile to station. (NOTE: A 4-wheel-drive vehicle can be driven to within 50 yards of station).

Station is center of 2-1/2-inch, iron pipe that projects 4 inches from the top of a 10-inch-square, concrete block that extends 20 inches above the 5-foot-square, concrete platform of the signal.

Reference mark number one is a standard disk stamped "MAUNALUA NO 1 1928", cemented in a drill hole in an 8-inch-diameter, bedrock knob that projects 4 inches. It is 1 foot lower than top of station pipe.

(Continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MAUNALUA

STATE: HAWAII

YEAR: 1928

SECOND

-ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 17 ' 57.67138	ELEVATION:	158	METERS
GEODETIC LONGITUDE:	157 42 24.10597	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ 10R Δ S1 ANGLE °
HI 3	5103	599,848.82	48,288.85	+ 0° 06' 24"

* 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
KUPAUA	67° 54' 48.2"	67° 48' 25"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

POSITION DETERMINED BY TRAVERSE FROM STATION KUPAUA

AND CHECKED BY ADDITIONAL OBSERVATIONS

QG 078

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 211573 STATION 1078

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

MAUNALUA (Continued)

Reference mark number two is a standard disk stamped "MAUNALUA NO 2 1928", cemented in a drill hole in a bedrock ledge, about 3 feet lower than top of station pipe.

RIDGE 1910 is a 1/2-inch-diameter drill hole in the middle of a 4-inch, chiseled triangle in top of lava bedrock. It is in the bottom of a 9-inch-square, 5-inch-deep depression in the center of a mass of concrete 30 inches in diameter which is built up on top of lava bedrock.

RECOVERY NOTE, TRIANGULATION STATION TRAVERSE

R

NAME OF STATION: MAUNALUA
ESTABLISHED BY: L.G.S. YEAR: 1928 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: C.A.A. YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3 1/2 miles east-northeast of Aiea Haina

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

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

A Geodimeter Traverse was made between MAUNALUA 1928 and KUPAUA 1928.

Geodimeter distance 3,072.922 meters or (10,081.5 ft.)

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1079
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

WAILUPE (Hawaii, L.G.S., 1928)--A standard bronze disk (Territory Survey) set in drilled hole in bedrock surrounded by a platform of rocks cemented together, on extreme SE corner of ridge, just above Hind & Clarke Dairy on Waiialae road, near the boundary between Waiialae and Wailupe districts.

Wailupe Wireless Station, flagpole is 25°48'02" in azimuth from station.

(H.A.P., 1931)--About 500 meters NE of the Wailupe Naval Radio Station on the S end of a ridge, about 300 feet above sea level. Marked in accordance with Note 14A. Disk could not be seen. An iron bolt is set in the rock, 7 feet 11 inches, S. 30° W. (mag.). A fair trail leads to the station from a point 25 meters W of the electric pumping station on the Hind & Clarke Dairy Farm.

COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: WAILUPE
ESTABLISHED BY: L.G.S. YEAR: 1928 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK		METERS,		HEIGHT OF LIGHT ABOVE STATION MARK		METERS	
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				
KOKO HEAD 3 1927				00	00	00.0	
R.M. No. 2	NW	9.732	2.967	208	48	47	
R.M. No. 1	NNE	18.563	5.659	268	59	40	

Station was recovered and found in good condition. Two new reference marks, numbers one and two, were established. A complete description follows:

Station is located at the southwest corner of Aina Haina, on the southeast tip of Wilililui Ridge, about 150 yards northwest from the Aina Haina School and at about 285 feet elevation.

To reach station from the traffic light at the intersection of the Kalaniana'ole Highway and West Hind Drive in Aina Haina, go north on West Hind Drive for 0.15 mile; turn left and follow asphalt driveway west for 0.1 mile to rear of Aina Haina School and end of truck travel. From here pack northwest up very steep, brushy hillside for about 150 yards to station.

Station mark is a Hawaiian Territorial Survey disk, unstamped, cemented in a drill hole in bedrock 8 feet northwest from edge of bluff. A "Type A", Hawaiian Territorial Survey signal is centered over the mark, the floor of the signal is 4 feet above ground and the red-and-white, metal target extends 6 feet above the floor.

Reference mark number one is a standard disk stamped "WAILUPE NO 1 1928 1963", cemented in a drill hole in a bedrock ledge. It is 2 feet southeast from edge of grass line, 1 foot northwest from southeast edge of ledge, and about 4 feet higher than station mark.

Reference mark number two is a standard disk stamped "WAILUPE NO 2 1928 1963", cemented in a drill hole in a black bedrock knob that projects about 2 feet above ground, and is about 2 feet higher than the station mark.

(continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WAILUPE

STATE: HAWAII

YEAR: 1928

FIRST

-ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21° 17' 02.19835	ELEVATION: 90.2 METERS
GEODETIC LONGITUDE: 157° 45' 38.71055	296 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S. IOR Δ S. I ANGLE °
HI 3	5103	581,454.76	42,660.63	+ 0° 05' 13"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
KOKO HEAD 3	289° 21' 34.7	289° 16' 22"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QG 079

WAILUPE (Continued)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573

STATION 1079

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

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: WAILUPE
ESTABLISHED BY: L.G.S. YEAR: 1928 STATE: Hawaii BENCH MARK ALSO ☐
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: In Aina Haina
HEIGHT OF TELESCOPE ABOVE STATION MARK 6.6 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 5.8 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	
KOKO HEAD 3 1927				0 00 00.00
R.M. # 2	NW	9.73	2.965	208 41 01
R.M. # 1	NNE	18.55	5.654	268 59 36
CKH VORTAC KOKO HEAD	SE	(3 3/4 miles)		357 31 12.8

Station mark and reference marks 1 and 2 were recovered in good condition as described in 1963. Due to some road changes, a complete description follows:

Station is located near the southwest corner of Aina Haina, on the southeast tip of Wiliwilinui Ridge and just south of a large house.

To reach the station from the traffic light at the intersection of West Hind Drive and Kalanianaʻole Highway in Aina Haina. Go west on the highway for 0.6 mile to Waa Street on the right. Turn right, on Waa Street, for 0.05 mile to Poola Street on the right. Turn right, on Poola Street, and go east and north, for 0.7 mile to Panalea Place on the right. Turn right, on Panalea Place, for about 150 feet to the end of the road at a circular drive, and the end of truck travel. From here pack south, around the large house, to the edge of the bluff and the station overlooking the Aina Haina School.

Station mark, is a Hawaiian Territorial Survey disk, which is unstamped. It is cemented in a drill hole in bedrock and a "Type A" Hawaiian Territorial Signal is centered over it. The floor of the signal is a 6-foot square concrete slab which projects 2 feet above the ground surface. It is 15 feet east of the southeast end of a concrete block wall and 10.5 feet south of the southwest end of a concrete block wall.

Reference mark 1, is a standard disk stamped WAILUPE NO 1 1928 1963. It is cemented in a drill hole in a large outcrop, which is about 3 feet higher than the station.

Reference mark 2, is a standard disk stamped WAILUPE NO 2 1928 1963. It is cemented in a drill hole in the top of a large boulder which projects about 2 feet on the west and south sides, and is about 1 foot higher than the station.

No azimuth mark was established for this station.

Reference mark 1 to reference mark 2 distance is 16.11 ft. or 4.910 m.

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1080
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 3-6

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

Description, including sketch of object:

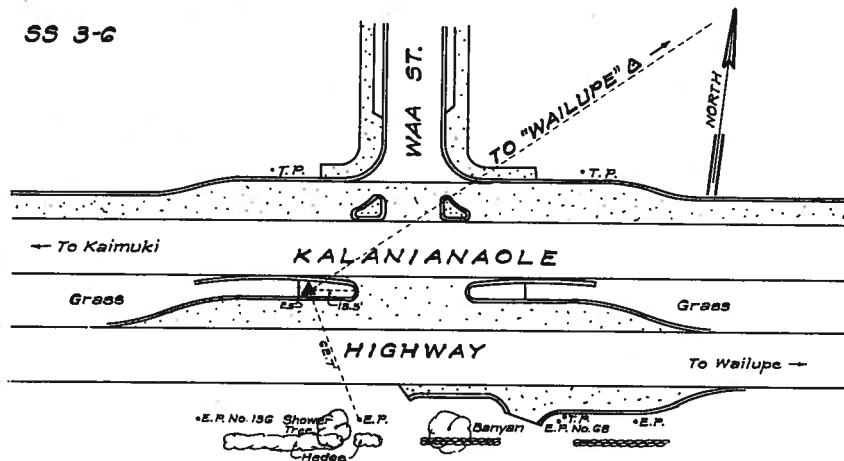
Station is located in Waiālae-Iki, at the intersection of Kalanianaʻole Highway and Waa Street, 0.8 mile east of the main entrance to Kalani High School (Kalaniki Street and Kalanianaʻole Highway).

Station mark is a standard State Survey disk stamped "3-6 1969" cemented in drill hole in east end of concrete portion of medial strip of Kalanianaʻole Highway, on the west side of its intersection with Waa Street. Ties from station are: E 15.5 ft. to end of medial strip, SE 62.7 ft. to Elect. Pole and S 2.5 ft to edge of medial strip.

Geodimeter connection was made between WAILUPE 1928 and State Survey "3-6".

This station is also Bench Mark 3-6 (SS) of the 1969 First Order Levels.

SS 3-6



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 3-6

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

0-14543

SOURCE: NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 16' 45.72123	ELEVATION:	3.11 METERS
GEODETIC LONGITUDE:	157 45 59.46386		10.2 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE *
HI 3	5103	579,454.51	40,995.17	+ 0° 05' 05"

* 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
WAILUPE	229° 43' 58.5	229° 38' 54"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAILUPE

QG 080

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1081
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 3-7

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

Description, including sketch of object:

Station is located in Wailupe district, 0.5 mile east of the Wailupe Fire station at the intersection of Kalaniana'ole Highway and Nenuke Street.

Station mark is a standard State Survey disk stamped "3-7 1969" cemented in drill hole in east end of concrete portion of medial strip of Kalaniana'ole Highway, on the west side of its intersection with Nenuke Street. Ties from station are: W. 6.63 feet to "+" in concrete curb, on line to "WAILUPE 1928", S.E. 5.82 feet to "+" in concrete pavement, on line to "KOKO HEAD 3 1927", S. 59.1 feet and 62.5 feet respectively to Fire Hydrant 1682 and Electric Pole 101, N.E. 13.4 feet to edge medial strip and S.E. 1.9 feet to edge of medial strip.

Geodimeter connection was made between "WAILUPE 1928" and State Survey "3-7".

This station is also Bench Mark 3-7 (SS) of the 1969 First Order Levels.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 3-7

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 16' 53.10202	ELEVATION:	2.04 METERS
GEODETIC LONGITUDE:	157° 45' 16.34451		6.7 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ FOR Δ ϕ ANGLE *
HI 3	5103	583,571.43	41,746.07	+ 0° 05' 21"

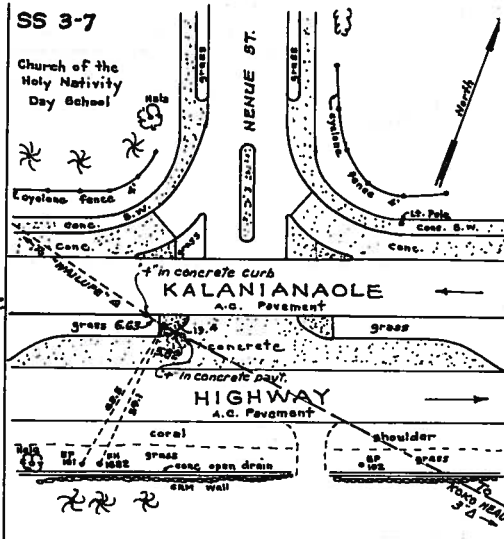
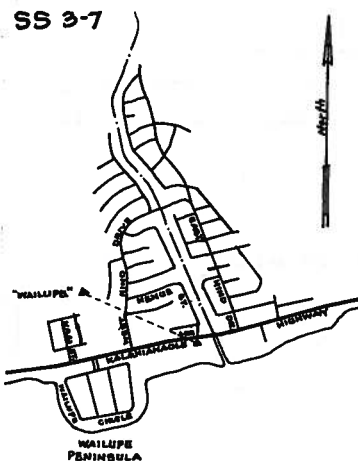
* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ FOR Δ ϕ FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
WAILUPE	113° 27' 26.1	113° 22' 05"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAILUPE

QG 081

SS 3-7



DESTROYED

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1082
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

Kalepeamoa (Oahu Island, L. G. Simmons, 1927).—In southeastern part of Oahu, on the highest (north) point of Wilhelmina Rise, just north of Kaimuki. Station can be approached to within short distance by car. This is an old station, the original mark, a 2-inch iron pipe driven in the ground, was replaced by a standard disk set in concrete pier, note 1a, while an underground mark was also set according to note 7a, a standard disk in concrete block 3 feet underground. Re-marked according to note 14A in 1929.

KALEPEAMOA (Hawaii, L. G. S., 1927; L. G. S., 1928)
--A standard disk set in a concrete pier, at highest point on Wilhelmina Rise, just above reservoir shed.

(H.A.P., 1931)--Recovered in good condition as described. A concrete water tank has been built S of station.

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 536
(Rev. Feb. 1965)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: **KALEPEAMOA**
ESTABLISHED BY: **L.G.S.** YEAR: 1927 STATE: **Hawaii**
RECOVERED BY: **H.O.P.** 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 as described in 1927 and 1931. The correct spelling is Kalepeamoa, although stamped "Kalipeamoa 1927".

RECOVERY NOTE, TRIANGULATION STATION

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

HEIGHT OF TELESCOPE ABOVE STATION MARK **2.57** METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
PUNCHBOWL 1873-1928				00 00 00.0
R.M. No. 2	NW	31.194	9.509	49 49 27
R.M. No. 1	SW	74.185	22.612	303 49 07

Station mark was recovered in good condition. It had been incorrectly stamped KALIPEAMOA so was re-stamped KALEPEAMOA at this time. Two reference marks were established. A complete description follows:
Station is located about 5 miles airline east of the Federal Building in Honolulu and 1-1/2 miles northeast of the post office in Kaimuki, at the northwest edge of a grove of large Australian Pine trees and by the Honolulu City & County Board of Water Supply Reservoir No. 4, in the Maunalani Heights District of Honolulu.

To reach station from the post office in Kaimuki, go northeast on Koko Head Ave. for 0.05 mile; turn left and go 0.2 mile on Waiatae Ave., turn right and follow Sierra Drive uphill for 2.4 miles. Take right fork and go 0.2 mile on Maunalani Circle to locked gate on right, across from home at 4988 Maunalani Circle. Pass through gate and follow steep, concrete driveway about 100 yards to the reservoir and station just above.

(Continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **KALEPEAMOA**

STATE: **HAWAII**

YEAR: **1927**

FIRST

-ORDER

SOURCE: **G-14543**

GEODETIC LATITUDE:	21° 18' 05.26522	ELEVATION:	340.27 METERS
GEODETIC LONGITUDE:	157° 47' 16.21578		1116.4 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S (OR Δ) ANGLE
HI 3	5103	572,224.81	49,010.84	+ 0° 04' 38"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
PUNCHBOWL	103° 03' 32.5	102° 58' 55"	5103
DIAMOND HEAD 2	32 55 34.9	32 50 57	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QG 082

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 211573 STATION 1082

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

KALEPEAMOA (Continued)

Station mark is a standard disk stamped "KALEPEAMOA 1927", set in the top of a 10-inch-square, concrete monument that projects 8 inches. It is 70 feet northeast of the northeast side of a small, concrete block house that sets near the northeast edge on top of the reservoir, and about 50 yards southwest of a slightly higher, bare dome. There is a Hawaii Territorial Survey "Type A" signal centered over the mark; the 5-foot-square, concrete slab floor being about 4 feet above ground and the red and white, metal target extending about 6 feet above the floor.

Reference mark number one is a standard disk stamped "KALEPEAMOA NO 1 1927", cemented in a drill hole in the flat, concrete top of the reservoir. It is 10 inches southeast from the northwest edge of the top, 3 feet west of the southwest corner of the concrete block building, about 1 foot above ground level, and 13 feet lower than station mark.

Reference mark number two is a standard disk stamped "KALEPEAMOA NO 2 1927", cemented in a drill hole in an 8-inch-square, bedrock outcrop that projects 2 inches. It is 14 feet southeast of edge of hilltop, at the northeast edge of a pine bush, and 2-1/2 feet lower than station mark.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KALEPEAMOA
ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK(S) ALSO ☒
RECOVERED BY: R.C. Munson YEAR: 1970 COUNTY: Honolulu

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

1 1/2 miles northeast of Kaimuki

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

Station and all marks were recovered as described by W.R. Porter in 1963. To reach the station from the post office in Kaimuki, go northeast on Koko Head Avenue for 0.05 mile, turn left and go 0.2 mile on Waialae Avenue, turn right and follow Sierra Drive uphill for 2.4 miles. Take right fork and go 0.2 mile on Maunalani Circle to fenced area and locked gate on right across from home at 4988 Maunalani Circle. Pass through gate and follow steep concrete driveway about 100 yards to the reservoir and station just above. Key to locked gate can be obtained from the Honolulu City & County Water Board.

R

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1083
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

WAIALAE (Hawaii, L.G.S., 1927; L.G.S., 1928)
--Mark consists of an Army Engineers rectangular bronze plate set in concrete in a 6-inch cast-iron pipe, sunk flush with ground on highest point of ridge in Waiialae district, just E of the Wilhelmina Rise district. Can be approached by car within about 100 yards by pineapple road.
Azimuth - WAIALAE to Central Union Church Spire - 88°15'46".

RECOVERY NOTE, TRIANGULATION STATION

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

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.35 METERS.		HEIGHT OF LIGHT ABOVE STATION MARK METERS.		
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KALEPEAMOA 1927				00 00 00.0
R.M. No. 2	W	12.974	3.955	10 26 39
R.M. No. 1	E	52.904	16.125	190 25 12

A "Type C", Hawaiian Territorial Survey signal was recovered in good condition. It was determined by an angle check to be the station. A previous description states that the station was marked with an Army Engineers brass plate set in concrete in a 5-inch, cast-iron pipe, however this could not be checked because of the signal. Two new reference marks, numbers one and two, were established. A complete description follows:

Station is located, airline, about 2 miles northwest of Aina Haina, 3-3/4 miles northeast of Diamond Head, and 1-3/4 miles north of the Waiialae Golf Course, on a prominent, bare, red hill of 1357 feet elevation on Waiialae Nui Ridge, and above the Waiialae Nui housing development.

To reach station from the intersection of Kalaniana'ole Highway and West Hind Drive in Aina Haina, go west on Kalaniana'ole Highway for 1.65 miles to traffic light at intersection of Aina Koa Ave. Turn right and go northerly on Aina Koa Ave. for 0.4 mile; turn left onto Hale Koa Dr. and follow winding street upgrade for 1.25 miles to end of paved road at water reservoir on right, at end of housing development. Cross shallow ditch and follow winding dirt road upgrade through brush for 0.7 mile to top of bare hill and station.

Station is center of 2-1/2-inch, iron pipe that projects 2 feet from the center of a 5-foot-square, concrete platform that is flush with the ground. It is 8 yards west of center line of track road. A red and white metal target is set into the iron pipe and extends about 6 feet above the platform.

Reference mark number one is a standard disk, stamped "WAIALAE NO 1 1927 1963", brazed onto the top of a 1-1/2-inch, iron pipe that is set in cement and projects 3 inches above ground. It is along crest of ridge and about 2-1/2 feet lower than station platform.

Reference mark number two is a standard disk, stamped "WAIALAE NO 2 1927 1963", brazed onto the top of a 1-1/2-inch, iron pipe that is set in cement and projects 5 inches above ground. It is along crest of ridge and about same elevation as station platform.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WAIALAE
STATE: HAWAII

YEAR: 1927

FIRST

ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21° 18' 13.29605	ELEVATION: 414 METERS
GEODETIC LONGITUDE: 157° 46' 40.07472	NO CHECK FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ θ: ANGLE °
HI 3	5103	575,641.24	49,825.85	+ 0° 04' 51"

* 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
KALEPEAMOA	76° 39' 47.7	76° 34' 57"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

POSITION DETERMINED BY TRAVERSE FROM STATION KALEPEAMOA

AND CHECKED BY ADDITIONAL OBSERVATIONS

QG 083

(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 211573 STATION 1083

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

WAIALAE (Continued)

RECOVERY NOTE, TRIANGULATION STATION TRAVERSE

NAME OF STATION: WAIALAE
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: 3 miles southwest of Kahaku /

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

The station mark and reference marks 1 and 2 were recovered as described, and in good condition. The center of a 2 1/2 inch pipe, which was previously the mark was held, and a standard triangulation disk stamped WAIALAE 1927 1969, was cemented in a drill hole in the center of the concrete slab which originally was the platform for a "Type C" Hawaiian Territorial Survey Signal.

The distance and direction to reference marks 1 and 2 were not checked at this time.

A Geodimeter Traverse was made between WAIALAE 1927 1969 and KALEPEAMO A 1927.

Geodimeter distance 1,070.695 meters or (3,512.74 ft.)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: WAIALAE
ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: E. Pursel Jr. YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2 miles northwest of Aiea Haina

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

This station was recovered in good condition as described.

This description may change soon however as a new housing development is being built.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: WAIALAE
ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: J.V. Teater YEAR: 1973 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

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

This station was recovered as described and found to be in good condition. The housing development mentioned in 1969 is still under way but a vehicle was driven to about 150 yards from the station.

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1084
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Diamond Head (Oahu Island, Hawaiian Government Survey, 1872; L. G. Simmons, 1927).—On the southeast coast of Oahu, on the southwest corner and highest point of Diamond Head, just south of Kaimuki. Marked by an iron pin driven into the ground, around which was later placed a concrete pier, 6 feet square, with pipe set vertically over pin. A metal drum was made to set into hole of vertical pipe, to serve as a target. Reference marks according to note 11c, standard reference disks in irregular concrete masses, were set at the following distances and azimuths from the station: No. 1, 3.239 meters (10.63 feet), 326° 56'; No. 2, 52.28 meters (171.52 feet), 167° 59'. Re-marked according to note 14C in 1929.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION **DIAMOND HEAD**
ESTABLISHED BY: H.G.S. YEAR: 1872 STATE: Hawaii
RECOVERED BY: C.A. Burroughs YEAR: 1962 COUNTY: Oahu

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.16 METERS		HEIGHT OF LIGHT ABOVE STATION MARK		METERS	
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION					
OBJECT	BEARING	DISTANCE		DIRECTION	
		FEET	METERS		
TANTALUS (HGS)				0	00 00.0
R.M. 1	S	10.65	10.65	149	15 33
Reference Point	N	(107.12)	(32.650)	349	01 09
R.M. 2	N	(171.40)	(52.243)	350	13 15

The station is on the southeast coast of Oahu, on the southwest corner and highest point of Diamond Head. It is just south of Kaimuki.

To reach the station information may be obtained at the Fort Ruger, Administration Building. A 45 minute pack.

The station mark is a superstructure type O monument with no passage in the platform to see the mark.

Reference mark 1 is a standard disk, stamped DIAMOND HEAD NO 1, set in a drill hole in the top, center, of a 4 foot square concrete foundation projecting 1 foot.

Reference mark 2 is a standard disk, stamped DIAMOND HEAD NO 2, set in a drill hole in the southeast corner of a 4 foot square concrete foundation. The foundation is north of the north edge of a concrete building and 2 feet lower. The mark is 4 feet west, of the northeast corner of the building and behind the building from the station.

Reference point a brass plug in a mass of concrete with the letter "A" inscribed in the top of the concrete, on the top of the ridge and in the center of the trail.

(Continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: DIAMOND HEAD

STATE: HAWAII

YEAR: 1872

SECOND

-ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21° 15' 46.334	ELEVATION: 252 METERS
GEODETIC LONGITUDE: 157 48 52.184	SCALED FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	SIDE ANGLE
HI 3	5103	563,166.33	34,681.39	+ 0 04 02

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
TANTALUS-PUU OHIA	177 44 32.4	177 40 30	5103

Q6 084

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 211573 STATION 1084

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

DIAMOND HEAD (Continued)

FORM 324a
(5-15-60)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: DIAMOND HEAD
ESTABLISHED BY: HGS YEAR: 1872 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK		1		METERS		HEIGHT OF LIGHT ABOVE STATION MARK				METERS	
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION											
OBJECT		BEARING	DISTANCE		DIRECTION						
			FEET	METERS							
TANTALUS 1872-1927						00	00	00.0			
R.M. No. 1		SE	10.598	3.230		149	16	18			
Reference Point		N	107.047	(32.627)		349	00	51			
R.M. No. 2		N	171.147	(52.166)		350	12	48			

Station was recovered and all marks found in good condition. Part of the northeast side of the concrete, station platform has been broken off to make room for wartime construction work on the hill, but the remaining part is very solid. This condition makes it difficult to set a tripod over the station. A complete description follows:

Station is located about 1 mile southeast from the southeast end of the Waikiki district of Honolulu, on the southwest end, and highest point, of the rim of Diamond Head Crater, at about 760 feet elevation.

To reach station from the Civil Defense Headquarters building at Fort Ruger, follow winding, asphalt road upgrade and through tunnel for 0.55 mile to the F.A.A. building inside the crater. Continue, downgrade past the building, for 0.2 mile; cross asphalt road, bear right, and follow track road up brushy, flat slope for 0.3 mile to end of road at start of foot trail with iron pipe hand-rail. Walk up trail about 1/2 mile to top of hill and station.

Station mark is center of 2-1/2-inch, iron pipe that projects 6 inches from the center of a 2-foot-high, concrete pedestal that sets at the center of a 5-foot-square, concrete platform. This structure is a Hawaii Territory Survey "Type C" signal. The station is 6.2 feet southwest of the southwest corner of a 10 x 12-foot, concrete, elevated platform which is at the same elevation as top of station pipe.

Reference mark number one is a standard disk stamped "DIAMOND HEAD NO 1", cemented in a drill hole in the center of a 4-foot-square, concrete foundation that projects 1 foot above ground. It is about 4 feet lower than top of station pipe.

Reference mark number two is a standard disk stamped "DIAMOND HEAD NO 2", cemented in a drill hole in the southeast corner of a 4-foot-square, concrete foundation at the north side of a concrete pillbox. It is 2 feet lower than top of pillbox and 16 feet lower than station pipe.

Reference point is a 3/4-inch brass plug cemented in a drill hole in a black rock outcrop embedded in the brown bedrock of the ridge top. An 8-inch-square, concrete fill surrounds the mark. It is in saddle of ridge line and is 25.7 feet lower than top of station pipe.

*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.

USCOM-DC 27179-P28

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 211573 STATION 1085
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

FORM 525
(6-18-69)

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

NAME OF STATION: DIAMOND HEAD 2 STATE: Hawaii COUNTY: Honolulu
CHIEF OF PARTY: C.A. Annis YEAR: 1969 DESCRIBED BY: L.B. Gittings

DESC.	DESC.	OBJECT	BEARING	DISTANCE		DIRECTION
				FEET	METERS	
		MAGIC ISLAND				0 00 00.0
desc.		Reference Point 1	N	107.04	32.626	41 04 54
desc.		Reference Mark 4	N	15.86	4.834	57 17 44
desc.		Reference Mark 3	E	13.31	4.058	135 39 30
desc.		Reference Point 2	SSE	10.61	3.232	201 23 20

The station is located about 1 1/2 miles southeast of Waikiki Beach and 1/2 mile north of the shoreline on the highest part of Diamond Head Crater. It is set in approximately the same place as DIAMOND HEAD 1872 1927 was. The iron rod which had originally marked the old station was found bent over so the top was sawed off even and marked by a "+" in the top. It was then driven farther into the ground and the top part surrounded by concrete and used for an underground mark for the new station. It is 16 inches below the surface station mark. To reach the station from the junction of Kalakaua Avenue and Monsarret Avenue in the south part of Waikiki, go easterly on Monsarret Avenue for 1.3 miles to the Civil Defense Headquarters Building in Fort Ruger. (The key which is needed to get through the tunnel on the way into the crater may be obtained here. The gate is usually not locked during the day but it is locked at night.) From the headquarters building go southeasterly on Diamond Head Road for 0.2 mile, then right, for 0.35 mile along winding road which passes through tunnel, to the Federal Aeronautics Building inside the crater. Continue ahead to a point just after crossing an asphalt road, then bear right along a track road and across a gunnery range to the end of truck travel and the beginning of a good foot trail. Follow trail up steps, through a tunnel, up a stairway, then up through an old bunker to the highest part of the hill and the station. About a 45 minute pack.

The station mark is a standard disk, stamped DIAMOND HEAD 2 1969, set in the top of an irregular mass of concrete. There is a 6-foot square concrete slab with an 18-inch pyramid-shaped concrete monument supporting a 2-inch pipe, over the mark. The concrete slab projects about 2 1/2 feet.

Reference mark 3 is a standard disk, stamped DIAMOND HEAD 2 NO 3 1969, cemented in a drill hole in a 6-foot square concrete slab with a cement roof about 4 1/2 feet above it which is supported at each corner by a concrete pillar. The mark is about 2 feet lower than the station mark.

Reference mark 4 is a standard disk, stamped DIAMOND HEAD 2 NO 4 1969, cemented in a drill hole in the northeast corner of a 6 by 9 foot concrete slab which is adjacent to the concrete monument over the station. It is about 2 1/2 feet lower than the station.

Reference Point 1 is a 3/4-inch brass plug with an indented "+" in the top, cemented in a drill hole in lava rock outcrop and surrounded by an 8-inch square of concrete. It is located in a small saddle to the north of the station and about 28 feet lower than the station mark.

Reference Point 2 is a stem of an old reference mark with indented "+" in the top, cemented in a drill hole in a small concrete slab which has 4 old stud bolts sticking up out of it. It is about 1 foot lower than the station mark.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: DIAMOND HEAD 2
STATE: HAWAII YEAR: 1969 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21° 15' 46.33400	ELEVATION: 232.2 METERS
GEODETIC LONGITUDE: 157° 48' 52.18400	762 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	# 10R Δ 01 ANGLE
HI 3	5105	563,166.33	34,981.39	+ 0° 04' 02"

* 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
MAGIC ISLAND	125° 40' 33.1	125° 36' 31"	5103

QG 085

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 211573 STATION 1086
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 2-5

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

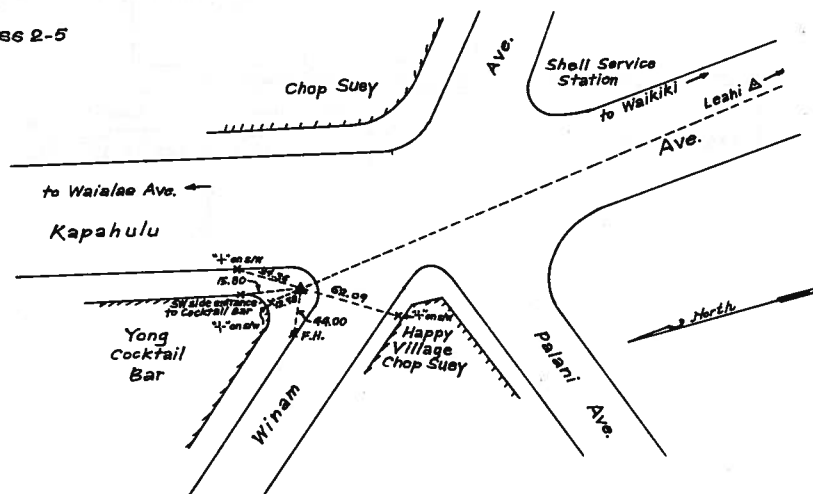
Description, including sketch of object:

Station is located in the Kapahulu District, on Kapahulu Avenue, two blocks north of Ala Wai Golf Course. The station is at the northwest corner of the intersection of Kapahulu, Winam and Palani Avenues.

Station mark is a standard State Survey disk stamped "2-5 1969" cemented in drill hole in concrete sidewalk at the northwest corner of Kapahulu and Winam Avenues. Ties from the station are: NW 12.98 feet to "+" in concrete sidewalk, N 34.36 feet to "+" in concrete sidewalk, S 62.09 feet to "+" in concrete sidewalk, across Winam Avenue and SW 44.00 feet to Fire Hydrant.

Geodimeter connection was made between "DIAMOND HEAD 2 1969" and State Survey "2-5 1969".

SS 2-5



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 2-5

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 17' 06.59395	ELEVATION:	3.84 METERS
GEODETIC LONGITUDE:	157° 49' 01.04804		12.6 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	± 10R Δ ±1 ANGLE °
HI 3	5103	562,318.52	43,078.55	+ 0° 03' 59"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
DIAMOND HEAD 2	354° 05' 20.7	354° 01' 21"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION DIAMOND HEAD 2

QG 086

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1087
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 3-4

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

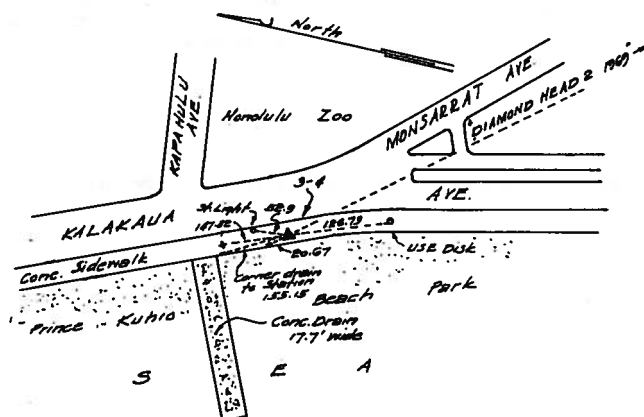
Description, including sketch of object:

Station is located in the Waikiki District, on the seaward side of Kalakaua Avenue, between Kapaehulu and Monsarrat Avenues and opposite the entrance to the Honolulu Zoo.

Station mark is a standard State Survey disk stamped "3-4 1969" cemented in drill hole in concrete sidewalk fronting the Prince Kuhio Beach Park and about 155 feet south from corner of 18-foot concrete drain and walkway that extends into the ocean. Ties from the station are: S 126.73 ft. to U.S. Corps of Engineers disk stamped "BEACH EROSION 1948" in concrete sidewalk, NW 20.67 ft. to cross cut in concrete sidewalk, in line with DIAMOND HEAD 2 1969 and NW 147.82 ft. to a cross cut in concrete sidewalk.

Geodimeter connection was made between "DIAMOND HEAD 2 1969" to "State Survey 3-4"

35 3-4



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 3-4

STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543
NO OBSERVATION CHECK ON THIS POSITION

GEODETTIC LATITUDE:	21° 16' 26.95711	ELEVATION:	2.51 METERS
GEODETTIC LONGITUDE:	157° 49' 31.26580		8.2 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	8 OR Δ 01 ANGLE °
HI 3	5103	559,465.18	39,076.00	+ 0° 03' 48"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE 8 OR Δ 01 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETTIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
DIAMOND HEAD 2	317° 57' 09.6	317° 53' 21"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION DIAMOND HEAD 2

QG 087

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 211573 STATION 1088
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

See Station DIAMOND HEAD 2

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 3-5

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21 ° 16' 06.32957	ELEVATION:	145	METERS
GEODETIC LONGITUDE:	157 48 14.56834	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ θ 1 ANGLE *
HI 3	5103	566,721.77	37,003.22	+ 0 ° 04' 16 "

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH *	CODE
DIAMOND HEAD 2	60 ° 26' 45.8 "	60 ° 22' 30 "	5103

POSITION DETERMINED BY TRAVERSE FROM STATION DIAMOND HEAD 2

QG 088

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1089
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Kaimuki (Oahu Island, Hawaiian Government Survey, 1872; L. G. Simmons, 1927).—In southeastern part of Oahu, on Telegraph Hill, south of the entrance to Palolo Valley. Marked by a granite post 6 inches square, which was later surrounded by a concrete pier 6 feet square. In 1910 it was reported lost, a reservoir having been built on the site, but in 1925 it was reported as recovered, being on top of the covered reservoir which is on Telegraph Hill, Kaimuki, behind the fire station, Pahoa and Kokohead Streets. The mark was then described as a symmetrical block of concrete about 5 feet square, from the center of which a galvanized iron pipe projected about 1 foot. A metal drum, to serve as a target, was made to mount into top of pipe. It is easily removable.

(11-)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: **KAIMUKI**
ESTABLISHED BY: **H.G.S.** YEAR: **1872** 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 a standard Type C Hawaiian Territory Survey Marker set on top of an abandoned reservoir on Telegraph Hill in Kaimuki. The station is just east of the Kaimuki Fire Station and a trail leads from the parking lot at the fire station to the top of the hill and the 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.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION **KAIMUKI**

STATE: **HAWAII**

YEAR: **1872**

FIRST

ORDER

SOURCE: **G-14543**

GEODETIC LATITUDE: 21° 16' 52.13094	ELEVATION: 92 METERS
GEODETIC LONGITUDE: 157° 48' 07.70282	NO CHECK FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S. OR Δ. ANGLE °
HI 3	5103	567,365.34	41,625.33	+ 0° 04' 19"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
DIAMOND HEAD 2	32° 21' 53.7"	32° 17' 35"	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NDV 1970

POSITION DETERMINED BY TRAVERSE FROM STATION DIAMOND HEAD 2

AND CHECKED BY ADDITIONAL OBSERVATIONS

QG 089

(continued on next page)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1089
LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

KAIMUKI (Continued)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAIMUKI
ESTABLISHED BY: HGS YEAR: 1872 STATE: Hawaii
RECOVERED BY: W.H. Porter YEAR: 1963 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK METERS.	METERS.	HEIGHT OF LIGHT ABOVE STATION MARK METERS.	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
			DISTANCE		DIRECTION	
OBJECT	BEARING		FEET	METERS		
PUNCHBOWL 1873-1928					00 00	00.0
R.M. No. 1	ESE		53.541	16.319	175 27	44
R.M. No. 2	SW		30.348	9.250	263 17	02

Station was recovered and found in good condition. Two new reference marks, numbers one and two, were established. A complete description follows:

Station is located about 4-1/4 miles airline east-southeast of the Federal Building in Honolulu; in the Kaimuki district, at the south side of the Kaimuki Fire Station, on a hill of about 250 feet elevation. It is on the flat, concrete roof of an old, 60 x 120-foot, concrete structure that extends from about 5 to 12 feet above ground.

To reach station from the post office in Kaimuki, go southwest on Koko Head Ave for 0.2 mile; turn left and go southeast on Pahoa Ave for 0.05 mile; turn right and go upgrade 0.05 mile on Ocean View Drive to old track road on right, opposite home at 929 Ocean View Drive. Turn sharp right and go up steep track road for 0.05 mile to end of road and station.

Station is center of the 2-1/2-inch, iron pipe that projects 1.8 feet from the center of a 6-foot-square, concrete platform which extends 1.3 feet above the concrete roof. It is 4.7 feet southwest from the northeast edge of the roof, 83 feet northeast of a small, concrete building that sets on the southwest corner of the roof, and 45-1/2 feet northwest from southeast end of roof.

Reference mark number one is a standard disk stamped "KAIMUKI NO 1 1872-1927 1963", cemented in a drill hole in the concrete roof, 1 foot northwest from southeast edge of roof and 3 feet lower than top of station pipe.

Reference mark number two is a standard disk stamped "KAIMUKI NO 2 1872-1927 1963", cemented in a drill hole in the exact center of the concrete roof. It is 3 feet lower than top of station pipe.

RECOVERY NOTE, TRIANGULATION STATION TRAVERSE

NAME OF STATION: KAIMUKI /
ESTABLISHED BY: H.G.S. / YEAR: 1872 / STATE: Hawaii /
RECOVERED BY: C.A.A. / YEAR: 1969 / COUNTY: Honolulu /
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: In Kaimuki /

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

The station mark and reference marks 1 and 2 were recovered as described, and in good condition. The center of a 2 1/2 inch pipe, which was previously the mark was held, and a standard disk stamped KAIMUKI 1872 1927 1969, was cemented in a drill hole in the center of a concrete platform which originally supported a "Type C" Hawaiian Territorial Survey Signal.

The distance and direction to reference marks 1 and 2 were not checked at this time.

A Geodimeter Traverse was made between KAIMUKI 1872 1927 1969 and DIAMOND HEAD 2.

Geodimeter distance 2395.504 meters or (7,859.17 ft.)

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1090
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

Kaimuki fire station (Oahu Island, E. R. Hand, 1925).—In southeastern Oahu, north of Diamond Head, the tall, slender, square, yellow tower of the Kaimuki Fire Station; it has red pyramidal roof. Shows when approaching from either east or west in the center of the gentle rise behind Diamond Head; appears on north side of small steep mound containing reservoir.

Form 526
(11-8-55)

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

R

NAME OF STATION: Kaimuki Fire Station
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. Located in highest part of Kaimuki, at the intersection of Pahoa and Koko Head Avenues, at the Kaimuki Fire Station, about 50 yards north of triangulation station KAIMUKI.

Station is the tall, square, tan tower, with red tile pyramidal roof, on the Kaimuki Fire Station. Top of tower is about 50 feet above ground.

INTERSECTION
RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KAIMUKI FIRE STATION
ESTABLISHED BY: E. R. H. YEAR: 1925 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 D. G. Rushford in 1964.

FORM C&GS-526 (9-66)
USCOMMA-DC 36496-P66

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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAIMUKI FIRE STATION

STATE: HAWAII

YEAR: 1925

THIRD

-ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 16' 53.67656	ELEVATION:	METERS
GEODETIC LONGITUDE:	157 48 07.61926		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S FOR Δ G: ANGLE *
HI 3	5103	567,373.05	41,781.29	+ 0° 04' 19"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE S FOR Δ G: 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

QG 090

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1091
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

FORM 526a
(8-18-68)

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: WAAHILA
ESTABLISHED BY: L.G.S. YEAR: 1928 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

HEIGHT OF TELESCOPE ABOVE STATION MARK 1 METERS		HEIGHT OF LIGHT ABOVE STATION MARK METERS		
DISTANCE 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	
ROCKY HILL 1872 1927				00 00 00.0
R.M. No. 2	NNW	12.617	3.846	58 57 36
R.M. No. 1	NE	35.083	10.694	137 25 49
Central Union Church Spire				343 01 45

A "Type C", Hawaiian Territorial Survey signal was recovered in good condition. There is no previous description so it is not known how the station was originally marked. Two new reference marks, numbers one and two, were established. A complete description follows:

Station is located about 3-1/4 miles airline east of the Federal Building in Honolulu, at about 483 feet elevation, on Waahila Ridge, which runs up to the northeast from Dole Drive and lies along the southeast side of the University of Hawaii buildings.

To reach station from the intersection of University Ave. and Dole Dr. at the southwest corner of the University of Hawaii grounds, go east on Dole Dr. for 0.55 mile; turn left and go about 50 yards to end of truck travel in northwest corner of parking area at west end of apartment buildings. From here pack northeasterly about 1/4 mile on dim trail up along power line and then along top of ridge, to station.

Station is center of 2-1/2-inch, iron pipe that projects 2 feet from the center of a 5-foot-square, concrete floor that is flush with the ground. A red and white metal target is set into the pipe and extends 7 feet above the floor. Station is 25 feet west of old, bulldozed road.

Reference mark number one is a standard disk, stamped "WAAHILA NO 1 1928 1963", cemented in a drill hole in a 2-foot, triangle-shaped, bedrock outcrop that projects 1 foot above ground. It is at the south end of a 20-foot-long patch of black lava rock outcroppings, at the west edge of the old road, and about 1 foot higher than top of station pipe.

Reference mark number two is a standard disk stamped "WAAHILA NO 2 1928 1963", cemented in a drill hole in a large, flat, bedrock outcrop that projects 3 inches above ground. It is at the south end of a 27-foot-long, bare, red area that has many black lava rock outcroppings scattered along it, and is about 4 feet lower than top of station pipe.

(Continued on next page)

NAME OF STATION: WAAHILA

STATE: HAWAII

YEAR: 1928

FIRST

-ORDER

SOURCE: G-14543

GEODETIC LATITUDE: 21 ° 18 ' 11.43375	ELEVATION: 147.8 METERS
GEODETIC LONGITUDE: 157 48 49.05158	485 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ (OR Δ θ) ANGLE °
HI 3	5103	563,441.54	49,622.15	+ 0 ° 04 ' 04 "

* 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
DIAMOND HEAD 2	1 ° 08 ' 40.4	1 ° 04 ' 57 "	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QG 091

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 211573 STATION 1091

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

WAAHILA (Continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: WAAHILA
ESTABLISHED BY: L.G.S. YEAR: 1928 STATE: Hawaii BENCH MARK ALSO ☐
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3 miles east of Honolulu.
HEIGHT OF TELESCOPE ABOVE STATION MARK 4 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 4 FEET.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
DIAMOND HEAD 2				0 00' 00.0"
HONOLULU ALA MOANA BLDG OBST LIGHT 1963	SW	(1.75 miles)		75 22 51.0"
RM 1	NW	35.07	10.689	161 41 12"
RM 2	NE	12.59	3.839	240 13 09"
RM 1 to RM 2		34.82	10.616	

The station and reference marks 1 and 2 were recovered and found in good condition. The station was previously the center of a 2 1/2 inch iron pipe which was part of a "Type C" Hawaii Territorial Survey Signal. The iron pipe was removed and a standard disk was set in the concrete pad by the Hawaii State Survey Office. A new description follows.

The station is located about 3 1/4 miles east of the Federal Building in Honolulu and on a low, rocky, brush covered ridge locally known as Waahila Ridge.

To reach the station from the junction of the Lunalilo Freeway and University Avenue in the northeast part of Honolulu, go northerly on University Avenue for 0.15 mile to Dole Drive, turn right and go easterly on Dole Drive for 0.55 mile to a paved drive on the left, turn left and go northerly on the paved drive for about 50 yards to a small turnout on the left and the end of truck travel. Pack westerly and northerly up the ridge on a dim trail for about 30 minutes to the station as described.

The station mark is a standard disk stamped WAAHILA 1928 1969, set in concrete about 6 inches below the surface and in the center of a 5 x 5 foot concrete pad.

Reference mark 1 is a standard disk stamped WAAHILA NO 1 1928 1963, set in a drill hole in a triangular shaped bedrock outcrop. It is about 3 feet higher in elevation than the station mark.

Reference mark 2 is a standard disk stamped WAAHILA NO 2 1928 1963, set in a drill hole in bedrock outcrop which projects about 3 inches above the ground. It is about 2 feet lower in elevation than the station mark.

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

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1092
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 2-2

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

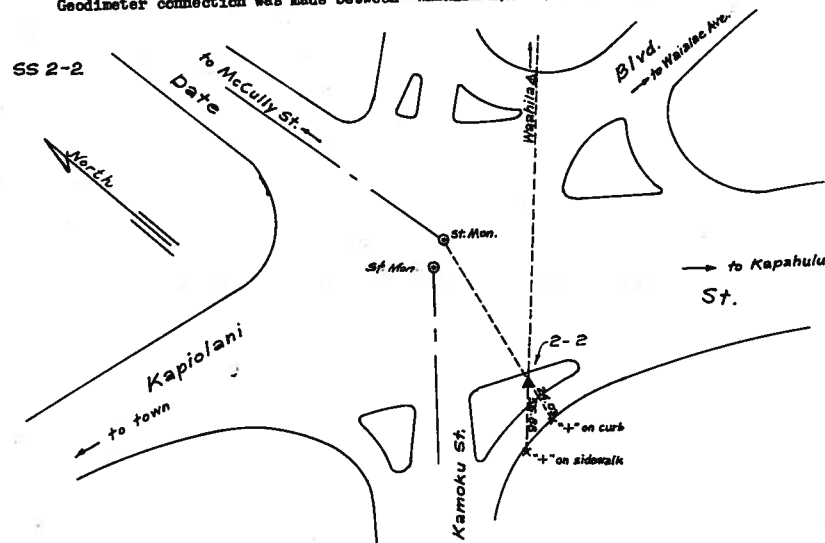
Description, including sketch of object:

Station is located in the Moiliili District of Honolulu at the intersection of Kapiolani Boulevard, Date and Kamoku Streets.

Station mark is a standard State Survey disk stamped "2-2 1969" in concrete monument in "traffic island" at the southerly corner of intersection, at the right turn lane from Kamoku Street into Date Street. The top of monument is a foot square and flush with ground level. Ties from the station are: SW 56.88 ft. to a "4" on the concrete sidewalk, said "4" being on line with "WAAHILA 1928 1969"; S 24.03 ft. to a "4" on the concrete curb, said "4" being on line with a Street Survey Monument at the intersection of Kapiolani Boulevard, Date and Kamoku Streets.

Sub-surface mark is identical with station mark, in concrete monument 3 ft. 10 in. below ground level and separated from top monument by a layer of sand.

Geodimeter connection was made between "WAAHILA 1928 1969" and State Survey "2-2 1969".



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 2-2

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 17' 25.79696	ELEVATION:	1	METERS
GEODETIC LONGITUDE:	157° 49' 35.06530	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S FOR Δ & ANGLE *
HI 3	5103	559,059.30	45,012.48	+ 0° 03' 47"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
WAAHILA	223° 21' 07.0	223° 17' 20"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAAHILA

Q6 092

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 211573 STATION 1093
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 2-8

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

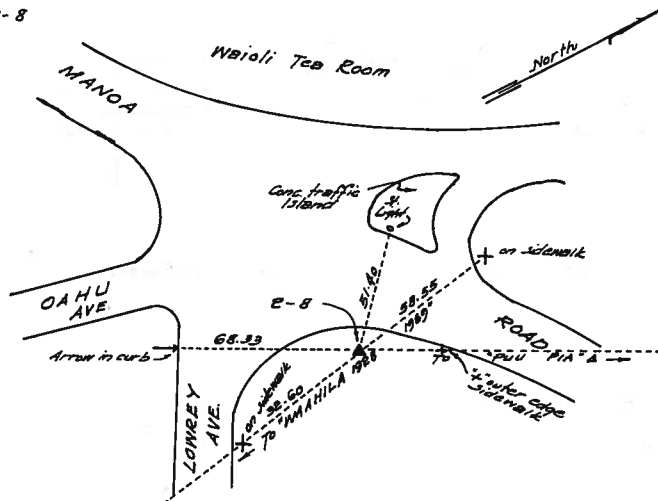
Description, including sketch of object:

Station is located in Manoa Valley, opposite the Waioli Tea Room, at the intersection of Manoa Road, Oahu and Lowrey Avenues.

Station mark is a standard State Survey disk stamped "2-8 1969" cemented in drill hole in concrete sidewalk on the northeast side of the intersection and about 40 feet north of Lowrey Avenue. Ties from the station are: S 32.60 ft. to a cross in inner edge of concrete sidewalk and on line with "WAAHILA 1928 1969", NW 58.55 ft. to cross in concrete sidewalk across Manoa Road, N 35.67 ft. to cross in outer edge of concrete sidewalk, S 68.33 ft. to arrow in curb on south side of Lowrey Avenue.

Geodimeter connection was made between "WAAHILA 1928 1969" to State Survey 2-8

SS 2-8



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 2-8

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 19' 06.52090	ELEVATION:	62 METERS
GEODETIC LONGITUDE:	157° 48' 52.35853	NO CHECK	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ θ ANGLE *
HI 3	5103	563,126.08	55,180.04	+ 0° 04' 03"

* 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
WAAHILA	356° 49' 07.6	356° 45' 05"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAAHILA

QG 053

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1094
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 2-9

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

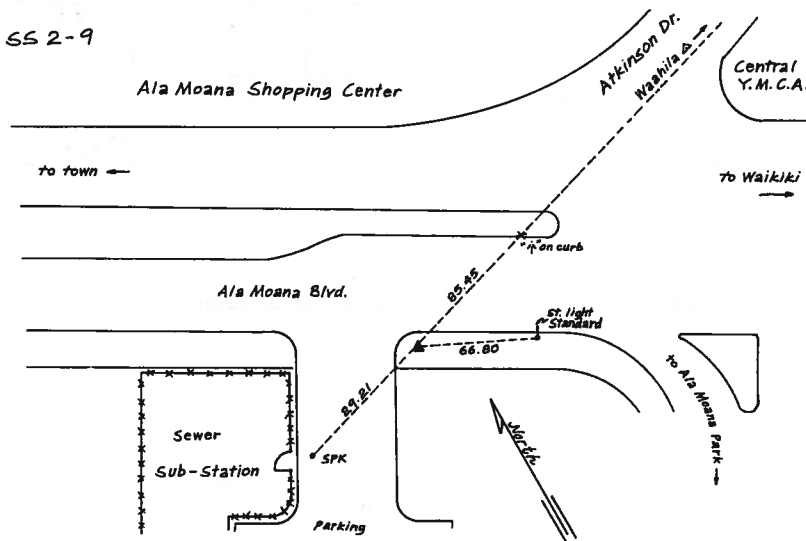
Description, including sketch of object:

Station is located at the northeast corner of Ala Moana Park, at Sewer Sub-Station on the southerly side of Ala Moana Boulevard and southwest of the intersection of Ala Moana Boulevard and Atkinson Drive.

Station mark is a standard State Survey disk stamped "2-9 1969" cemented in drill hole in concrete sidewalk on east side of entrance road to Sewer Sub-Station. Ties from station mark are: NE 85.45 feet to "4" in concrete curb near end of medial strip of Ala Moana Boulevard and SW 29.21 feet to spike in pavement of Sewer Sub-Station road, both points and station mark being on line with "WAAHILA 1928 1969", E 66.80 feet to street light standard.

Geodimeter connection was made between "WAAHILA 1928 1969" to State Survey "2-9 1969".

SS 2-9



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 2-9

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: 0-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 17' 31.74686	ELEVATION:	1.46 METERS
GEODETIC LONGITUDE:	157 50 41.18848		4.8 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S 10R Δ R1 ANGLE °
HI 3	5103	552,845.51	45,606.30	+ 0° 03' 23"

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE S 10R Δ R1 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
WAAHILA	249° 17' 59.6	249° 14' 37"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAAHILA

QG 094

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 211573 STATION 1095
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 2-10

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

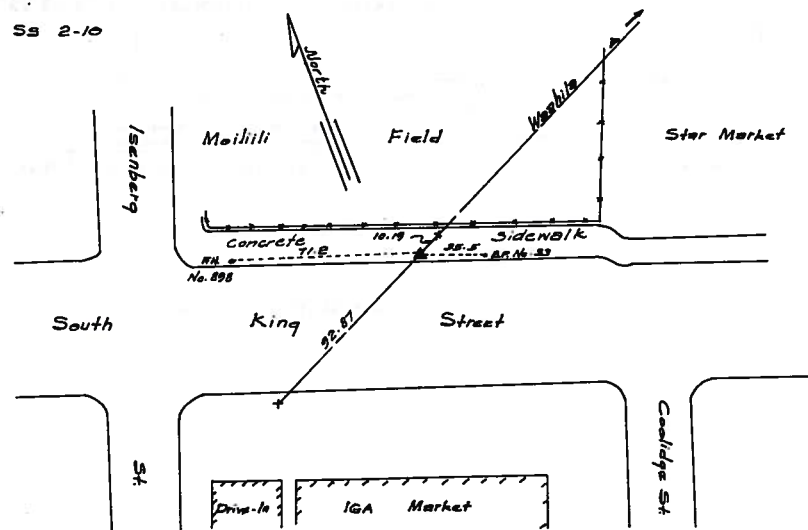
Description, including sketch of object:

Station is located in the Moiliili District of Honolulu, about 275 feet southeast from the intersection of Isenberg and South King Streets.

Station mark is a standard State Survey disk stamped "2-10 1969" cemented in drill hole in concrete sidewalk on the southerly side of Moiliili Field, the northerly side of South King Street, between Isenberg Street and the Star Market. Ties from the station are: NE 10.19 feet to a "+" in concrete sidewalk, SW 92.87 feet to a "+" in concrete in driveway of IGA Market across South King Street, 71.20 feet to Fire Hydrant on the westerly side, and 35.50 feet to Electric Pole #33 on the easterly side.

Geodimeter connection was made between "WAAHILA 1928 1969" to State Survey 2-10.

Ss 2-10



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 2-10

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 17' 46.73116	ELEVATION:	3.70 METERS
GEODETIC LONGITUDE:	157 49 40.16857		12.1 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S OR Δ R: ANGLE *
HI 3	5103	558,614.38	47,124.19	+ 0° 03' 45"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
WAAHILA	242° 42' 06.7	242° 38' 22"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAAHILA

QG 095

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1096
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 3-3

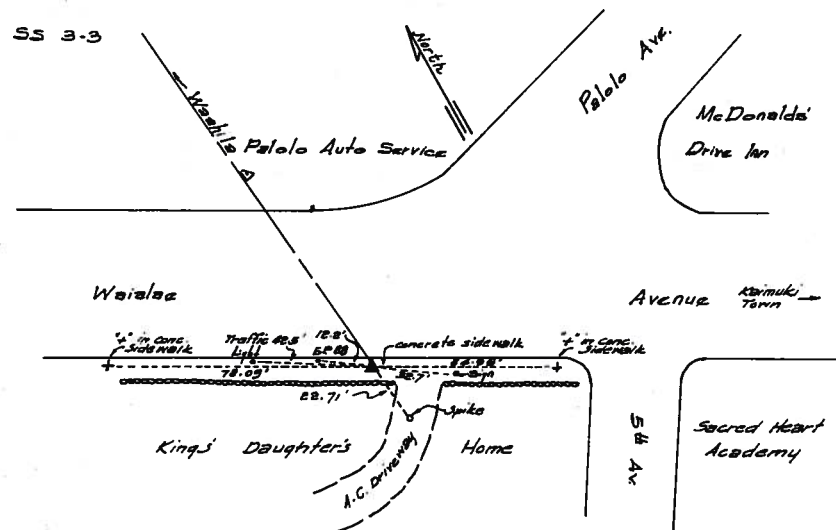
CHIEF OF PARTY: Carl A. Annis YEAR: 1969 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object:

Station is located about 3.7 miles southeast of downtown Honolulu, in the Kaimuki District, at the intersection of Waialae, Palolo and 5th Avenues.

Station mark is a standard State Survey disk stamped "3-3 1969" cemented in drill hole in concrete sidewalk, on the southerly side of Waialae Avenue, and fronting the "Kings Daughters Home". Ties from station mark are SE 22.71 feet to a spike in middle of paved driveway of Kings Daughters Home, 84.96 feet to a "+" in concrete sidewalk on the westerly side, 78.09 feet to a "+" in concrete sidewalk on the easterly side.

A Geodimeter connection was made between "WAAHILA 1928 1969" and State Survey "3-3 1969".



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 3-3

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 17' 24.11124	ELEVATION:	30.31 METERS
GEODETIC LONGITUDE:	157° 48' 36.10256		99.4 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S IOR Δ R: ANGLE °
HI 3	5103	564,675.55	44,848.81	+ 0° 04' 08"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE
WAAHILA	165° 34' 27.2	165° 30' 19"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION WAAHILA

QG 096

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1097
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
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: MAGIC ISLAND / STATE: Hawaii / COUNTY: Honolulu /
CHIEF OF PARTY: C.A. Annis / YEAR: 1969 / DESCRIBED BY: B.W. Miller /

NOTE:	HEIGHT OF TELESCOPE ABOVE STATION MARK 1.6 METERS. HEIGHT OF LIGHT ABOVE STATION MARK 1.3 METERS.	
	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	
Desc. / None	SURFACE-STATION MARK, UNDERGROUND-STATION MARK	OBJECT
		BEARING
		DISTANCE
		FEET METERS
		DIRECTION
		PUNCH BOWL 1872 1927 /
		Honolulu 1350 Ala Moana Apt. /
Desc. /		R.M. NO 1 /
Desc. /		R.M. NO 2 /

The station is located about 2 miles southeast of Downtown Honolulu and 0.4 mile south of the Ala Moana Shopping Center, on a concrete seawall in the southwest part of a man made island called Magic Island. To reach from the intersection of Pali Highway and Ala Moana Boulevard (Nimitz Highway), just east of the Aloha Tower in Honolulu, go southeasterly on Ala Moana Boulevard for 1.05 mile to the Fishermans Wharf Restaurant on the right. Continue ahead on Ala Moana Boulevard for 0.3 mile to a side street on the right (northwest entrance to the Ala Moana Park). Turn right and follow park road south and southeast for 1.1 mile to a side road on the right (road on east side of parking lot). Turn right and go southerly for 0.2 mile to a gate, pass through gate and continue southerly for 0.25 mile, thence bear right and go west for 0.15 mile to a seawall and station. Station mark is a standard disk stamped MAGIC ISLAND 1969, cemented in a drill hole set in seawall, set flush. It is 5.9 feet west of the east edge of seawall, 5.8 feet east of the west edge of seawall. Set in the approximate center of seawall north to south. Reference mark 1 a standard disk stamped MAGIC ISLAND NO 1 1969, cemented in a drill hole set in seawall, set flush. It is 6.2 feet east of the west edge of seawall, 5.5 feet west of the east edge of the seawall. Reference mark 2 a standard disk stamped MAGIC ISLAND NO 2 1969, cemented in a drill hole set in seawall, set flush. It is 7.4 feet west of the east edge of seawall, 4.3 feet east of the west edge of the seawall.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MAGIC ISLAND
STATE: HAWAII YEAR: 1969 FIRST ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21° 17' 14.89778	ELEVATION:	3.7 METERS
GEODETIC LONGITUDE:	157° 51' 03.81857		12 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE °
HI 3	5103	550,707.03	43,904.18	+ 0° 03' 15"

* 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
PUNCHBOWL	178° 25' 43.4"	178° 22' 29"	5103

QG 097

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1098
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION STATION

DEPARTMENT OF COMMERCE
U.S. COAST AND GEODETIC SURVEY
NAME OF STATION: LILLIHAIU STATE: Hawaii COUNTY: Honolulu

CHIEF OF PARTY: W.R. Porter YEAR: 1961 Described by: C.G. Elliott

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK Surface-station mark Underground-station mark	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION	BEARING	DISTANCE		DIRECTION†
				feet	meters	
desc. none						
		PUNCHBOWL (PUOWAINA) 1873	N	(approx 1.35 mi)	00 00 00.0	
		KGMB Radio Tower	NE	(approx 0.6 mi)	69 23 36.8	
		KIKI Radio Tower	WNW	(approx 0.6 mi)	313 30 22.9	
		KONA Radio Tower	NW	(approx 0.25 mi)	325 19 40.4	

Station is about 1.4 miles south of Punchbowl Crater and 2.8 miles WNW of Diamond Head (Leahi) in the approximate center of Ala Moana Park in the city of Honolulu.

To reach the station from the intersection of A la Moana Blvd. and Ward Ave., proceed westerly on Ala Moana for 0.3 miles to a side road right at the west entrance to Ala Moana Park. Turn right and continue south and west along the beachline road for 0.6 miles to a rock wall on the left (north) and two sets of steps leading down into the park. Take the left set of steps down (west) and the station is approximately 138 feet WNW of the bottom step

in the middle of a clump of six palm trees. This is the only clump of palm trees in the vicinity.

The station mark is a non-standard 5 inch by 9 inch bronze plaque with the following inscription "In Memoriam, Queen Lillihau, 1587-1617, Hers Was A Happy Reign, This Memorial Established by USC&GSS SURVEYOR". The plaque is set in the top of a 12 inch square concrete monument projecting about 3 inches above ground level and is located 15.9 feet south of the most northerly palm tree, 11.2 feet west of the most easterly tree and 3.3 feet south of the center tree of the group. The mark used to observe on is a punch mark between the 1587 and 1617 portion of the inscription.

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

(Continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: LILLIHAIU
STATE: HAWAII YEAR: 1961 SECOND -ORDER

SOURCE: G-14543

GEODETIC LATITUDE:	21 ° 17' 36.22227	ELEVATION:	1 METERS
GEODETIC LONGITUDE:	157 51 05.81630	NO CHECK	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	§ 10R Δ § 1 ANGLE °
HI 3	5103	550,516.08	46,055.62	+ 0° 03' 14"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
PUNCHBOWL	179° 21' 38.0	179° 18' 24"	5103
MAGIC ISLAND	354 58 54.9	354 55 41	5103

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

POSITION DETERMINED BY TRAVERSE FROM STATION MAGIC ISLAND

AND CHECKED BY ADDITIONAL OBSERVATIONS

QG 098

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 211573 STATION 1098

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

LILLIHAW (Continued)

Form 528
(11-8-61)

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

R

NAME OF STATION: LILLIHAW
ESTABLISHED BY: W.R.P. YEAR: 1961 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:

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

Station is located about 1-1/4 miles airline southeast of the Federal Building in Honolulu, about in the middle of Ala Moana Park.

To reach station from the intersection of Ward Avenue and Ala Moana Blvd, go easterly, on Ala Moana Blvd, for 0.3 mile to side road right, just after passing McWayne Marine Supply Co. Turn right and follow the park drive easterly for 0.6 mile to station on left, opposite west end of a jogging, stone wall on left, with two sets of wide stone steps leading down into the park.

Station mark is a 5 x 9-inch, bronze plate with the following inscription on it "IN MEMORIAM, QUEEN LILLIHAW 1587-1617, HERS WAS A HAPPY REIGN, THIS MEMORIAL ESTABLISHED BY USC&GSS SURVEYOR". A punch mark is at the center of the plate. The mark is set in the top of a 12-inch-square, concrete monument projecting 3 inches. It is set in the middle of a clump of 6 palm trees, about 105 yards south of Ala Moana Blvd, 169 feet north of west end of the stone wall, and 141 feet northwest of the west set of steps.

RECOVERY NOTE, ~~TRIANGULATION~~ STATION
TRAVERSE

R

NAME OF STATION: LILLIHAW /
ESTABLISHED BY: W.R.P. / YEAR: 1961 / STATE: Hawaii / BENCH MARK(S) ALSO ☐
RECOVERED BY: G.A.A. / YEAR: 1969 / COUNTY: Honolulu /
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: In Honolulu /

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

The station mark was recovered as described, and found to be in good condition.

A Geodimeter Traverse was made between LILLIHAW 1961 and MAGIC ISLAND.

Geodimeter distance 658.343 meters or (2,159.89 ft.)

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 211573 STATION 1099
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 2-11

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

Description, including sketch of object:

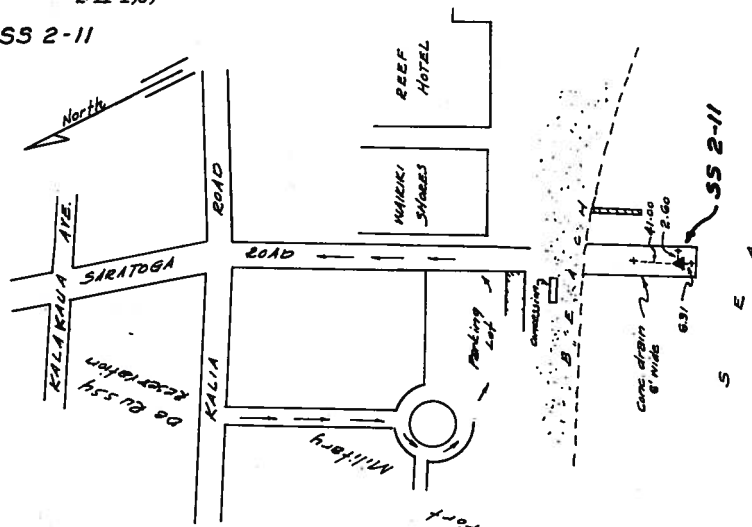
Station is located on the beach of Waikiki on 6-ft. wide concrete drain, extending 85 ft. into the sea, at the end of Saratoga Road, between Fort De Russey and the Waikiki Shores (Hotel).

Station mark is a standard State Survey disk stamped "2-11 1969" cemented in drill hole in the middle of and 7.5 ft from the seaward end of concrete drain. Ties from station are to crosses cut in concrete drain: NE 41.00 ft., SW 6.31 ft. and SE 2.60 ft.

Note: Station is slightly awash by wave action during high tide.

Geodimeter connection was made between "MAJIC ISLAND 1969" and State Survey "2-11 1969"

SS 2-11



Note: Station will be slightly awash at high tide.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 2-11

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	21° 16' 51.20233	ELEVATION:	0	METERS
GEODETIC LONGITUDE:	157 50 11.55974	NO CHECK		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S FOR Δ & ANGLE
HI 3	5103	555,651.67	41,518.23	+ 0° 03' 34"

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

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE
MAGIC ISLAND	115° 49' 05.5	115° 45' 32"	5103

POSITION DETERMINED BY TRAVERSE FROM STATION MAGIC ISLAND

QG 099

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1100
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

WAIKIKI (Ter. of Hawaii, L.G.S., 1927; L.G.S., 1928)
-A standard Coast and Geodetic Survey bronze disk set
in concrete pier between sidewalk and curbing on the makai side of
Alawai road at the Maikai Ewa corner of intersection of Kalaimoku
Street and Alawai road.
Azimuth - WAIKIKI to Central Union Church Spire - 162°58'57.8.

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

R

HEIGHT OF TELESCOPE ABOVE STATION MARK		1.65 METERS.		HEIGHT OF LIGHT ABOVE STATION MARK		METERS.	
DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION							
OBJECT	BEARING	DISTANCE		DIRECTION			
		FEET	METERS				
KAIMUKI 1872-1928				00	00	00.0	
R.M. No. 2	SSW	58.690	17.888	94	12	58	
R.M. No. 3	NW	50.100	15.267	211	33	08	
R.M. No. 1	NE	1.539	0.469	302	34	36	

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

Station is located in the Waikiki District of Honolulu, along the southwest side of Ala Wai Blvd. and Ala Wai Canal, in the west angle of the T-intersection of Ala Wai Blvd. and Kalaimoku Street, in the narrow, dirt strip between sidewalk and edge of boulevard.

To reach station from the Waikiki Fire Station, at intersection of Kapahulu Ave. and Ala Wai Blvd., go northwest on Ala Wai Blvd. for 1.1 miles to station on left.

Station mark is a standard disk, stamped "WAIKIKI 1927", set in the top of a 12-inch-square, concrete monument, 1 inch below ground surface. It is 1.8 feet southwest of southwest edge of Ala Wai Blvd., 43.6 feet northwest of center line of Kalaimoku Street, 11.0 feet northwest of center of manhole cover with "WATER" embossed on it, 7.0 feet southwest of center of manhole cover with "C&C" embossed on it, and 1.1 feet northeast of edge of sidewalk.

Reference mark number one is a standard disk, stamped "WAIKIKI NO 1 1927", cemented in a drill hole in the concrete curb on the southwest side of Ala Wai Blvd.

Reference mark number two is a standard disk, stamped "WAIKIKI NO 2 1927 1963", cemented in a drill hole in the concrete structure of a storm-drain catch-basin. It is 8.8 feet southwest of the center of the storm-drain manhole cover, 17.4 feet northwest of center line of Kalaimoku Street, 56.5 feet northeast of center of street lamp-post, and 1.7 feet southeast of edge of sidewalk.

Reference mark number three is a standard disk, stamped "WAIKIKI NO 3 1927 1963", cemented in a drill hole in the concrete curb at the southwest side of Ala Wai Blvd. It is 21.7 feet southwest of the center line of the boulevard, 2.65 feet northeast of edge of sidewalk, and 32.6 feet southeast of the center line of the driveway at northwest side of the house at 2885 Ala Wai Blvd.

NAME OF STATION: WAIKIKI
ESTABLISHED BY: L.G.S. YEAR: 1927 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: J.S.M. YEAR: 1968 COUNTY: Honolulu

R

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

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

Station mark and reference marks were destroyed due to widening of road.

A new station, WAIKIKI 2 was established in 1967 when information on impending destruction of station was received.

NAME OF STATION: WAIKIKI

STATE: HAWAII

YEAR: 1927

SECOND

-ORDER

SOURCE: G- 7448

GEODETIC LATITUDE: 21° 17' 15.155	ELEVATION: 1	METERS
GEODETIC LONGITUDE: 157° 49' 54.405	SCALED	FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	# FOR Δ = ANGLE
HI 3	5103	557,271.51	43,936.73	+ 0 03 40

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

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

QG 100