

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1001
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

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

R

NAME OF STATION: PUU KAUAI
ESTABLISHED BY: H.O.F. YEAR: 1957 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 recovered in good condition.
A complete description follows:
Station is located about 5-1/2 miles northwest of Kaneohe, 1/2-mile southwest of the Waiahole Poi Factory, and 0.4 mile west of station WAIHOLE, on a point of about 615 feet elevation on the ridge dividing the Waiahole and Kaalaea districts.

To reach station from the post office in Kaneohe, go northwest on State Highway 83 for 4.5 miles to the Hygenic Store on left at small settlement; continue on the highway for 1.25 miles; turn left on Kaimalolo Pl. and go up steep hill for 0.15 mile to end of street at about 200 feet elevation. From here walk southwest up onto brushy ridge, then go northwest up along ridge about 1/4-mile to station.

Station is center of a 2-1/2-inch iron pipe that projects about 2 feet from the center of a concrete platform about 5 feet square and flush with ground. This signal was built long ago by the Hawaii Territorial Survey and is known as a "Type C" signal. A red and white metal target is set into the station pipe.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: Puu Kauai
ESTABLISHED BY: H.O.F. YEAR: 1957 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: R.L. Newsom YEAR: 1967 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 5 1/2 miles NW of Kaneohe Town

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

Station recovered in good condition. New description follows.
Station located about 5 1/2 miles NW of Kaneohe, 1/2 mile SW of Waiahole Poi factory, 0.4 mile west of station Waiahole and Kaalaea districts.

To reach station from Post Office in Kaneohe, go NW on State Hwy. 83 for 4.5 miles to the Hygenic Store on left at small settlement; continue on highway for 1.25 miles; turn left on Kaimalolo Place and go up steep hill for 0.15 mile to end of street at about 200 ft. elevation. From there walk SW up the top driveway. Look to the left for a trail leading up out of a clay bank onto a brushy ridge, then go NW up a ridge to the station.

Station is center of a 2 1/2 in. iron pipe that projects about 2 feet from the center of a concrete platform about 5 feet square and flush with the ground. This signal was built long ago by the Hawaii Territorial Survey and is known as a "Type C" Signal. A red & white metal target is set into the station pipe.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU KAUAI

STATE: HAWAII

YEAR: 1957

FIRST

ORDER

SOURCE: G-14543

| | | | |
|---------------------|------------------|------------|--------------|
| GEODETIC LATITUDE: | 21° 28' 41.85680 | ELEVATION: | 186.5 METERS |
| GEODETIC LONGITUDE: | 157 51 06.44283 | | 612 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|------------|-------------------------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ OR ANGLE |
| HI 3 | 5103 | 550,553.48 | 113,216.12 | + 0 03 15 |

* 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 |
|----------------------|----------------------------------|-------------------------------|------|
| MOKAPU | 280° 44' 42.7 | 280° 41' 27 | 5103 |

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QG 001

(Continued on next page)

NAME OF STATION: PUU KAUAI
 ESTABLISHED BY: H.O.F. YEAR: 1957 STATE: Hawaii BENCH MARK(S) ALSO ☐
 RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 5 1/2 miles northwest of Kaneohe.
 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 | |
| MOKAPU 1872 1962 | | | | 0 00' 00.0" |
| KANEEOHE BAY MCAS E RADIO MAST OF 3 1957 | E | (6 1/2 miles) | | 3 32' 54.6" |
| RM 2 | SW | 18.27 | 5.569 | 128 13' 18" |
| RM 1 | NE | 15.67 | 4.776 | 304 29' 38" |

This station was previously the center of a 2 1/2 inch iron pipe which was part of the "C Type" Hawaii Territorial Survey Signal. At this time the iron pipe was sawed off about 1 inch above the base of the signal and a standard station disk was cemented into the pipe. Reference marks 1 and 2 were established at this time. A new description follows.

The station is located about 5 1/2 miles northwest of Kaneohe and on the highest point of a low, brush covered ridge.

To reach the station from the post office in Kaneohe, go northwest on State Highway 83 for 4.5 miles to a reverse fork, bear right and continue northerly on State Highway 83 for 1.25 miles to a side street on the left, turn left and follow Kaimalolo Place for 0.15 mile to the end of the street and the end of truck travel. Pack westerly up onto the ridge, then bear right and follow the ridge northerly to the highest point and the station.

The station mark is a standard disk stamped PUU KAUAI 1957 1969, cemented in the top of a 2 1/2 inch iron pipe which projects about 1 inch above the surface of a 5 x 5 foot concrete pad.

Reference mark 1 is a standard disk stamped PUU KAUAI 1957 NO 1 1969, brazed to the top of 2 inch soil pipe projecting 4 inches above the ground. It is about the same elevation as the station mark.

Reference mark 2 is a standard disk stamped PUU KAUAI 1957 NO 2 1969, brazed to the top of a 2 inch soil pipe projecting about 4 inches above the ground. It is about the same elevation as the station mark.

No measurement was made between the reference marks due to the crest of the ridge and the observing stand being on line.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUU KAUAI
 ESTABLISHED BY: H.O.F. YEAR: 1957 STATE: Hawaii BENCH MARK(S) ALSO ☐
 RECOVERED BY: G.M. Ward YEAR: 1970 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

5 1/2 miles northwest of Kaneohe.

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

Station and Reference Marks No. 1 and No. 2 were recovered in apparent good condition as described in the recovery description of C.A. Annis, 1969 with the addition that the State of Hawaii has now erected a type "B" signal over the station. Access holes have been placed such that direct measurements to the reference marks is not possible.

NAME OF STATION: PUU KAUAI
 ESTABLISHED BY: H.O.F. YEAR: 1957 STATE: Hawaii BENCH MARK(S) ALSO ☐
 RECOVERED BY: R. B. Melby YEAR: 1975 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 5 1/2 miles NW of Kaneohe

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:
 The station and reference marks were recovered in good condition as described in 1969 and 1970. The pack along the trail from the end of truck travel is somewhat brushy and takes about 20 minutes.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUU KAUAI
 ESTABLISHED BY: H.O.F. YEAR: 1957 STATE: Hawaii BENCH MARK(S) ALSO ☐
 RECOVERED BY: C.K.T. YEAR: 1976 COUNTY: Honolulu
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 5 1/2 miles NW of Kaneohe

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.

FORM C&GS-526 (9-66)
 ISCOMM-DC 26490-P08

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1031
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

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

R

NAME OF STATION: PUU KAUAI
ESTABLISHED BY: H.O.F. YEAR: 1957 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 recovered in good condition.

A complete description follows:

Station is located about 5-1/2 miles northwest of Kaneohe, 1/2-mile southwest of the Waiahole Poi Factory, and 0.4 mile west of station WAIHAOLE, on a point of about 615 feet elevation on the ridge dividing the Waiahole and Kaalaea districts.

To reach station from the post office in Kaneohe, go northwest on State Highway 83 for 4.5 miles to the Hygenic Store on left at small settlement; continue on the highway for 1.25 miles; turn left on Kaimalolo Pl. and go up steep hill for 0.15 mile to end of street at about 200 feet elevation. From here walk southwest up onto brushy ridge, then go north-west up along ridge about 1/4-mile to station.

Station is center of a 2-1/2-inch iron pipe that projects about 2 feet from the center of a concrete platform about 5 feet square and flush with ground. This signal was built long ago by the Hawaii Territorial Survey and is known as a "Type C" signal. A red and white metal target is set into the station pipe.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: Puu Kauai
ESTABLISHED BY: H.O.F. YEAR: 1957 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: R.L. Newsom YEAR: 1967 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 5 1/2 miles NW of Kaneohe Town

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

Station recovered in good condition. New description follows.

Station located about 5 1/2 miles NW of Kaneohe, 1/2 mile SW of Waiahole Poi factory, 0.4 mile west of station Waiahole and Kaalaea districts.

To reach station from Post Office in Kaneohe, go NW on State Hwy. 83 for 4.5 miles to the Hygenic Store on left at small settlement; continue on highway for 1.25 miles; turn left on Kaimalolo Place and go up steep hill for 0.15 mile to end of street at about 200 ft. elevation. From there walk SW up the top driveway. Look to the left for a trail leading up out of a clay bank onto a brushy ridge, then go NW up a ridge to the station.

Station is center of a 2 1/2 in. iron pipe that projects about 2 feet from the center of a concrete platform about 5 feet square and flush with the ground. This signal was built long ago by the Hawaii Territorial Survey and is known as a "Type C" signal. A red & white metal target is set into the station pipe.

FORM CG-55-526 (11-65)
USCOMDA-DC 30250-PSS

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

NAME OF STATION: PUU KAUAI

STATE: HAWAII

YEAR: 1957

FIRST

-ORDER

SOURCE: G-14543

| | | | |
|---------------------|------------------|------------|--------------|
| GEODETIC LATITUDE: | 21° 28' 41.85680 | ELEVATION: | 186.5 METERS |
| GEODETIC LONGITUDE: | 157 51 06.44283 | | 612 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|------------|-----------------------|
| STATE & ZONE | CODE | X | Y | S - OR Δ - OR ANGLE ° |
| HI 3 | 5103 | 550,393.48 | 113,216.12 | + 0 03 15 " |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH (From south) | CODE |
|----------------------|----------------------------------|-------------------------------|------|
| MOKAPU | 280° 44' 42.7 | 280° 41' 27 " | 5103 |

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QC 001

(Continued on next page)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1001
LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

PUU KAUAI (Continued)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUU KAUAI
ESTABLISHED BY: H.O.F. YEAR: 1957 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 5 1/2 miles northwest of Kaneohe.
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 | |
| MOKAPU 1872 1962 | | | | 0 00 00.0" |
| KANEOHE BAY MCAS E RADIO MAST OF 3 1957 | E | (6 1/2 miles) | | 3 32 54.6" |
| RM 2 | SW | 18.27 | 5.569 | 128 13 18" |
| RM 1 | NE | 15.57 | 4.776 | 304 29 38" |

This station was previously the center of a 2 1/2 inch iron pipe which was part of the "C Type" Hawaii Territorial Survey Signal. At this time the iron pipe was sawed off about 1 inch above the base of the signal and a standard station disk was cemented into the pipe. Reference marks 1 and 2 were established at this time. A new description follows.

The station is located about 5 1/2 miles northwest of Kaneohe and on the highest point of a low, brush covered ridge.

To reach the station from the post office in Kaneohe, go northwest on State Highway 83 for 4.5 miles to a reverse fork, bear right and continue northerly on State Highway 83 for 1.25 miles to a side street on the left, turn left and follow Kaimalolo Place for 0.15 mile to the end of the street and the end of truck travel. Pack westerly up onto the ridge, then bear right and follow the ridge northerly to the highest point and the station.

The station mark is a standard disk stamped PUU KAUAI 1957 1969, cemented in the top of a 2 1/2 inch iron pipe which projects about 1 inch above the surface of a 5 x 5 foot concrete pad.

Reference mark 1 is a standard disk stamped PUU KAUAI 1957 NO 1 1969, brazed to the top of 2 inch soil pipe projecting 4 inches above the ground. It is about the same elevation as the station mark.

Reference mark 2 is a standard disk stamped PUU KAUAI 1957 NO 2 1969, brazed to the top of a 2 inch soil pipe projecting about 4 inches above the ground. It is about the same elevation as the station mark.

No measurement was made between the reference marks due to the crest of the ridge and the observing stand being on line.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUU KAUAI
ESTABLISHED BY: H.O.F. YEAR: 1957 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: G.M. Ward YEAR: 1970 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

5 1/2 miles northwest of Kaneohe.

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

Station and Reference Marks No. 1 and No. 2 were recovered in apparent good condition as described in the recovery description of C.A. Annis, 1969 with the addition that the State of Hawaii has now erected a type "B" signal over the station. Access holes have been placed such that direct measurements to the reference marks is not possible.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUU KAUAI
ESTABLISHED BY: H.O.F. YEAR: 1957 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: R. B. Melby YEAR: 1975 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 5 1/2 miles NW of Kaneohe

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:
The station and reference marks were recovered in good condition as described in 1969 and 1970. The pack along the trail from the end of truck travel is somewhat brushy and takes about 20 minutes.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PUU KAUAI
ESTABLISHED BY: H.O.F. YEAR: 1957 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: C.K.T. YEAR: 1976 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 5 1/2 miles NW of Kaneohe

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.

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1002
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

ADJUSTED HORIZONTAL CONTROL DATA

DESCRIPTION OF BENCH MARK STATE SURVEY 4-32

Location: Kaneohe
State: Hawaii County: Honolulu
Chief of party: C. Symms
Leveling date: July 1969
Stamping: 4-32 1969
Description: 4.85 miles northwest along State Highway 83 from the post office at Kaneohe, at the junction of Waihee Road, in the top of the center of a sidewalk, 37.1 feet southwest of the center line of the highway, 26.0 feet northwest of the center line of the road, 20.1 feet northeast of a power pole, 17.6 feet south of a 2-inch iron pipe supporting a "KAHALUU ELEMENTARY SCHOOL" sign, and about 1 foot higher than the highway.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: STATE SURVEY 4-32
ESTABLISHED BY: C. Symms YEAR: 1969 STATE: Hawaii BENCH MARK(S) ALSO ☒
RECOVERED BY: R. B. Melby YEAR: 1975 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 5 miles NNW of Kaneohe

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

The station was recovered as described except the 2-inch pipe supporting a 'KAHALUU ELEMENTARY SCHOOL' sign is now 38.2 feet north of the station. The station has apparently been reset as the disk a State of Hawaii Survey mark is stamped 4-32 1975. All other reference distances check.

NAME OF STATION: STATE SURVEY 4-32

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | |
|---------------------|------------------|------------|-------------|
| GEODETIC LATITUDE: | 21° 27' 46.63750 | ELEVATION: | 2.02 METERS |
| GEODETIC LONGITUDE: | 157 50 38.75585 | | 6.6 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|------------|----------------------------|
| STATE & ZONE | CODE | X | Y | ϕ OR Δ ANGLE * |
| HI 3 | 5103 | 553,010.24 | 107,649.01 | + 0 03 25 |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH * | CODE |
|----------------------|----------------------------------|-----------------|------|
| PUU KAUAI | 154 53 22.8 | 154 49 57 | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION PUU KAUAI

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1003
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

STATE SURVEY 4-29

Designation: State Hawaii County Honolulu
Nearest town: Kaneohe County Honolulu Chief of party: C. Symms
Distance and direction from nearest town: 7.8 miles northwest Leveling date: July 1969
Character of mark: SS disk Stamping: 4-29 1969
Established by: State of Hawaii
Detailed description: Section .T .R

7.8 miles northwest along State Highway 83 from the post office at Kaneohe, near the north corner of the parking area for Our Lady of Mt. Carmel Catholic Church, 13.5 feet southwest of the center line of the highway, 48 feet southeast of the extended center line of a driveway to the parking area, 57.6 feet south and across the highway from power pole 96-278, 147.0 feet northeast of the north corner of a rectory, and set in the top of a concrete post 0.2 foot underground. About level with the highway.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: STATE SURVEY 4-29
ESTABLISHED BY: C. Symms YEAR: 1969 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: R. B. Melby YEAR: 1975 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 8 miles NW of Kaneohe

Detailed statement as to the fitness of the original description, including marks found, stampings, changes made, and other pertinent facts:
The station was recovered as described in 1969. It is a State of Hawaii Survey disk stamped 4-29 1969 set in the top of a concrete monument, about 3 inches below the surface of the ground.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-29

STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543
NO OBSERVATION CHECK ON THIS POSITION

| | | | |
|---------------------|------------------|------------|--------------|
| GEODETIC LATITUDE: | 21° 29' 55.61256 | ELEVATION: | 13.87 METERS |
| GEODETIC LONGITUDE: | 157 51 16.02464 | | 45.5 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|------------|----------------------|
| STATE & ZONE | CODE | X | Y | Bearing Δ or Angle ° |
| HI 3 | 5103 | 549,481.57 | 120,659.32 | + 0 03' 12" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH* (From south) | CODE |
|----------------------|----------------------------------|--------------------------------|------|
| PUU KAUAI | 353° 03' 55.8" | 353° 00' 48" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION PUU KAUAI

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

See Station PUU KAUAI

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211575 STATION 1004
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: MAKIKIKI

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543
NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|-------------------|------------|-----|--------|
| GEODETIC LATITUDE: | 21 ° 29' 06.82125 | ELEVATION: | 158 | METERS |
| GEODETIC LONGITUDE: | 157 52 18.34641 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|------------|---------------------------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ OR ANGLE ° |
| HI 3 | 5103 | 543,600.25 | 115,731.06 | + 0 ° 02' 49" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From north) | PLANE AZIMUTH* (From north) | CODE |
|----------------------|----------------------------------|--------------------------------|------|
| PUU KAUAI | 250 ° 20' 50.4" | 250 ° 18' 01" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION PUU KAUAI

QG 004

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 1305
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

See Station PUU KAUAI

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-28

STATE HAWAII

YEAR 1969

SECOND

ORDER

SOURCE G-14543
NO

OBSERVATION CHECK ON THIS POSITION

| | | | | |
|--------------------|------------------|-----------|----|--------|
| GEODETIC LATITUDE | 21° 29' 09.06382 | ELEVATION | 20 | METERS |
| GEODETIC LONGITUDE | 157 51 19.48720 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|------------|--|
| STATE & ZONE | CODE | X | Y | θ OR Δ OR α ANGLE |
| HI 3 | 5103 | 549,158.93 | 115,962.18 | + 0 03' 11" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH (From south) | CODE |
|----------------------|----------------------------------|-------------------------------|------|
| PUU KAUAI | 335° 45' 47.9" | 335° 46' 37" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION PUU KAUAI

QG 005

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1006
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Heeia (Oahu Island, Hawaiian Government Survey, 1872;
L. G. Simmons, 1927).—On eastern coast of Oahu in Heeia,
on summit of hill called Maelieli, directly between Libbyville and Heeia, about
1 1/4 miles northwest of Heeia, and 1 1/4 miles southeast of Libbyville. It is the
most prominent summit just west of Kaneohe Bay, some 7 miles from the Pali.
Easiest ascent is probably made from north side of hill at the little bay just before
reaching Libbyville. Station is about 2 feet northwest of fence corner, and was
originally marked by an iron stake 3 1/2 feet long, but the mark recovered in 1910
was a concrete post with cross in top. In 1925 no mark could be found, but the
Army had erected over the station a large signal of 6 by 6 inch timbers, which
showed up conspicuously from anywhere along the road between Heeia and
Kahaluu Landing. In 1927 this large signal was found down, and the only thing
found in the way of a mark was an iron stake, underground, and at correct
distance and direction from fence corner. It was replaced with a new mark,
note 6a, consisting of a standard disk station mark set in concrete in top of 5-inch
soil pipe set in ground and surrounded with concrete. Reference marks were
set according to note 13a, standard reference disks in concrete in tiles, at the
following distances and azimuths from station: No. 1, 4.238 meters (13.90 feet),
312° 24'; No. 2, 18.853 meters (61.85 feet), 170° 29'. Re-marked according to
note 14A in 1929.

RECOVERY NOTE, TRIANGULATION STATION

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

| HEIGHT OF TELESCOPE ABOVE STATION MARK 2.53 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 | |
| -----1927 DISTANCES AND DIRECTIONS---- | | | | |
| PAHU 1910 | | | | 00 00 00.0 |
| R.M. No. 1 | | 13.90 | 4.238 | 03 02 50 |
| R.M. No. 2 | | 61.85 | 18.853 | 221 07 50 |
| -----1963 DISTANCES AND DIRECTIONS---- | | | | |
| R.M. No. 1 | SE | 13.988 | 4.264 | 02 58 35 |
| R.M. No. 2 | NW | 61.862 | 18.856 | 221 10 31 |

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

Station is located, airline, about 2-1/4 miles northwest of Kaneohe and 1-1/4 miles southeast of Kahaluu, on Puu Maelieli, a brush covered hill of about 718 feet that has an old, underground, concrete pillbox (with roof flush with ground), and a lone power pole, on its summit.

To reach station from the post office in Kaneohe, go northerly on State Highway 83 for 4.3 miles to St. Johns By The Sea Church; continue on the highway for 0.4 mile; turn sharp left and go southeast on Ahui-manu Rd. for 0.7 mile; take left fork and go 0.5 mile on Okana Rd.; turn left and go 0.3 mile on Okana Pl. to end of road in the yard of Mr. R. Parder. From here pack northeast up along crest of very brushy ridge for about 1/4 mile to station.

Station mark is a standard disk stamped "HEEIA" set in concrete in the top of a concrete-filled, 5-inch, iron pipe about flush with the ground. It is 73 feet south-southeast of lone power pole and 33.4 feet south of the center of the roof entrance of the pillbox. A "Type A" Hawaii Territory Survey signal is centered over the mark. The concrete floor of the signal is 3 feet above ground and the metal target extends 10 feet above it.

Reference mark number one is a standard disk stamped "HEEIA NO 1", set in concrete in the top of a 5-inch iron pipe that projects about 18 inches above ground. It is at about same elevation as station mark.

Reference mark number two is a standard disk stamped "HEEIA NO 2", set in concrete in the top of a 5-inch iron pipe that projects about 12 inches. It is 10.6 feet northwest of the northwest corner of the pillbox, 2 feet north of a trail, 12.5 feet east of lone power pole and about 1-1/2 feet lower than station mark.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **HEEIA**

STATE: **HAWAII**

YEAR: **1872**

FIRST

ORDER

SOURCE: **G-14543**

| | |
|---------------------------------------|-------------------------|
| GEODETIC LATITUDE: 21° 26' 52.95421 | ELEVATION: 218.6 METERS |
| GEODETIC LONGITUDE: 157° 49' 31.36004 | 717 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|------------|-------------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ OR ANGLE * |
| HI 3 | 5103 | 559,386.15 | 102,238.99 | + 0 03' 50" |

* 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 |
|----------------------|-------------------------------|----------------------------|------|
| MOKAPU | 263° 40' 23.1 | 263° 36' 33" | 5103 |

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QG 006

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1006
LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: HEEIA
ESTABLISHED BY: H.G.S. YEAR: 1872 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: G.A.A. YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1-1/4 miles southeast of Kahaluu.
HEIGHT OF TELESCOPE ABOVE STATION MARK 8.3 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 7.3 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 | |
| MOKAPU 1872 1962 | | | | 0 00 00.0 |
| R.M. 1 | SE | 13.99 | 4.264 | 48 40 04 |
| KAILUA KLEI RADIO MAST | SSE | (2 miles) | | 65 01 10.4 |
| R.M. 2 | NNW | 61.88 | 18.862 | 266 52 02.0 |

The station mark and both reference marks were recovered as described in the 1963 data. A new "to reach" was established and a complete description follows.

The station is located about 2-1/4 miles northeast of Kaneohe and 1-1/4 miles southeast of Kahaluu on a brushy hill with a lone power pole on the top of the hill.

To reach the station from junction of State Highway 63 (Likelike Highway) and State Highway 83 (Kamehameha Highway) in Kaneohe, go northeast on State Highway 83 for 3.2 miles to a side road left. Turn left, west, on track road for 0.1 mile to a dim track road right. Turn right, north, following the remains of an old road for 0.1 mile to a fork. Keep left fork, westerly, along old road that follows the ridge, for 0.6 mile to the end of truck travel. The old road continues along the right side of the ridge at this point but bear left on the crest of the ridge to the top of the hill and station. This is about a 10 minute pack. The last 0.7 mile of the old road was overgrown with brush and will probably need some clearing before too long. A 4-wheel vehicle is also needed the last 0.7 mile.

The station mark is a standard disk, stamped HEEIA, set in the top of a concrete-filled 5-inch iron pipe which is flush with the surface. There is a Hawaiian Territorial Monument over the mark. It is a 5-foot square concrete slab supported on two sides by 3-foot tall rock walls. It is 73 feet south-southeast of a power pole and 33 feet south of the center of the roof entrance of an old bunker.

Reference mark 1 is a standard disk, stamped HEEIA NO. 1, set in the top of a concrete-filled 5-inch iron pipe and projects about 18 inches above the surface. It is about the same elevation as the station mark.

Reference mark 2 is a standard disk, stamped HEEIA NO. 2, set in the top of a concrete-filled 5-inch iron pipe and projects about 1 foot above the surface. It is 12.5 feet east of the power pole, 10.6 feet northwest of the northwest corner of the old bunker and about 1-1/2 feet lower than the station mark.

No azimuth mark established for this station.

No measurement between reference marks due to heavy brush on line.

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

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: HEEIA
ESTABLISHED BY: H.G.S. YEAR: 1872 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: J.V. Tester YEAR: 1973 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:

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

The station and all marks were recovered as described in 1969. The 1969 description is adequate for recovery.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: HEEIA
ESTABLISHED BY: H.G.S. YEAR: 1872 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: C.K. TOWNSEND YEAR: 1976 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:

Station was not visited. The metal cross banner located over the station was visible.

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1007
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

STATE SURVEY 4-27

Destination: Kaneohe
Nearest town: Kaneohe
Distance and direction from nearest town: 2.1 miles northwest
Character of mark: SS disk
Established by: State of Hawaii
Detailed description: Section T R

1.95 miles northwest along State Highway 83 from the post office at Kaneohe, thence 0.15 mile northeast along the Heeia Koa Pier, in the southeast corner of the asphalt parking area at the east end of the pier, 25.0 feet north of the northeast corner of a fence around a gasoline storage tank, 17.0 feet southwest of the northeast edge of the asphalt, 9.9 feet northwest of the southeast edge of the asphalt, 15.6 feet west of a 2-inch iron post supporting a "1 HR PARKING" sign, 41.6 feet northwest of the northeast corner of a rest room, 73 feet northeast of power pole 4 bearing three transformers and three lights, about level with the asphalt parking area, and set in the top of a concrete post projecting 0.1 foot above the asphalt.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: STATE SURVEY 4-27

ESTABLISHED BY: C. Symms YEAR: 1969 STATE: Hawaii BENCH MARK(S) ALSO ☒
RECOVERED BY: C.K.T. YEAR: 1976 COUNTY: Honolulu

AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2 miles NW of Kaneohe

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 1969.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-27

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | |
|---------------------|------------------|------------|-------------|
| GEODETIC LATITUDE: | 21° 26' 50.27977 | ELEVATION: | 1.30 METERS |
| GEODETIC LONGITUDE: | 157 48 45.10695 | | 4.3 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|------------|-----------------|
| STATE & ZONE | CODE | X | Y | B OR Δ OR ANGLE |
| HI 3 | 5103 | 563,755.90 | 101,974.19 | + 0 04 07 |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH (From south) | CODE |
|----------------------|----------------------------------|-------------------------------|------|
| HEEIA | 93° 32' 11.0 | 93° 28' 04" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION HEEIA

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 1008
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

See Station HEEIA

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-31

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|-------------------|-----------|----|--------|
| GEODETIC LATITUDE: | 21 ° 20' 46.57952 | ELEVATION | 16 | METERS |
| GEODETIC LONGITUDE: | 157 50 07.59342 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|------------|---------------------------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ OR ANGLE * |
| HI 3 | 5103 | 553,963.74 | 101,592.07 | + 0 03' 37" |

* 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 |
|----------------------|----------------------------------|-------------------------------|------|
| HEEIA | 259 ° 21' 22.3 | 259 ° 17' 46" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION HEEIA

QG 308

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1009
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

Bench Mark B 4

RECOVERY NOTE, BENCH MARK

Designation: Bench Mark B 4
Name: Kaneohe
State: Hawaii
County: Honolulu
Described in: 2 Hawaii-1
Chief of party: C. Symms
Distance and direction from nearest town: 1.1 miles north
Recovery date: July 1969
Character of mark: C&GS tidal mark disk
Established by: C&GS
Stamping: B 4 1927
Also horizontal control point: ☐
Present condition: Good
Detailed report: 1.1 miles north along State Highway 83 from the post office to Kaneohe, 0.25 mile southeast of a long concrete bridge, 25.2 feet southwest of the center line of the highway, 25.0 feet south of power pole 50, 7.8 feet southwest of a triangle blaze on a 16-inch monkey pod tree, 11.3 feet south-southwest of a 12-inch monkey pod tree, and set in the top of a concrete post about 1 1/2 feet under-ground.

Form C&GS-685A
(57)

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

NAME OF STATION: BENCH MARK B 4

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | |
|--------------------|-------------------|-----------|--------------|
| GEODETIC LATITUDE | 21° 26' 08.54123 | ELEVATION | 12.54 METERS |
| GEODETIC LONGITUDE | 157° 48' 43.67297 | | 41.1 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|------------------|
| STATE & ZONE | CODE | X | Y | Bearing or Angle |
| HI 3 | 5103 | 563,856.44 | 97,742.71 | + 0° 04' 07" |

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE BORELLI FORMULA NEGLECTING THE SECOND TERM

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH* | CODE |
|----------------------|----------------------------------|----------------|------|
| HEE IA | 134° 58' 46.3 | 134° 54' 39" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION HEEIA

QG 009

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211575 STATION 1010
HAWAII
LATITUDE 21° 30' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

FORM 525
(6-15-69)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

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

| NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK 1.7 METERS. HEIGHT OF LIGHT ABOVE STATION MARK 1.4 METERS. | | DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION | | | |
|---|------|--|---------|-------------------------|-----------------|
| Desc. | None | OBJECT | BEARING | DISTANCE FEET METERS | DIRECTION |
| | | HEEIA 1872 1927 | | | 0 00 00.0 |
| | | Kaneohe Bay MCAS Hawaiiiloa Hill | | | |
| | | Beacon 1959 | NE | (5 1/2 miles) | 56 00 04.2 |
| Desc. | | R.M. NO 1 | W | 22.11 | 6.738 272 38 27 |
| Desc. | | R.M. NO 2 | WNW | 30.04 | 9.156 318 41 06 |
| | | Distance RM 1 to RM 2 | | 21.78 | 6.637 |

The station is located about 4 3/4 miles west of Kailua, 1 3/4 miles southwest of the Post Office in Kaneohe, 1/4 mile west-northwest of the Likelike Highway, on a red colored hogback ridge leading up to a sheer wall of the pali.

To reach from the Post Office in Kaneohe, go southerly on State Highway 83 for 1.1 mile to the junction with Likelike Highway. Turn right and go 0.75 mile to a side road on the right, turn right and bear left for 0.2 mile to an old quarry and end of truck travel. Pack to the right and back to the left onto a ridge, then up the ridge westerly for approximately 1/4 mile to the station on the right on a narrow part of ridge, to the right and above what appears to be an old washed out wagon road.

Station mark is a standard disk stamped RED DIRT 1969, brazed to the top of a 3 inch pipe, which is set flush with the surface of the ground. It is 15 feet south of the center of ridge, 4 feet north of dropoff.

Reference mark 1 is a standard disk stamped RED DIRT NO 1 1969, brazed to the top of a 3 inch pipe, which projects 10 inches above the surface of the ground. It is 14 feet south of the center of ridge, 4 feet north of dropoff.

Reference mark 3 is a standard disk stamped RED DIRT NO 2 1969, brazed to the top of a 3 inch pipe, which projects 8 inches above the surface of the ground. It is 12 feet north of the center of ridge, 3 feet south of a dropoff.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: RED DIRT
STATE: HAWAII YEAR: 1969 FIRST ORDER

SOURCE: G-14543

| | | | |
|--------------------|-------------------|-----------|--------------|
| GEODETIC LATITUDE | 21° 24' 02.29867 | ELEVATION | 215.0 METERS |
| GEODETIC LONGITUDE | 157° 49' 02.03226 | | 705 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-----------------|
| STATE & ZONE | CODE | X | Y | B OR Δ B' ANGLE |
| HI 3 | 5103 | 562,176.75 | 85,022.90 | + 0 04' 00" |

* 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 |
|----------------------|----------------------------------|-------------------------------|------|
| HEEIA | 170° 51' 34.7 | 170° 47' 35" | 5103 |

QG 010

*Refers to notes in manuals of triangulation and state publications of triangulation. B Direction-angle measured clockwise, referred to initial sta. n.
†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 1011
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 4-12

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

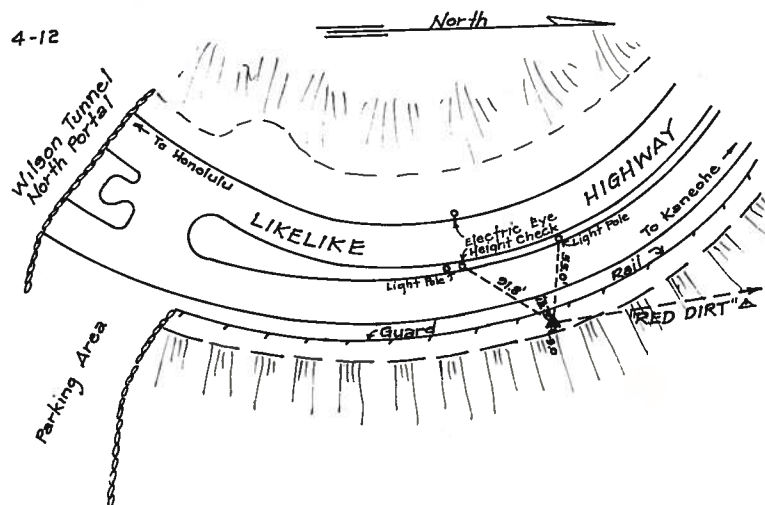
Description, including sketch of object:

Station is located in Kaneohe District on the easterly side of Likelike Highway about 300 feet north of the Wilson Tunnel North Portal.

Station mark is a standard State Survey disk stamped "4-12 1969 = WILSON" and placed in center of a three-fourths inch pipe marking the State Highways Division Station "WILSON" and reinforced with a foot-square concrete monument projecting 5 inches above ground level. Ties from station are: S.W. 91.8 ft. to Electric Eye height check device; N.W. 55.0 ft. to light pole; W. 12.0 ft. to edge of pavement; E. 3.0 ft. to top of bank.

Geodimeter connection was made between "RED DIRT" and "State Survey 4-12".

SS 4-12



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-12

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

NO G-14545
NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|-------------------|------------|-----|--------|
| GEODETIC LATITUDE: | 21° 23' 03.07825 | ELEVATION: | 207 | METERS |
| GEODETIC LONGITUDE: | 157° 48' 51.88549 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|----------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ ± ANGLE |
| HI 3 | 5103 | 563,142.66 | 79,048.67 | + 0° 04' 04" |

* 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 |
|----------------------|----------------------------------|--------------------------------|------|
| RED DIRT | 170° 53' 00.9 | 170° 48' 57" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION RED DIRT

QG 011

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1012
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF STATE SURVEY STATION

NAME: STATE SURVEY 4-24 = Groucho STATE: Hawaii COUNTY: Honolulu

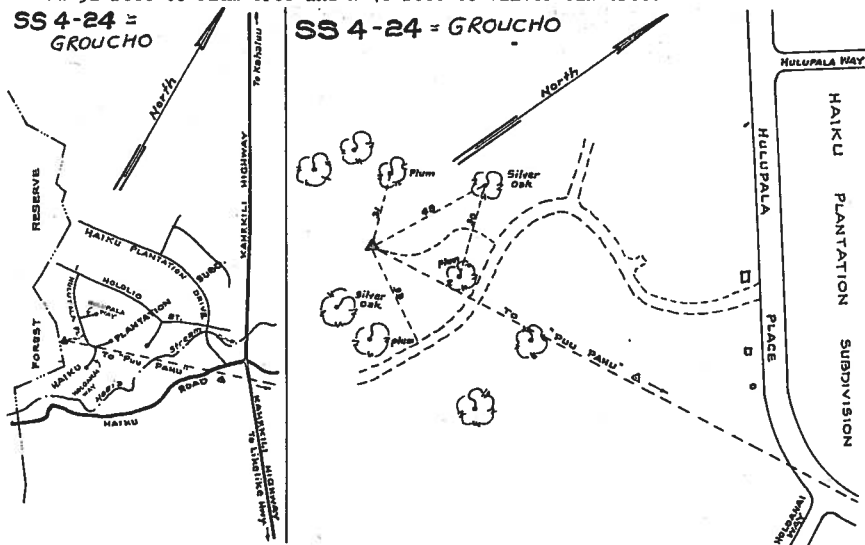
ESTABLISHED BY: State of Hawaii YEAR: 1969

DESCRIBED BY: Harold M. Yonamine, Highways Division

The station is located in the Haiku Plantation Subdivision, on the North slope of Haiku Valley, about 1 mile from the intersection of Kahakili Highway and Haiku Road in Kaneohe.

To reach station from Kahakili Highway, go Westerly on Haiku Road for 0.1 mile, turn right on Haiku Plantation Drive and proceed North-westerly for 0.15 mile, turn left on Hololio Street and continue Westerly for 0.35 mile, turn left on Hulupapa Place and go Southerly for 0.25 mile to the intersection of dirt road on the right at Trans-former Box No. 25635.

Proceed on foot Southwesterly for about 400 feet to station marked with standard State Survey disk stamped "4-24 1969 = Groucho" in concrete monument 0.5 foot above ground level. Tics from Station: NW 31 feet to Plum tree and N 48 feet to Silver Oak tree.



RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: STATE SURVEY 4-24-GROUCHO
ESTABLISHED BY: H.G.S. YEAR: 1969 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: R. B. Melby YEAR: 1975 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: at Kaneohe

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. It is 155.4 feet southwest of the southwest corner of the roof (eaves) of Letterman residence at 46430 Hulupapa Place.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-24-GROUCHO

STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543

| | | | | |
|---------------------|-------------------|------------|-----|--------|
| GEODETIC LATITUDE: | 21° 24' 58.26924 | ELEVATION: | 135 | METERS |
| GEODETIC LONGITUDE: | 157° 49' 30.18452 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-----------------------------|
| STATE & ZONE | CODE | X | Y | ϕ OR Δ OR ANGLE |
| HI 3 | 5103 | 559,510.11 | 90,667.32 | + 0 03' 50" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH (From south) | CODE |
|----------------------|----------------------------------|-------------------------------|------|
| PAHU | 250° 30' 41.0 | 250° 26' 51" | 5103 |

QG 012

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 1013
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF STATE SURVEY STATION

NAME: STATE SURVEY 9-26 = Low STATE: Hawaii COUNTY: Honolulu

ESTABLISHED BY: State of Hawaii YEAR: 1969

DESCRIBED BY: Harold M. Yonamine, Highways Division

Station is located on the top of Koolau Range, between Moanalua Valley and Haiku Valley, and about midway between the antenna anchor towers for the Haiku radio station cables.

Station is on a small peak with an area of about 15 feet width seated over the saddle ridge and can only be reached by the use of helicopter.

Station mark is a standard survey disk stamped "9-26 1969 = Low" cemented in concrete monument 0.1 foot above ground level.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION STATE SURVEY 9-26 LOW

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

| | | | |
|---------------------|------------------|------------|-------------|
| GEODETIC LATITUDE: | 21° 24' 10.15815 | ELEVATION: | 4.48 METERS |
| GEODETIC LONGITUDE: | 157 50 16.66208 | | 14.7 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-------------------------------------|
| STATE & ZONE | CODE | X | Y | ϕ OR Δ θ ANGLE * |
| HI 3 | 5103 | 555,123.53 | 85,808.18 | + 0° 03' 33" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH * | CODE |
|-------------------------|----------------------------------|-----------------|------|
| STATE SURVEY 1-10 GUAVA | 52° 32' 48.0" | 52° 29' 15" | 5103 |

QG 013

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1014
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF SURVEY MARK

NAME OF STATION: PILOT STATE: Hawaii COUNTY: Honolulu
ESTABLISHED BY: Parsons Brinckerhoff-Hirpta Associates DATE: February 11, 1969
DESCRIBED BY: James Hamasaki SURFACE MARK: Standard State Bronze Plate

The station is about 2 miles west of Kanohe town at the base of Koolau Range, in the Haiku Valley Forest Reserve, on the South side of the Naval Reservation property.

To reach this station from Kanohe Shopping Center, go northerly on Kamehameha Highway for about 0.6 mile to Haiku Valley Road. Turn left on Haiku Valley Road and head westerly for about 0.7 mile to Kahekili Highway. Proceed westerly across Kahekili Highway on Haiku Road 0.9 mile to the Naval Reservation gate. Pass through gate and follow paved road 0.3 mile to a fork in the road. Take left fork 0.4 mile, passing Bldgs. 24 and 40 on right side of road to a dirt side road on left. Go on dirt road 200 ft. to an old shack. Turn right (South westerly) and follow trail on ridge line. There are 3 antennae poles on the trail. Go pass the second pole and turn right on a trail for about 50 ft. Turn left 75 ft. to ridge line. Turn right and follow ridge line for about 150 ft. to station.

Station mark is a State of Hawaii bronze disc in concrete, 3" above the ground, and stamped "Pilot".

ADJUSTED HORIZONTAL CONTROL DATA

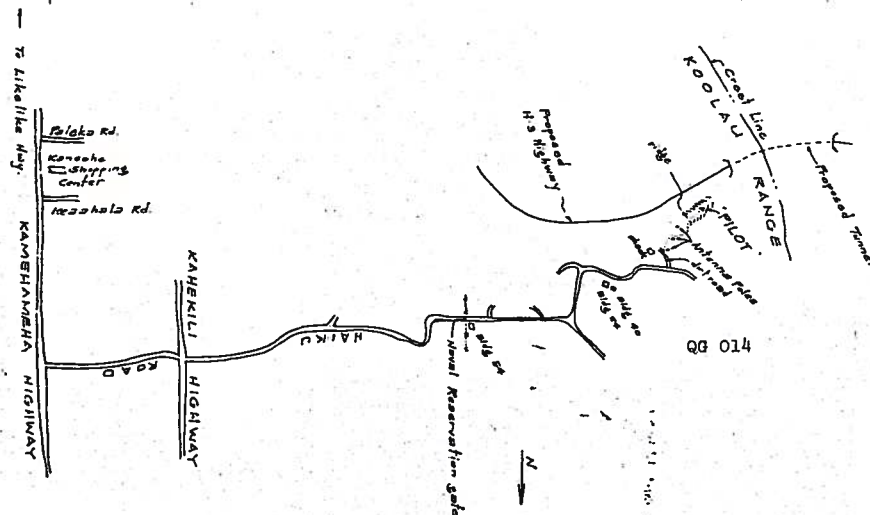
NAME OF STATION: PILOT
STATE: HAWAII YEAR: 1969 SECOND ORDER
SOURCE: G-14543

| | | | |
|--------------------|------------------|-----------|--------------|
| GEODETIC LATITUDE | 21° 24' 17.22271 | ELEVATION | 219.4 METERS |
| GEODETIC LONGITUDE | 157 49 51.03590 | | 720 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-------------------------------|
| STATE & ZONE | CODE | X | Y | ϕ OR Δ OR ANGLE * |
| HI 3 | 5103 | 557,544.36 | 86,523.55 | + 0 05' 42" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From north) | PLANE AZIMUTH * | CODE |
|---------------------------|----------------------------------|-----------------|------|
| STATE SURVEY 4-24 GRJUCHO | 205° 26' 26.8 | 205° 22' 45" | 5103 |



HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1015
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

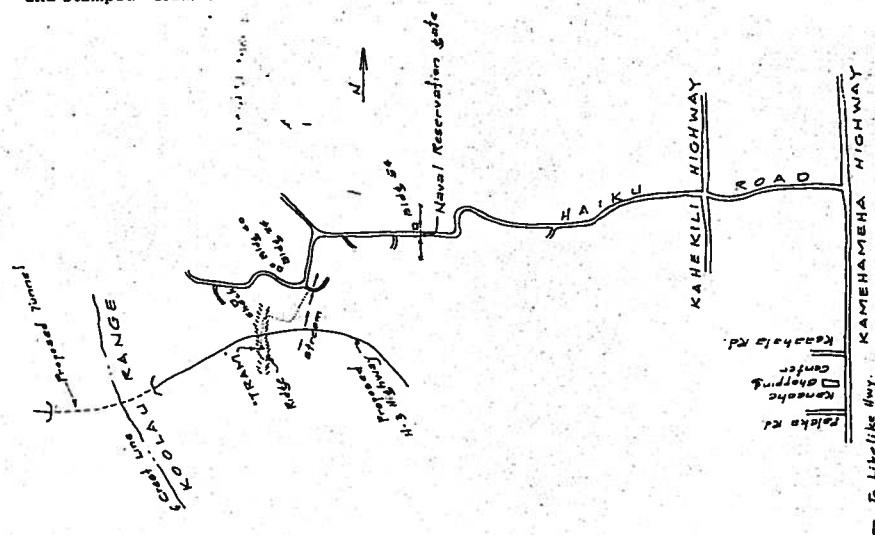
DESCRIPTION OF SURVEY MARK

NAME OF STATION: TRAM STATE: Hawaii COUNTY: Honolulu
ESTABLISHED BY: Parsons Brinckerhoff-Hirota Associates DATE: February 10, 1969
DESCRIBED BY: James Hamasaki SURFACE MARK: Standard State Bronze Plate

The station is about 2 miles west of Kaneohe town at the base of the Koolau Range, in the Haiku Valley Forest Reserve, on the South side of the Haiku Naval Reservation property.

To reach the station from Kaneohe Shopping Center, go northerly on Kamehameha Highway for about 0.6 mile to Haiku Valley Road. Turn left on Haiku Valley Road and head westerly for about 0.7 mile to Kahekili Highway. Proceed westerly across Kahekili Highway on Haiku Road 0.9 mile to the Naval Reservation gate. Pass through gate and follow paved road 0.3 mile to a fork in the road. Take left fork 0.1 mile to a paved side road on left. Go about 100 ft. on paved road to a "Slow" sign and stream. Turn right (southerly) and go uphill on trail on right side of stream for about 300 ft. to a bend. Turn right and go approximately 150 ft. to the ridge. Go left on ridge for approximately 150 ft. to red dirt area and station.

Station mark is a State of Hawaii bronze disc in concrete 4" above the ground and stamped "Tram".



ADJUSTED HORIZONTAL CONTROL DATA

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

SOURCE: G-14543

| | | | |
|---------------------|------------------|------------|--------------|
| GEODETIC LATITUDE: | 21° 24' 22.56594 | ELEVATION: | 214.9 METERS |
| GEODETIC LONGITUDE: | 157 49 40.80353 | | 705 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|----------------|
| STATE & ZONE | CODE | X | Y | Δ OR Δ Δ ANGLE |
| HI 3 | 5103 | 558,510.68 | 87,063.73 | + 0 03 46" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH (From south) | CODE |
|----------------------|----------------------------------|-------------------------------|------|
| PILOT | 60° 51' 25.8" | 60° 47' 40" | 5103 |

QG 015

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1J16
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

Pahu (Oahu Island, O. B. French, 1910).—On the prominent hill just southeast of the old mill at Heia and northeast of the courthouse at Kaurohe. Marked by a cross in top of a square concrete post.

PAHU (Hawaii, O.B.F., 1910; H.A.P., 1932)
Found signal 14C at site of old station. It is supposed the Territorial Surveyor re-marked the station.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PAHU
ESTABLISHED BY: O.B.F. YEAR: 1910 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 in good condition. It is marked by a type C, Hawaiian territory Survey monument set on the highest point of the ridge called PUU Pahu in the village of Kaneohe.

RECOVERY NOTE, TRIANGULATION STATION

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

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

| DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION | | | | |
|--|---------|----------|--------|------------|
| OBJECT | BEARING | DISTANCE | | DIRECTION |
| | | FEET | METERS | |
| HEEIA 1872-1927 | | | | 00 00 00.0 |
| R.M. No. 2 | NW | 15.260 | 4.651 | 27 59 34 |
| R.M. No. 1 | SE | 18.240 | 5.560 | 207 59 02 |

The station, a Territory of Hawaii "Type C" signal, was recovered in good condition. Two reference marks, numbers one and two, were established. A complete description follows:

Station is located at the north end of Kaneohe, about 1/2 mile east-northeast of the post office, on Puu Pahu, a prominent, reddish hill of about 280 feet elevation, which has a lone light pole on its top.

To reach station from the post office in Kaneohe, go southeast on Kamehameha Highway for 0.05 mile; turn left and go east-northeast on Liliupuna Road for 0.7 mile to south side of hill. Turn left and go up steep dirt road for 0.2 mile to top of hill and station.

Station is center of 2-1/2-inch iron pipe that projects 2 feet from the center of a 6-foot-square, concrete platform flush with the ground. It is 17.5 feet south-southeast of the center of the lone light pole.

Reference mark number one is a standard disk stamped "PAHU NO 1 1910 1963", set in the top of a 12-inch-diameter, concrete monument that projects 2 inches above ground. It is along the sharp crest of the hill and about 3 feet lower than the concrete platform.

Reference mark number two is a standard disk stamped "PAHU NO 2 1910 1963", set in the top of a 12-inch-diameter, concrete monument that projects 2 inches above ground. It is 2.9 feet southwest of the center of the light pole and about the same elevation as the concrete platform.

(Continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PAHU
STATE: HAWAII YEAR: 1910 FIRST ORDER

SOURCE: G-14543

| | |
|---------------------------------------|------------------------|
| GEODETIC LATITUDE: 21° 25' 32.56045 | ELEVATION: 86.5 METERS |
| GEODETIC LONGITUDE: 157° 47' 46.67886 | 283 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|------------------|
| STATE & ZONE | CODE | X | Y | # OR Δ ° ANGLE ° |
| HI 3 | 5103 | 569,285.70 | 94,139.15 | + 0 04' 28" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH (From south) | CODE |
|----------------------|-------------------------------|----------------------------|------|
| RED DIRT | 38° 01' 19.0 | 37 56' 51" | 5103 |

THESE DATA OBTAINED FROM ADJUSTMENT OF NUV 1970

QG 016

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1016
LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

PAHU (Continued)

RECOVERY NOTE, TRIANGULATION STATION

R

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PAHU
ESTABLISHED BY: O.B.F. YEAR: 1910 STATE: Hawaii BENCH MARK ALSO ☐
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1/2 mile north of Kaneohe
HEIGHT OF TELESCOPE ABOVE STATION MARK 4 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 4 FEET.

NAME OF STATION: PAHU
ESTABLISHED BY: O.B.F. YEAR: 1910 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: C.K. Townsend YEAR: 1976 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN:
North of Kaneohe

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

Station and reference marks were recovered in good condition as described in 1969.

| 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 | |
| RED DIRT | | | | ° 00' 00.0" |
| RM 2 | NW | 15.28 | 4.658 | 119 21 51' |
| KANEHOE HA TEL CO MICROWAVE TOWER | E | (2 1/2 miles) | | 232 08 53.2' |
| RM 1 | SE | 18.25 | 5.564 | 299 18 34' |

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 the "C Type" Hawaii Territorial Survey Signal. The 2 1/2 inch iron pipe was removed by the Hawaii State Survey Office and replaced by a standard station disk. A new description follows.

The station is located at the north end of Kaneohe and on a prominent, reddish colored hill known as Puu Pahu which has a lone power pole on its top.

To reach the station from the post office in Kaneohe, go south on State Highway 83 for 0.05 mile to Linipuna Road on the left, turn left and go easterly on Linipuna Road for 0.65 mile to a concrete drive on the left, turn left and go northerly on the steep concrete drive for 0.1 mile to the end of the drive, a turn around area and the end of truck travel. Pack easterly for about 75 yards to the top of the hill and the station as described.

The station mark is a standard disk stamped PAHU 1910 1969, set in a mass of concrete in the center of the 5 x 5 foot concrete pad. It is about 8 inches below the surface of the concrete pad and 17.5 feet south of the lone power pole.

Reference mark 1 is a standard disk stamped PAHU 1910 NO 1 1963, set in the top of a round concrete post which is flush with the ground surface. It is 36 feet south of the power pole and about 1 foot lower in elevation than the station.

Reference mark 2 is a standard disk stamped PAHU 1910 NO 2 1963, set in the top of a round concrete post which is flush with the ground surface. It is 2.0 feet south of the power pole and about the same elevation as the station.

The distance between the reference marks is 33.53 feet or 10.222 meters.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: PAHU
ESTABLISHED BY: O. B. French YEAR: 1910 STATE: Hawaii BENCH MARK ALSO ☐
RECOVERED BY: R. B. Helby YEAR: 1975 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: at Kaneohe
HEIGHT OF TELESCOPE ABOVE STATION MARK 5 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 | |
| HONIA, 1872 | | | | ° 00' 00.0" |
| R. M. 2 | NW | 15.26 | 4.652 | 28 03 00' |
| Pyramid Rock Light | NE | (3 miles) | | 85 55 23.6' |
| R. M. 1 | SE | 18.23 | 5.556 | 207 55 47' |

The station and reference marks were recovered in good condition as described in 1969.

FORM CG-526 (9-66)
JSCOMM-DC 36496-P56

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

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1017
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

ADJUSTED HORIZONTAL CONTROL DATA

DESCRIPTION OF BENCH MARK STATE SURVEY 4-19

Location Kaneohe State Hawaii County Honolulu
Chief of party C. Symms
Distance and direction from nearest town 1.25 miles southeast
Leveling date July 1969
Character of mark SS disk
Stamping 4-19 1969
Established by State of Hawaii
Detailed description

1.25 miles southeast along State Highway 83 from the post office at Kaneohe, in the southwest corner of a triangle formed by the intersection of the highway and Kaneohe Bay Drive, in the top of a concrete sidewalk, 17.4 feet east of the east curb of the highway, 8.2 feet north of the south curb of the drive, 12.3 feet east of a traffic light, 39.4 feet south of telephone pole 43, and about 1/2 foot above the highway.

FORM CG-5-628
(5-6-61)
USCOM-MDC 60236-P66

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

NAME OF STATION STATE SURVEY 4-19

STATE HAWAII

YEAR 1969

SECOND

ORDER

SOURCE G-14543

NJ OBSERVATION CHECK ON THIS POSITION

| | | | |
|---------------------|-------------------|------------|--------------|
| GEODETIC LATITUDE: | 21° 24' 22.17131 | ELEVATION: | 36.60 METERS |
| GEODETIC LONGITUDE: | 157° 48' 37.80183 | | 120.3 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-----------------------------|
| STATE & ZONE | CODE | X | Y | ρ OR Δ OR ANGLE |
| HI 3 | 5133 | 567,458.91 | 87,354.27 | + 0 34' 20" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH* | CODE |
|----------------------|----------------------------------|----------------|------|
| PAHU | 195° 41' 43.0" | 195° 37' 23" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION PAHU

QG 017

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 1018
HAWAII
LATITUDE 21° 30' TO 21° 33'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

STATE SURVEY 4-23

| | | |
|--|---------------------|-------------------------|
| Designation | State Hawaii | County Honolulu |
| Nearest town | Kaneohe | County Honolulu |
| Distance and direction from nearest town | 0.45 mile southeast | Chief of party C. Symms |
| Character of mark | SS disk | Leveling date July 1969 |
| Established by | State of Hawaii | Stamping 4-23 1969 |
| Detailed description | Section | ,T, R |

0.45 mile southeast along State Highway 83 from the post office at Kaneohe, at the south corner of the intersection of Maikalua Road northeast and Paleka Road southwest, across Paleka Road from the Kaneohe Fire Station, 1.2 feet southwest of the southwest curb of the southeast bound lanes of the highway, 57.0 feet southeast of the center line of Paleka Road, 27.8 feet south-southeast of a traffic light, 35.1 feet east of the east corner of the State Saving and Loan Association building, and about $\frac{1}{2}$ foot higher than the highway.

FORM CGCS-638
(8-64)
USCOMM-OC 60288-P86

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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-23

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | |
|---------------------|------------------|------------|--------------|
| GEODETIC LATITUDE: | 21° 24' 59.22936 | ELEVATION: | 19.72 METERS |
| GEODETIC LONGITUDE: | 157 48 10.27138 | | 64.7 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-------------------------------|
| STATE & ZONE | CODE | X | Y | ϕ OR Δ RI ANGLE * |
| HI 3 | 5103 | 567,060.85 | 90,773.12 | + 0 04' 19" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH * | CODE |
|----------------------|----------------------------------|-----------------|------|
| PAHU | 213° 32' 08.8 | 213° 27' 50" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION PAHU

QG 018

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 1019
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

See Station PAHU

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-25

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|------------------|------------|----|--------|
| GEODETIC LATITUDE: | 21° 26' 07.51365 | ELEVATION: | 45 | METERS |
| GEODETIC LONGITUDE: | 157 49 32.59940 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-------------------|
| STATE & ZONE | CODE | X | Y | θ FOR Δ & ANGLE ° |
| HI 3 | 5103 | 559,274.17 | 97,653.87 | + 0° 03' 49" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH (From south) | CODE |
|----------------------|----------------------------------|-------------------------------|------|
| PAHU | 289° 24' 29.8 | 289° 20' 40" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION PAHU

QG 019

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 1020
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

STATE SURVEY 4-26

Designation State Hawaii County Honolulu
Nearest town Kaneohe County Honolulu Chief of party C. Symms
Distance and direction from nearest town 0.7 mile northwest Levelling date July 1969
Character of mark SS disk Stamping 4-26 1969
Established by State of Hawaii
Detailed description Section ,T ,R

0.7 mile northwest along State Highway 83 from the post office at Kaneohe, about 100 yards west of the Samuel Wilder School building, along the west side of the football field, 31.0 feet east of the center line of the highway, 65.2 feet southeast and across the highway from power pole 37, 126.7 feet north-northeast and across the highway from power pole 36, 30 yards northeast and across the highway from house No. 46-188, and about 1/2 foot lower than the highway.

FORM CGCS-438
(6-68)
USCOMP-DC 60288-P88

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 4-26

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

G-14543

SOURCE: NO OBSERVATION CHECK ON THIS POSITION

| | | | |
|---------------------|-----------------|------------|--------------|
| GEODETIC LATITUDE: | 21 25 49.96590 | ELEVATION: | 25.19 METERS |
| GEODETIC LONGITUDE: | 157 48 36.01305 | | 82.6 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|---------------------------------|
| STATE & ZONE | CODE | X | Y | θ FOR Δ & ANGLE * |
| HI 3 | 5103 | 564,622.37 | 95,889.50 | + 0 04' 10" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH * (From south) | CODE |
|----------------------|----------------------------------|---------------------------------|------|
| PAHU | 290° 38' 34.5" | 290° 34' 25" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION PAHU

QG 020

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD: 211573 STATION 1021
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Mokapu (Oahu Island, Hawaiian Government Survey, 1872;
L. G. Simmons, 1927).—On southeastern coast of Oahu,
at the northeast corner of Mokapu Peninsula, and about 100 feet south of the
highest part of Ulupau Head. A trail leads up southwest of the station. Orig-
inally marked by an iron stake set in the rock with melted lead. Later re-marked
by a United States Engineers' plate set in a cylinder of concrete. In 1927 this
was replaced with a large concrete pier in the top of which was placed a standard
disk station mark, note 1a. Reference marks, note 12a, standard reference disks
in outcropping bedrock are at the following distances and azimuths from station:
No. 1, 6.898 meters (22.63 feet), 340° 31'; No. 2, 4.348 meters (14.27 feet),
216° 28'. Re-marked according to note 14A in 1929.

MOKAPU (HAWAII, O.B.F., 1910; O.W.S., 1931)

--Station not visited. Highest point of
Ulupau crater used as hydrographic signal.

Form 528
(11-8-65)

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

NAME OF STATION: *Mokapu*

ESTABLISHED BY: *Hawaiian Govt. Survey* YEAR: *1872* STATE: *Hawaii*
RECOVERED BY: YEAR: *1952* COUNTY: *Honolulu*

Devised statement as to the fitness of the original description, including marks found, stampings, changes made, and other pertinent facts:
*Inspected station Sept. 19 and Dec. 3, 1952 and found concrete platform tilted and shaky causing
signal to lean, due to crumbling sandstone masonry wall under superstructure.*

Built wooden platform over concrete superstructure to make 1952 observations.
*April 6, 1962 - Inspected station with Capt. Seaborg of Coast and Geodetic Survey, Lt. Sylvia and Chief
Engineer Kusimoto of Kaneohe Marine Air Base. Found concrete superstructure to be in same condition
as in 1952. Referenced station from disk for resetting at a later date. After grading this area
will be 10 to 20 feet lower than the present ground level.*

May 31, 1962 - Mokapu Trig. station and Reference marks No. 1 and No. 2 destroyed.

July 19, 1962 - Trig. station reset with standard disk and stamped MOKAPU 1872-1962.

July 26, 1962 - Type B-1 concrete platform built over reset station by E. A. Fernandez.

October 9, 1962 - Set standard reference marks No. 3 and No. 4 and stamped MOKAPU 1872 Reset 1962.

October 9, 1962 - Made observations. Field Book 1662, Pages 52-56
*Jeep station wagon (4-wheel drive) can be driven right up to station over present
graded rough road on Southwesterly slope of Ulupau Crater*

Form 526a
(5-19-63)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: *Mokapu*

ESTABLISHED BY: *Hawaiian Govt. Survey* YEAR: *1872* STATE: *Hawaii*
RECOVERED BY: YEAR: *1962* 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 | | | | |
| U.S. Mon. No. 1 | | | | 0 | 00 | 00.0 | |
| Reference mark No. 4 | | 69.31 | 21.126 | 19 | 05 | 08.3 | |
| Reference mark No. 3 | | 16.52 | 5.035 | 272 | 42 | 22.6 | |

(Continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: MOKAPU

STATE: HAWAII

YEAR: 1872

FIRST

-ORDER

SOURCE: G-14543

| | | | |
|---------------------|-------------------|------------|--------------|
| GEODETIC LATITUDE: | 21° 27' 26.77673 | ELEVATION: | 202.1 METERS |
| GEODETIC LONGITUDE: | 157° 44' 04.66576 | | 663 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|------------|-------------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ or ANGLE ° |
| HI 3 | 5103 | 590,242.55 | 135,695.06 | + 0° 35' 50" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From north) | PLANE AZIMUTH * (From north) | CODE |
|----------------------|----------------------------------|---------------------------------|------|
| US MON 1 | 351° 03' 39.0 | 350° 57' 50" | 5103 |

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QG 021

MOKAPU (Continued)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1021

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

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: MOKAPU
ESTABLISHED BY: Haw. State Surv. YEAR: 1872 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 | | | | |
| U.S. Mon No. 1 | --- | 1962 DISTANCES AND DIRECTIONS----- | | 00 00 00.0 | | | |
| Reference Mark No. 4 | | 69.31 | 21.126 | 19 05 08.3 | | | |
| Reference Mark No. 3 | | 16.52 | 5.035 | 272 42 32.6 | | | |
| -----1963 DISTANCES----- | | | | | | | |
| RM No. 4 | S | 69.258 | 21.110 | | | | |
| RM No. 3 | E | 16.528 | 5.038 | | | | |

Station was recovered and all marks found in good condition. When the hilltop was to be cut off and leveled by the military in 1962, the station point was referenced by personnel of the Hawaii State Survey, under the supervision of the Coast and Geodetic Survey. Upon completion of the grading the station was remarked at the new, lower elevation by Hawaii State Survey personnel. They also established two reference marks, numbers three and four, and constructed a "Type B" signal over the station mark. A complete description follows:

Station is located about 3 miles airline north of Kailua, on the Kaneohe Marine Corps Air Station, on the summit of Ulupau Head. Station may be reached by obtaining permission and directions at the S-2 Office in the Base Administration Building, No. 215, on the Marine Base. (NOTE: A 4-wheel-drive vehicle is required in order to drive to station).

Station mark is a standard disk stamped "MOKAPU 1872 1962", set in the top of a concrete monument about 6 inches below ground level. It is near the south end of the long, narrow, flat top of the hill, 24 feet west of a fenceline, 100 feet north from south end of the fence, and at the south end of a row of portable radar antennas. The 6-foot-square, concrete floor of the Type B signal extends 6 inches above ground.

Reference mark number three is a standard disk stamped "MOKAPU 1872 RESET 1962 NO 3", cemented in a drill hole in the concrete dead-man anchor of the tram cable. It is 7.8 feet northeast of the southwest end of the anchor, 7.6 feet west of the fence, and 8 inches below ground.

Reference mark number four is a standard disk stamped "MOKAPU 1872 RESET 1962 NO 4", cemented in a drill hole in the north end of a 12-foot square concrete platform that has a small building setting on it, and is located at the extreme south end of the hilltop.

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

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

USCOMM-DC 27179-P81

(Continued on next page)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1021
LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

MOKAPU (Continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: MOKAPU
ESTABLISHED BY: H.G.S. YEAR: 1872 STATE: Hawaii BENCH MARK ALSO ☐
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3 miles north of Kailua.
HEIGHT OF TELESCOPE ABOVE STATION MARK 8 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 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 | |
| U S MON NO 1 1952 | S | 69.27 | 21.111 | 0 00 '00.0" |
| EM 4 | SW | (2 3/4 miles) | | 19 05 10" |
| KANEHOE HA TEL CO MICROWAVE TOWER | E | 16.54 | 5.040 | 45 25 12.0" |
| EM 3 | | | | 272 35 24" |

The station mark and reference marks 3 and 4 were recovered and found in good condition. A considerable difference was obtained in the direction to reference mark 3. This was rechecked at a later date. A new description follows.

The station is located about 3 miles north of Kailua, on the Kaneohe Marine Corps Air Station and on the summit of Ulupau Head.

To reach the station from the intersection of Kaneohe Bay Drive and Mokapu Boulevard at the north edge of Kailua, go northeasterly on Mokapu Boulevard for 0.65 mile to the guard gate at the entrance to Kaneohe Marine Corps Air Station, continue ahead on Mokapu Boulevard for 1.0 mile to Harris Avenue on the right, turn right and go north on Harris Avenue for 0.15 mile to Irwin Street, turn right and go east on Irwin Street for 0.35 mile to the end of the paved street, bear left and continue on a dirt road for 0.05 mile to a reverse fork, continue ahead easterly on the surfaced road for 0.85 mile to a side road left, turn sharp left and follow the winding surfaced road for 0.7 mile to the end of the surfaced road and a locked cable gate. With a 4-wheel drive vehicle, pass through the gate and follow the steep bladed road for 0.6 mile to the top of the hill and the station. Note: the key for the locked cable was obtained from the Public Works Building 352, which is on the air station.

The station mark is a standard disk stamped MOKAPU 1872 1962, set in the top of a concrete post which is 6 inches below the surface of the ground. There is a "Type B" Hawaii Territorial Survey Signal constructed over the mark. It is near the south end of the long, flat topped hill and 24 feet west of a fence.

Reference mark 3 is a standard disk stamped MOKAPU NO 3 1872 RESET 1962, set in a drill hole in a concrete deadman anchor of a tram cable. It is 8 inches below the surface of the ground and 7 feet west of the fence.

Reference mark 4 is a standard disk stamped MOKAPU NO 4 1872 RESET 1962, set in a drill hole at the north edge of a 12 x 12 foot concrete foundation which supports a small building. It is at the extreme south end of the hill and 16 feet west of the fence.

The distance between reference mark 3 and reference mark 4 is 75.63 feet or 23.055 meters.

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: MOKAPU
ESTABLISHED BY: H.G.S. YEAR: 1872 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: R. B. Melby YEAR: 1975 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 3 miles north of Kailua

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 3 and 4 were recovered in good condition as described in 1969. Permission to enter the station site area must be obtained from the Provost Marshal's Office; Building 576; Kaneohe Marine Corps Air Station.

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 1022
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

See Station MOKAPU

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-15

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|-------------------|------------|---|--------|
| GEODETIC LATITUDE: | 21 ° 25' 17.06615 | ELEVATION: | 2 | METERS |
| GEODETIC LONGITUDE: | 157 44 50.60042 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|--------------------|
| STATE & ZONE | CODE | X | Y | § HOR Δ RI ANGLE ° |
| HI 3 | 5103 | 585,924.55 | 92,599.94 | + 0 05' 32" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH* (From south) | CODE |
|----------------------|----------------------------------|--------------------------------|------|
| MOKAPU | 198 ° 20' 50.6 | 198 14 56 | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION MOKAPU

QG 022

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 211575 STATION 1023
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

See Station MOKAPU

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-20

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|-------------------|------------|---|--------|
| GEODETIC LATITUDE: | 21° 26' 34.69916 | ELEVATION: | 3 | METERS |
| GEODETIC LONGITUDE: | 157° 45' 27.66537 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|------------|------------------|
| STATE & ZONE | CODE | X | Y | FOR Δ R: ANGLE ° |
| HI 3 | 5103 | 582,410.35 | 100,427.66 | + 0° 05' 19" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH * (From south) | CODE |
|----------------------|----------------------------------|---------------------------------|------|
| MOKAPU | 236° 09' 59.6 | 236° 04' 41" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION MOKAPU

QG 023

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1024
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

PAPAA 2 (Hawaii, H.A.P., 1932)--Station of 1910 was not recovered so a new station was established. Station is on the highest of 4 small peaks on the top of a prominent hill about 1/2 mile SW of Nuupia Pond. The station mark is a standard disk set in a drill hole in a boulder.

The reference mark is a galvanized-iron pipe 2 inches in diameter projecting about 2 feet above the ground. It is located on the most E of the 4 small peaks while the station mark is on the second peak from the W.

| | | |
|----------------|----------|-----------|
| OBJECT | DISTANCE | DIRECTION |
| HEEIA | meters | 0°00'00.0 |
| Reference mark | 29.65 | 193 44 |

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PAPAA 2
ESTABLISHED BY: H.A.P. YEAR: 1932 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

| HEIGHT OF TELESCOPE ABOVE STATION MARK 1.45 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 | " | " | " |
| MOKAPU 1872 1962 | | | | 00 | 00 | 00.0 |
| R.M. No. 1 | E | 47.778 | 14.564 | 81 | 37 | 45 |
| Reference Pipe | E | 97.113 | 29.600 | 87 | 26 | 50 |
| R.M. No. 2 | S | 17.327 | 5.281 | 190 | 29 | 01 |

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

Station is located 2-1/2 miles airline east, across Kaneohe Bay, from Kaneohe town, just northwest of the northern end of Kailua, on Puu Papaa, a bare hill of 542 feet elevation, that has a row of 5 wooden antenna and power poles in a north-south row on its top.

To reach station from the traffic light at junction of Kaneohe Bay Drive and Mokapu Road in the north end of Kailua, go westerly on Kaneohe Bay Drive for 1.35 miles to old track side road left, at a locked, board gate. Pass through gate and follow road upgrade for 0.55 mile to end of road at telephone building. Walk north past building and go right, up wooden steps about 20 feet to crest of hill and station on high point to right. (Note: 1-Key for locked gate was obtained at the Kaneohe Ranch Office at Castle Junction), (Note: 2-A 4-wheel drive vehicle is needed to drive up hill on old track road).

Station mark is a standard disk stamped "PAPAA 2 1932", cemented in a drill hole in a 16-inch boulder that projects 8 inches above ground. It is 9.6 feet northeast from the center of the south 1 of the row of poles.

Reference mark number one is a standard disk stamped "PAPAA 2 NO 1 1932 1963", cemented in a drill hole in a 16-inch boulder that projects 1 foot above ground. It is along crest of hill, 6 feet north of trail, about 5 feet higher than trail and 2.3 feet lower than station mark.

Reference mark number two is a standard disk stamped "PAPAA 2 NO 2 1932 1963", cemented in a drill hole in a bedrock ledge projecting 4 feet above ground. It is 8.1 feet southeast of the center of the south 1 of the 5 poles and is 2.1 feet lower than station mark.

Reference pipe is a 1-1/4-inch, iron pipe that projects on a slant about 18 inches above the ground. It is 6 feet southwest from the southwest corner of an old, wooden building and about 3 feet lower than the station mark.

(Continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PAPAA 2

STATE: HAWAII

YEAR: 1932

FIRST

ORDER

SOURCE: G-14543

| | |
|---------------------------------------|-------------------------|
| GEODETIC LATITUDE: 21° 25' 32.23069 | ELEVATION: 166.4 METERS |
| GEODETIC LONGITUDE: 157° 45' 34.73579 | 540 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|------------------|
| STATE & ZONE | CODE | X | Y | # OR Δ ° ANGLE ° |
| HI 3 | 5103 | 581,751.68 | 94,123.50 | + 0 05 16 |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH (From south) | CODE |
|----------------------|----------------------------------|-------------------------------|------|
| MOKAPU | 216° 21' 28.7 | 216° 16' 13 | 5103 |

THESE DATA OBTAINED FROM ADJUSTMENT OF NJV 1970

QG 024

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1024
LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

PAPAA 2 (Continued)

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

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PAPAA 2 STATE: Hawaii COUNTY: Honolulu
ESTABLISHED BY: H.A.P. YEAR: 1932 LOCALITY: Kaneohe
RECOVERED BY: E.H. Fernandes YEAR: 1968

Detailed statement as to the fitness of the original description:

Station and reference marks recovered in good condition.

A type "B-1" concrete monument was built over the station.

The station mark was not disturbed and can be seen thru openings at the base of concrete pier holding the target. This work was done by the State Survey Division on July 6, 1968.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PAPAA 2 STATE: Hawaii COUNTY: Honolulu
ESTABLISHED BY: H.A.P. YEAR: 1932 LOCALITY: Kaneohe
RECOVERED BY: C.A.A. YEAR: 1969
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1-1/2 miles northwest of Kailua

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

The station mark, reference marks 1 and 2, and the reference pipe were recovered as described in the 1963 recovery note and found to be in good condition. The 1963 "to reach" is sufficient. A slight difference was found in the distance and direction to the reference marks and the reference pipe and is noted below.

| OBJECT | BEARING | FEET | METERS | DIRECTION |
|--|---------|-----------|--------|-------------|
| MOKAPU | E | 47.75 | 14.556 | 0 00 00.0 |
| R.M. 1 | E | 97.05 | 29.580 | 81 38 03.9 |
| *Reference Pipe | S | 17.29 | 5.270 | 87 23 35.9 |
| R.M. 2 | N | (2 miles) | | 190 29 04.6 |
| KANEOHE BAY MCAS HILL BEACON | | | | 323 49 23.6 |
| No measurement between marks due to heavy brush. | | | | |

*Edge of pipe nearest station measured to.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PAPAA 2 STATE: Hawaii COUNTY: Honolulu
ESTABLISHED BY: H.A.P. YEAR: 1932 LOCALITY: Kaneohe
RECOVERED BY: R. B. Melby YEAR: 1975
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2 1/2 miles east of Kaneohe

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

The station and the reference marks were recovered as described in 1963 and 1968. The to reach has changed as the access road begins along the east side of the highway overpass over Kaneohe Bay Drive. There are two locked gates (consult the Hawaiian Telephone Co. for key). The dirt road has been surfaced and a 2 wheel drive vehicle can be driven to within 100 feet of the station.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: PAPAA 2
ESTABLISHED BY: H.A.P. YEAR: 1932 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: C.R.T. YEAR: 1976 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1 mile west of Kailua

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.

FORM CGS-525 (2-66)
USCOMM-DC 26490-P66

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

HORIZONTAL CONTROL DATA

QUAD 211573 STATION 1025
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: KANEOHE HAWAIIAN TEL MICROWAVE

STATE: HAWAII

YEAR: 1969

THIRD

ORDER

SOURCE: G-14543

RECOVERY NOTE, TRIANGULATION STATION

R

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

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

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

QG 025

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 1026
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

See Station PAPAA 2

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-17
STATE: HAWAII YEAR: 1965 SECOND ORDER

SOURCE: G-14543
NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|--------------------|-----------|-----|--------|
| GEODETIC LATITUDE: | 21 ° 24 ' 48.35286 | ELEVATION | 120 | METERS |
| GEODETIC LONGITUDE: | 157 46 03.05561 | NO CHECK | | FFET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|---------------------------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ OR ANGLE ° |
| HI 3 | 5103 | 579,082.89 | 89,692.16 | + 0 05' 06" |

* 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 * | CODE |
|----------------------|----------------------------------|-----------------|------|
| PAPAA 2 | 211 ° 08' 36.6 | 211 ° 03' 31" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION PAPAA 2

QG 026

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

See Station PAPAA 2

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1027
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 4-18

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|-------------------|------------|----|--------|
| GEODETIC LATITUDE: | 21° 24' 42.54644 | ELEVATION: | 42 | METERS |
| GEODETIC LONGITUDE: | 157° 47' 05.96686 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-----------------------------------|
| STATE & ZONE | CODE | X | Y | ϕ OR Δ ϕ ANGLE * |
| HI 3 | 5103 | 573,139.19 | 89,097.81 | + 0° 04' 43" |

* 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 |
|----------------------|----------------------------------|---------------------------------|------|
| PAPAA 2 | 239° 48' 48.5 | 239° 44' 06" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION PAPAA 2

QG 027

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1028
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

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: State Survey 4-21
ESTABLISHED BY: C.A. Annis YEAR: 1969 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: J.V. Teater YEAR: 1973 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2.5 miles NE of Kaneohe

R

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:
The station was recovered and found to be in good condition.

The station is located about 2.5 miles NE of Kaneohe, 2.5 miles NNW of Kailua, and 1.0 mile WNW of the Kaneohe Marine Corps Air Station main gate.

The station mark, State of Hawaii station disk stamped 4-21 1969, is set in the top of a pipe like projection of 4 inches above a square concrete monument that projects about 6 inches above the ground. It is about 8 feet east of the west edge of the rocky point, 7 feet S of the N edge of the rock point, and 5 feet N of the south edge of the point.

To reach the station from the main gate at the Kaneohe Marine Corps Air Station go southerly on Makapu Road for 0.6 miles to the intersection of Kaneohe Bay Drive. Turn right and go 0.9 mile to the intersection of a 4 lane divided road that is under construction at this time. Turn right onto the entrance road and go 0.3 mile to the station on the left side of the road.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: STATE SURVEY 4-21
ESTABLISHED BY: C.A.A. YEAR: 1969 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: C.K. Townsend YEAR: 1976 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:

Station was recovered in good condition as described in 1969. The four lane divided road is still under construction and access is limited.

NAME OF STATION: STATE SURVEY 4-21

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

G-14543
SOURCE: NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|--------------------|------------|---|--------|
| GEODETIC LATITUDE: | 21 ° 26 ' 09.67067 | ELEVATION: | 1 | METERS |
| GEODETIC LONGITUDE: | 157 45 48.10515 | NU CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|----------------------|
| STATE & ZONE | CODE | X | Y | 9 ° OR Δ ° I ANGLE ° |
| HI 3 | 5103 | 580,483.19 | 97,895.31 | + 0 ° 05 ' 11 " |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH* (From south) | CODE |
|----------------------|----------------------------------|--------------------------------|------|
| PAPAA 2 | 341 ° 30 ' 59.5 | 341 ° 25 ' 46 " | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION PAPAA 2

QQ 028

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

See Station PAPAA 2

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1029
HAWAII
LATITUDE 21 ° 30' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-22

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|-------------------|------------|----|--------|
| GEODETIC LATITUDE: | 21 ° 25' 48.27240 | ELEVATION: | 13 | METERS |
| GEODETIC LONGITUDE: | 157 45 53.32904 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|---------------------------------|
| STATE & ZONE | CODE | X | Y | θ (OR Δ) ANGLE ° |
| HI 3 | 5103 | 579,992.89 | 95,739.46 | + 0 ° 05' 09" |

* 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 |
|----------------------|----------------------------------|--------------------------------|------|
| PAPAA 2 | 312 ° 39' 44.5 | 312 ° 34' 36" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION PAPAA 2

06 029

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211575 STATION 1030
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Kailua (Oahu Island, Hawaiian Government Survey, 1872;
L. G. Simmons, 1927).—In southeastern part of Oahu,
on the highest summit of the low hills between the Pali and Mokapu, and about
2 miles from the Pali, in the land of Kailua, called Ulumawao. Best reached by
going along the Waimanalo road for about ½ mile from where it leaves the main
road to the Pali, thence following the prominent ridge to the summit plainly
visible ahead. Marked by a 1¼-inch iron pipe projecting some 5 inches above
ground and surrounded by stones. Re-marked according to note 14C in 1929.
(11-8-85)

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: KAILUA
ESTABLISHED BY: HGS YEAR: 1872 STATE: Hawaii
RECOVERED BY: D.G. Rushford YEAR: 1964 COUNTY: Honolulu

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

The "Type C" signal established by the Hawaii Territorial Survey in
1929 was recovered in good condition. Station was originally described
as marked with a 1-1/2-inch iron pipe, however because of the signal
the marking could not be checked. A complete description follows:
Station is located about 2 miles southwest of Kailua and 2-1/2 miles
southeast of Kaneohe, at about 995 feet elevation, on the highest point
of the prominent hill that lies just northeast of Castle Junction.
To reach station from the traffic light at the intersection of
Kailua Rd. and Oneawa Street in Kailua, go southwest on Kailua Rd. (Pali
Highway) for 2.2 miles; turn right, on paved side road, and go 1.3 miles
to the H.C. and D. Office in Kapaa Quarry. Go left on main road upgrade
along edge of quarry for 0.7 mile to end of road and start of bulldozed
track. Pack southwest up this old road about 1/2 mile to fork in saddle.
Take left fork and follow dim, very brushy trail along face of hill, at
same elevation, for about 1/4 mile, until beneath station point. Go up
very steep and brushy slope about 150 yards to station.
Station is center of a 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 on the highest part of the very sharp-topped,
brushy peak and at the south edge of a large, 6-foot-deep pit. A
red and white, removable, metal target is set into the pipe and
projects 8 feet above the platform.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: KAILUA

STATE: HAWAII

YEAR: 1872

FIRST

ORDER

SOURCE: G-14543

| | | | |
|---------------------|-------------------|------------|--------------|
| GEODETIC LATITUDE: | 21° 23' 13.68613 | ELEVATION: | 304.0 METERS |
| GEODETIC LONGITUDE: | 157° 46' 35.62910 | | 997 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|------------------|
| STATE & ZONE | CODE | X | Y | S OR Δ & ANGLE * |
| HI 3 | 5105 | 575,640.57 | 80,135.23 | + 0 04 52 " |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH * (From south) | CODE |
|----------------------|----------------------------------|---------------------------------|------|
| RED DIRT | 110° 01' 59.2 | 109° 57' 07 " | 5103 |

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QG 030

(Continued on next page)

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

KAILUA (Continued)

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1030

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

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: KAILUA
ESTABLISHED BY: H.G.S. YEAR: 1872 STATE: Hawaii BENCH MARK ALSO ☐
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2.0 miles southwest of Kailua.
HEIGHT OF TELESCOPE ABOVE STATION MARK 4.5 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 4.0 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 | |
| RED DIRT | | | | 00 00 00.0 |
| Kailua KLEI Radio Mast | NW | (1 1/2 miles) | | 16 44 43.9 |
| R.M. 1 | NNE | 24.31 | 7.409 | 90 28 25 |
| R.M. 2 | SW | 18.15 | 5.532 | 304 55 10 |

No measurement between reference marks due to location.

The original station point was the center of a 2 1/2 inch iron pipe which was cemented in the center of a 5 foot square concrete platform which is flush with the surface on the highest point of the station hill. At this time the iron pipe was cut off flush with the concrete platform and a station mark disk was cemented in the center of the pipe and reference marks 1 and 2 were established. Following is a new and complete description:

Station is located about 2 1/2 miles southeast of Kaneohe, 2.0 miles southwest of Kailua and on the highest point of a prominent point just to the north of Castle Junction.

To reach from the intersection of Kailua Road and Oneawa Street in Kailua, go southwest on Kailua Road (Pali Highway) for 2.1 miles to a paved road on the right and a Drive-In Theater on the right, turn right and go north on the paved road for 1.1 miles to a fork, keep left fork and continue for 0.1 mile to the entrance to gravel pit and their office on the right, bear left and continue northwest and west on a gravel road 0.4 mile to a side road left, continue ahead on the gravel road for 1.0 mile to a point where the road curves and starts north and the end of truck travel at a cleared area on the right. Pack southeast, crossing creek for about 75 yards to a powerline pole at the crest of a low ridge, bear right and pack southerly up very steep ridge to the highest point and the station as described. 1 1/2 hour pack. The brush is very heavy the last half of the way to the station.

Station mark is a standard disk, stamped KAILUA 1872 1969, cemented in the top of a 2 1/2 inch iron pipe which is flush with the concrete platform. It is on the highest point of the hill.

Reference mark 1 is a standard disk stamped, KAILUA 1872 NO 1 1969, brazed to the top of a 2-inch sewer pipe which projects about 3 inches above the ground surface. It is about 1.0 foot lower than the station.

Reference mark 2 is a standard disk, stamped KAILUA 1872 NO 2 1969, brazed to the top of a 2-inch sewer pipe which projects about 8 inches above the ground surface. It is about 1 1/2 feet lower than the station.

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 1031
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 526
(11-8-65)

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

R

NAME OF STATION: OLOMANA RIDGE
ESTABLISHED BY: HTS YEAR: 1952 STATE: Hawaii
RECOVERED BY: D.G. Rushford YEAR: 1964 COUNTY: Honolulu

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

Station was recovered in good condition. A complete description follows:
Station is located about 2 miles southwest of Kailua and 1/2 mile south of the Pali Highway, near the northwest end of Olomana Ridge which runs northwest from Olomana Peak. It is at about 400 feet elevation.
To reach station from the traffic light at intersection of State Highways 72 & 63 about 1-1/2 miles southwest of Kailua, go southeast on State Highway 72 for 0.4 mile to paved side road right. Turn right and follow this road for 0.5 mile to end of road at piggery of State Training School. Pass through board gate on right and follow dirt track road through pasture land for 0.2 mile to locked gate in ravine. Pass through gate and continue on road for 0.2 mile to saddle on ridge line. This is end of truck travel. Pack northwest along fence line following crest of ridge about 275 yards to station.
Station is marked by a "Type C" signal built in 1929 by the Hawaii Territorial Survey. The concrete platform of the signal is flush with ground and has a 2-1/2-inch iron pipe projecting from its center for a distance of 2 feet. Center of pipe is used as station. A removable, red and white metal target is set into the pipe and extends 7 feet above the platform.

RECOVERY NOTE, TRIANGULATION STATION TRAVERSE

NAME OF STATION: OLOMANA RIDGE
ESTABLISHED BY: H.T.S. YEAR: 1952 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: G.A.A. YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2 miles southwest of Kailua

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

The station was recovered as described and in good condition. The center of a 2 1/2 inch pipe, which was previously the mark was held. A standard triangulation disk stamped OLOMANA RIDGE 1952 1969, was cemented in a drill hole in the center of a concrete slab which originally was the platform for a "Type C" Hawaiian Territorial Survey signal.

A Geodimeter Traverse was made between OLOMANA RIDGE 1952 1969 and KAILUA 1872 1927.

Geodimeter distance 2,246.113 meters or (7,369.05 ft.)

R

NAME OF STATION: OLOMANA RIDGE

STATE: HAWAII

YEAR: 1952

SECOND

-ORDER

G-14543

SOURCE:

| | | | | |
|---------------------|------------------|------------|-----|--------|
| GEODETIC LATITUDE: | 21° 22' 26.26071 | ELEVATION: | 122 | METERS |
| GEODETIC LONGITUDE: | 157 45 40.33335 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|------------------|
| STATE & ZONE | CODE | X | Y | θ (OR Δ) ANGLE ° |
| HI 3 | 5103 | 581,251.72 | 75,358.21 | + 0° 05' 13" |

* 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 |
|----------------------|----------------------------------|--------------------------------|------|
| KAILUA | 130° 29' 46.6 | 130° 24' 33" | 5103 |

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

POSITION DETERMINED BY TRAVERSE FROM STATION KAILUA

AND CHECKED BY ADDITIONAL OBSERVATIONS

QG 031

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1032
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 4-11

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

Description, including sketch of object:

Station is located in Kaneohe District on the southwest side of Kamehameha Highway on the northwest side of entrance road to the Pali Golf Course. To reach station from the intersection of Pali Highway, Kalaniana'ole Highway and Kamehameha Highway go northwest for 0.12 mile and station on left near Golf Course boundary fence at top of bank.

Station mark is a standard State Survey disk stamped "4-11 1969" in concrete monument flush with ground level. Ties from station are: S.W. 4.12 ft. to chain link fence; E. 18.5 ft. to electric pole 12; S. 46.7 ft. to corner of chain link fence; S.E. 123.4 ft. to center of medial strip at entrance to Pali Golf Course. N.E. 42.5 ft. to edge of pavement.

Sub-surface mark is identical with station in concrete monument 2.2 ft. below ground level and separated from top monument by a layer of sand.

Geodimeter connection was made between "KAILUA 1872 1969" and "State Survey 4-11."

This station is also Bench Mark 4-11 (SS) of the 1969 First Order of Levels.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-11

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | |
|----------------------|-------------------|------------|--------------|
| GEODETTIC LATITUDE: | 21° 22' 48.97190 | ELEVATION: | 57.91 METERS |
| GEODETTIC LONGITUDE: | 157° 47' 10.00675 | | 321.2 FEET |

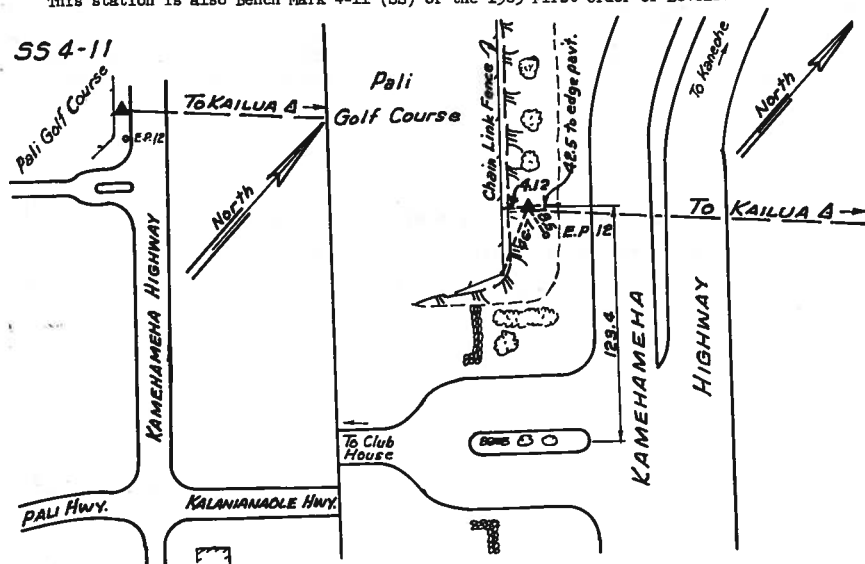
| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-----------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ #° ANGLE |
| HI 3 | 5103 | 572,773.06 | 77,637.57 | + 0° 04' 41" |

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

| TO STATION OR OBJECT | GEODETTIC AZIMUTH (From south) | PLANE AZIMUTH* (From south) | CODE |
|----------------------|-----------------------------------|--------------------------------|------|
| KAILUA | 229° 01' 17.4 | 228° 56' 37" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION KAILUA

QG 032



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 1033
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

See Station KAILUA

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-13

STATE: HAWAII

YEAR 1969

SECOND

ORDER

G-14543
SOURCE: NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|-------------------|------------|----|--------|
| GEODETIC LATITUDE: | 21° 23' 26.50704 | ELEVATION: | 96 | METERS |
| GEODETIC LONGITUDE: | 157° 47' 44.45608 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-------------------------------------|
| STATE & ZONE | CODE | X | Y | β OR Δ β ANGLE * |
| HI 3 | 5103 | 569,512.22 | 81,460.91 | + 0° 04' 28" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH * (From south) | CODE |
|----------------------|----------------------------------|---------------------------------|------|
| KAILUA | 282° 16' 50.1" | 282° 12' 22" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION KAILUA

QG 033

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 1034
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

See Station KAILUA

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-16

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|------------------|------------|---|--------|
| GEODETIC LATITUDE: | 21° 24' 42.56495 | ELEVATION: | 3 | METERS |
| GEODETIC LONGITUDE: | 157 45 30.58690 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|--------------------------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ OR ANGLE* |
| HI 3 | 5105 | 582,151.77 | 89,112.79 | + 0° 05' 17" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH* (From south) | CODE |
|----------------------|----------------------------------|--------------------------------|------|
| KAILUA | 36° 02' 26.0 | 35° 57' 05" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION KAILUA

QG 034

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 1035
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 30'
DIAGRAM NF 4-11 OAHU

FORM 525
(6-16-69)

U. S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

DESCRIPTION OF TRIANGULATION STATION

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

| NOTE | HEIGHT OF TELESCOPE ABOVE STATION MARK 1.4 METERS, HEIGHT OF LIGHT ABOVE STATION MARK 1.2 METERS. | |
|------|---|--|
| | SURFACE-STATION MARK, UNDERGROUND-STATION MARK | DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION |
| | OBJECT | BEARING DISTANCE FEET METERS |
| | PAPAA 2 1932 | N (About 4 1/2 mile) 0 00 00.0 |
| desc | KANEOME BAY MCAS HILL BEACON | W 37.22' 11.347' 282 55 36 |
| desc | R.M. 1 | W 22.78' 6.942' 283 16 36 |
| | R.M. 2 | NNW (About 2 3/4 mile) 359 50 31.8 |
| | KANEOME HA TEL TOWER | 14.46 4.409 |
| | R.M. 1 to R.M. 2 | |

The station is located about 3 1/4 miles northwest of Waimanalo, 1/2 mile south-southwest of the post office in Kailua and 1/4 mile east of Kailua High School, on the highest point of a northwest-southeast ridge.

To reach the station from the intersection of Onewa Street and Pali Highway (this is about 100 yards northwest of the post office) in Kailua, go southwest on the Pali Highway for 0.55 mile to a Lutheran Church on the right and a crossing in the divider of the highway, on the left. Make a U-turn and go about 50 yards northeast to a side road right. Turn right, southeast, on narrow asphalt road for 0.1 mile to a track side road left. Turn sharp left, northeast, and follow track road uphill for 0.15 mile to the end of the road and two reservoirs. Pack around to the opposite side of the south reservoir and pick up a foot trail. Follow foot trail up to a T-fence corner. (This is about 75 yards south of the reservoir.) Pack southeast along right side of fence and the top of the ridge to the highest point on the ridge and the station at a fence corner. About a 20 minute pack.

The station mark is a standard disk, stamped PUU O EHU 1969, welded to the top of a 2-inch pipe which projects 6 inches. The pipe is surrounded by concrete and is 6 feet east of a fence.

Reference mark 1 is a standard disk, stamped PUU O EHU NO 1 1969, cemented in a drill hole in black bedrock. It is 32.5 feet west of a fence, 15 feet south of a fence and about 8 feet lower than the station mark.

Reference mark 2 is a standard disk, stamped PUU O EHU NO 2 1969, cemented in a drill hole in black bedrock. It is 17.5 feet west of the fence, 12 feet south of the fence and about 4.5 feet lower than the station mark.

No azimuth mark was established for this 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.

USCOM-DC 2-75-1-PSB

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: PUU O EHU
STATE: HAWAII YEAR: 1969 SECOND ORDER

SOURCE: G-14543

| | | | |
|---------------------|-------------------|------------|-------------|
| GEODETIC LATITUDE: | 21° 23' 25.89293 | ELEVATION: | 98.9 METERS |
| GEODETIC LONGITUDE: | 157° 44' 46.83681 | | 324 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|----------------|
| STATE & ZONE | CODE | X | Y | S OR Δ & ANGLE |
| HI 3 | 5103 | 586,298.28 | 81,383.05 | + 0 05' 33" |

* 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 |
|----------------------|----------------------------------|--------------------------------|------|
| PAPAA 2 | 160° 27' 10.7" | 160° 21' 38" | 5103 |

QG 035

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 1036
HAWAII
LATITUDE 21 ° 30' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: STATE SURVEY 4-9

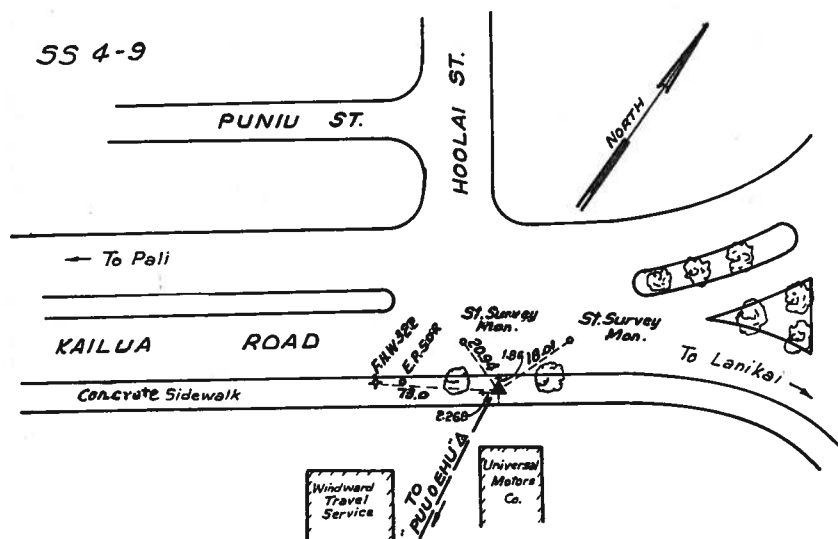
CHIEF OF PARTY: Carl A. Annis YEAR: 1969 STATE: Hawaii COUNTY: Honolulu

Description, including sketch of object:

Station is located in Kailua District about 1.23 miles northeast of Castle Hospital, on the south side of Kailua Road opposite Hoolai Street at 737 Kailua Road in the business section of Kailua Town.

Station is a standard State Survey disk stamped "4-9 1969" cemented in drill hole in concrete sidewalk. Ties from station are: S.W. 73.0 ft. to Fire Hydrant W322; W. 20.94 ft. to brass pin in Street Survey Monument; N.W. 1.86 ft. to "+" cut in concrete sidewalk; N.E. 18.01 ft. to brass pin in Street Survey Monument; S.W. 2.268 ft. to "+" cut in concrete sidewalk.

Geodimeter connection was made between "PUU O EHU" and "State Survey 4-9"



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-9

STATE: HAWAII

YEAR: 1969

SECOND ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|--------------------|------------|---|--------|
| GEODETIC LATITUDE: | 21 ° 23 ' 48.50697 | ELEVATION: | 2 | METERS |
| GEODETIC LONGITUDE: | 157 44 48.93541 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|---|
| STATE & ZONE | CODE | X | Y | β OR Δ OR α ANGLE ° |
| HI 3 | 5103 | 580,096.28 | 83,664.50 | + 0° 05' 32" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH* (From south) | CODE |
|----------------------|----------------------------------|--------------------------------|------|
| PUU O EHU | 355° 01' 56.7 | 354° 56' 24" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION PUU O EHU

QG 036

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211575 STATION 1037
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 4-10

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

Description, including sketch of object:

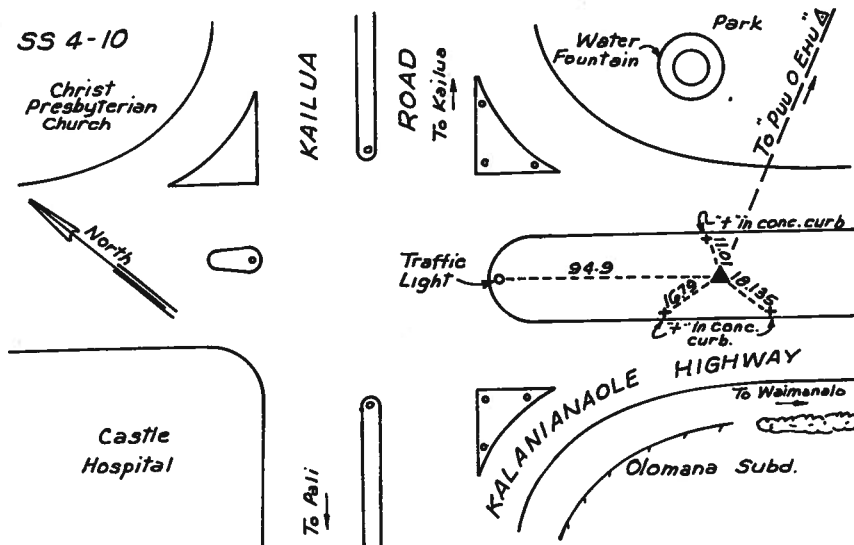
Station is located in Pohakapu, Kailua in medial strip southeast of the intersection of Kailua Road and Kalaniana'ole Highway, opposite the Castle Hospital and Christ Presbyterian Church.

Station mark is standard State Survey disk stamped "4-10 1969" in concrete monument flush with ground level, in medial strip of Kalaniana'ole Highway. Ties from station are: N.W. 94.9 ft. to Traffic Light at northwest end of medial strip; N.E. 11.01 ft. to "+" in concrete curb of medial strip; S.E. 18.135 ft. to "+" in concrete curb of medial strip and W. 16.79 ft. to "+" in concrete curb of medial strip.

Sub-surface mark is identical with station, in concrete monument 2.7 ft. below ground level and separated from top monument by a layer of sand.

Geodimeter connection was made between "PUU O EHU" and "State Survey 4-10".

This station is also Bench Mark 4-10 (SS) of the 1969 First Order Levels.



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-10

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | |
|---------------------|------------------|------------|--------------|
| GEODETIC LATITUDE: | 21° 23' 01.52969 | ELEVATION: | 37.73 METERS |
| GEODETIC LONGITUDE: | 157 45 30.44573 | | 123.8 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-----------------------------------|
| STATE & ZONE | CODE | X | Y | β OR Δ β ANGLE |
| HI 3 | 5103 | 582,180.79 | 78,918.29 | + 0 05 .17 |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH (From south) | CODE |
|----------------------|----------------------------------|-------------------------------|------|
| PUU O EHU | 239° 10' 59.0 | 239° 05' 42" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION PUU O EHU

QG 037

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 1038
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
(9-18-69)

U.S. DEPARTMENT OF COMMERCE
COAST AND GEODETIC SURVEY

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: U.S. MON 1
ESTABLISHED BY: HTS YEAR: 1952 STATE: Hawaii
RECOVERED BY: W.R. Porter YEAR: 1963 COUNTY: Honolulu

| OBJECT | BEARING | DISTANCE | | DIRECTION |
|------------------|---------|----------|--------|------------|
| | | FEET | METERS | |
| KAILUA 1872-1927 | | | | 00 00 00.0 |
| R.M. No. 1 | E | 10.729 | 3.271 | 175 46 28 |
| R.M. No. 2 | SW | 13.478 | 4.108 | 333 16 16 |

Station mark 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 1-3/4 miles airline southeast of Kailua and 1/2 mile northeast of Enchanted Lakes, on a hill of 603 feet elevation which is the highest point on Kaiwa Ridge, the prominent, bare hill that lies at the north end of Bellows Air Force Base.

To reach station from the traffic light at intersection of Kuulei and Kailua Roads in Kailua, go east on Kailua Road for 0.65 mile to fork at traffic light. Take right fork and follow Wanaao Road southerly for 0.9 mile; turn left and follow Keolu Dr. for 0.25 mile to St. John Vianney Church on right. Turn left and follow washed-out track road easterly up draw for 0.3 mile to base of ridge and end of truck travel. Pack east up ridge about 0.4 mile to top and station.

Station mark is a 2-inch-square copper plate, unstamped, set in the top of a mass of concrete flush with the ground. There is a "Type A" Hawaiian Territorial Survey signal centered over the mark, the floor being 3 feet above ground and the metal target extending 8 feet above the floor.

Reference mark number one is a standard disk stamped "U.S. MON NO 1 NO 1 1952 1963", cemented in a drill hole in a small rock outcrop that projects 8 inches. It is on the southeast side of the hill and 1-1/2 feet lower than station mark.

Reference mark number two is a standard disk stamped "US MON NO 1 NO 2 1952 1963", cemented in a drill hole in a 2-1/2 x 4-foot bedrock outcrop that projects 1 foot. It is on the highest point of the hill and is 1.2 feet higher than station mark.

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

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

USCOMM-DC 27178-P89

(Continued on next page)

NAME OF STATION: US MON 1

STATE: HAWAII

YEAR: 1952

FIRST

ORDER

SOURCE: G-14543

| | |
|---------------------------------------|-------------------------|
| GEODETIC LATITUDE: 21° 23' 02.86342 | ELEVATION: 182.7 METERS |
| GEODETIC LONGITUDE: 157° 43' 20.34549 | 559 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|--------------------|
| STATE & ZONE | CODE | X | Y | 8 HOR Δ 81 ANGLE " |
| HI 3 | 5103 | 554,476.28 | 79,072.88 | + 0° 06' 05" |

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE 8 HOR Δ 81 FORMULA NEGLECTING THE SECOND TERM

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH (From south) | CODE |
|----------------------|----------------------------------|-------------------------------|------|
| MAKAPUU POINT RM 3 | 319° 20' 11.6 | 319° 14' 07" | 5103 |

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QG 038

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 1038

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

US MON 1 (Continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: U.S. MON 1
ESTABLISHED BY: H.T.S. YEAR: 1952 STATE: Hawaii BENCH MARK ALSO ☐
RECOVERED BY: C.A.A. YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1-3/4 miles southeast of Kailua
HEIGHT OF TELESCOPE ABOVE STATION MARK 8.5 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 7.5 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 | | | | 0 00 00.0 |
| R.M. 2 | SW | 13.39 | (4.081) | 107 14 08 |
| R.M. 1 | E | 10.86 | (3.310) | 309 35 03 |
| MAKAPUU POINT LIGHT 1927 | SE | (6-3/4 miles) | | 358 01 07.0 |

The station mark and both reference marks were recovered as described in the 1963 data. A difference was found in the direction and distance to both reference marks. At the time the station was first visited it was noted that because of the monument over the mark it would be very difficult to see the disk in the mark. The monument was revised so at this time you could get an accurate plumb and measurement to the station mark, therefore it is believed the 1969 measurements are correct. A new and complete description follows.

To reach the station from the intersection of Kuulei Road and Kailua Road in Kailua, go east on Kailua Road for 0.65 mile to a fork. Keep right fork, east and south, on Wanaao Road for 0.9 mile to a signal light. Turn left, east and southeast, on Keolu Drive for 0.3 mile to Kamahale Street on the left. Turn left, northeast and north, for 0.25 mile to the end of truck travel and a foot trail on the right. Follow foot trail easterly to the top of the hill and the station on the highest point. This is about a 45 minute pack.

The station mark is a 2-inch square copper plate, unstamped, and set in the top of an 8-inch square concrete monument which projects 1 inch above the surface. There is a Hawaiian Territorial Monument over the mark. It is a 5-foot square concrete slab supported on 2 sides by 3-foot high rock walls.

Reference mark 1 is a standard disk, stamped US MON NO 1 NO 1 1952 1963, cemented in a drill hole in rock outcrop. It is about 1-1/2 feet lower than the station, on the southeast edge of the hill.

Reference mark 2 is a standard disk, stamped US MON NO 1 NO 2 1952 1963, cemented in a drill hole in the top of a 2-1/2 foot by 4 foot outcrop of rock. It is about 1-1/2 feet higher than the station mark and projects about 1 foot above the surface.

No azimuth mark established for this station.

No measurement between reference marks because the monument is on line.

* Name of chief of party should be inserted here. The person who actually visited the station 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 1039
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

See Station US MON 1

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-3

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|-------------------|------------|----|--------|
| GEODETIC LATITUDE: | 21° 22' 37.04682 | ELEVATION: | 88 | METERS |
| GEODETIC LONGITUDE: | 157° 44' 49.45614 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-------------------|
| STATE & ZONE | CODE | X | Y | g OR Δ ±1 ANGLE * |
| HI 3 | 5103 | 586,054.89 | 76,454.05 | + 0° 05' 32" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH * | CODE |
|----------------------|----------------------------------|-----------------|------|
| US MON 1 | 252° 49' 04.4" | 252° 43' 32" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION US MON 1

QG 039

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1040
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 4-14

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

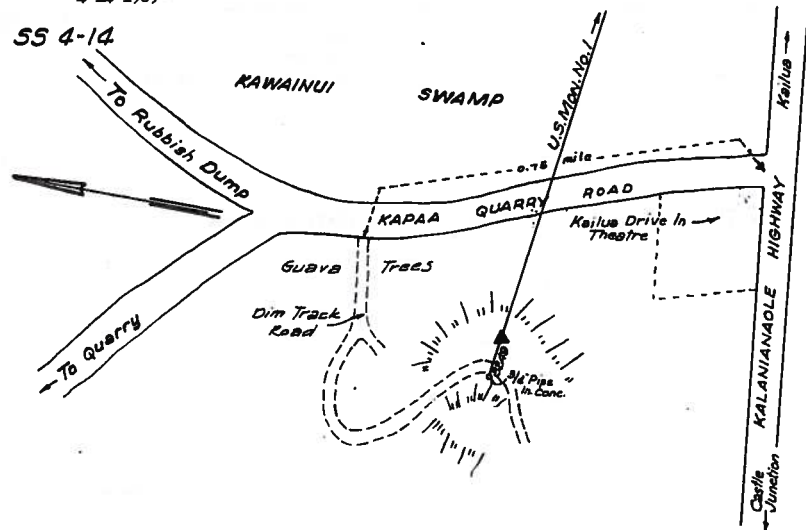
Description, including sketch of object:

Station is located in Kailua District near the west side of Kawaiinui Swamp and Quarry Road. To reach station from the junction of Kalaniana'ole and Kamehameha Highways (Castle Junction), go towards Kailua along Kalaniana'ole Highway for about a mile to Kailua Drive In Theatre on left. Turn left into and follow Kapaa Quarry Road for 0.75 mile to dim track road on left in growth of Guava trees. Leave car here and pack about 5-minutes along overgrown road up hillside to junction, follow right track road which circles to the left and a sharp right to station a few feet to left of road, overlooking the Kailua area.

Station mark is a standard State Survey disk stamped "4-14 1969" in concrete monument flush with ground. A 3/4" pipe in concrete was set as a tie from station. It is W 32.49 ft. on line from U.S. Mon. No. 1 1952 and on the westside of track road.

Sub-surface mark is identical with station mark, in concrete monument, 30-inches below ground level and separated from top monument by a layer of sand.

Geodimeter connection was made between "U.S. Mon. No. 1 1952" and State Survey 4-14 1969"



ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-14

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|-------------------|------------|----|--------|
| GEODETIC LATITUDE: | 21° 25' 23.65" E | ELEVATION: | 49 | METERS |
| GEODETIC LONGITUDE: | 157° 46' 00.32881 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-------------------|
| STATE & ZONE | CODE | X | Y | β OR Δ OR ANGLE ° |
| HI 3 | 5103 | 579,353.24 | 81,146.59 | + 0° 05' 06" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH (From south) | CODE |
|----------------------|----------------------------------|-------------------------------|------|
| US MON 1 | 277° 53' 34.5" | 277° 48' 28" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION US MON 1

QG 040

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1041
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Form 52
(11-8-55)

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

NAME OF STATION: WAIMANALO RIDGE

ESTABLISHED BY: H.T.S. YEAR: 1952 STATE: Hawaii
RECOVERED BY: M.C. Acopiado, YEAR: 1961 COUNTY: Honolulu
FF Cruz & Co.

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

Station found in good condition. It is a iron pipe drilled in a concrete monument on the highest peak.

Form 52
(11-8-55)

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

NAME OF STATION: WAIMANALO RIDGE

ESTABLISHED BY: Terr. of Haw. YEAR: 1952 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:

A "Type C" signal built by the Hawaii Territorial Survey in 1929 was recovered in good condition. A complete description follows:

Station is located about 2-3/4 miles northwest of the post office in Waimanalo and 1/4 mile west of State Highway 72, at the north end of the open flat country in the Waimanalo district, on a hill of about 425 feet elevation, above an old quarry.

To reach station from the post office in Waimanalo, go northwest on State Highway 72 for 2.7 miles to graveled side road left; go up this farm driveway for 0.05 mile to ranch buildings; continue for 0.1 mile, passing to left of barn, to a side road left, after passing through gate; turn sharp left, along right side of fence and follow road upgrade for 0.1 mile to fork. Take right fork and go 0.25 mile to old quarry on right. Continue ahead on old road, bearing right, up along ridge line, for 0.2 mile to end of road at second quarry. From here pack northwest up along ridge line for about 200 yards to station.

Station is center of a 2-1/2-inch iron pipe that projects 2 feet from

the center of a 5-1/2-foot-square concrete platform flush with the ground. A removable, red and white, metal target extends 8 feet above the platform. The station is 12 feet northwest of an old shallow trench.

(Continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WAIMANALO RIDGE

STATE: HAWAII

YEAR: 1952

FIRST

-ORDER

SOURCE: G-14543

| | | | |
|---------------------|-------------------|------------|--------------|
| GEODETIC LATITUDE: | 21° 21' 25.18115 | ELEVATION: | 128.4 METERS |
| GEODETIC LONGITUDE: | 157° 44' 10.59756 | | 421 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-------------------------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ OR ANGLE |
| HI 3 | 5103 | 569,743.51 | 69,208.82 | + 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 |
|----------------------|----------------------------------|-------------------------------|------|
| US MON 1 | 205° 43' 39.9 | 205° 37' 54" | 5103 |

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QG 041

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

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1041

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

WAIMANALO RIDGE (Continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: WAIMANALO RIDGE
ESTABLISHED BY: H.T.S. YEAR: 1952 STATE: Hawaii BENCH MARK ALSO ☐
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 2 3/4 miles northwest of Waimanalo.
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 | |
| U S MON NO 1 1952 | | | | ° 00' 00.0" |
| MAKAPUU POINT COAST GUARD RADIO MAST | SE | (6.0 miles) | | 94 35 03.6 |
| RM 1 | WSW | 16.97 | 5.173 | 221 27 16 |
| RM 2 | NW | 14.81 | 4.516 | 288 28 21 |

This station was previously the center of a 2 1/2 inch iron pipe which was part of a "C Type" Hawaii Territorial Survey Signal. At this time, the iron pipe was removed and a standard station disk was set. Reference marks 1 and 2 were established at this time. A new description follows.

The station is located about 2 3/4 miles northwest of Waimanalo, 1/4 mile west of State Highway 72 and on the highest point of a low brushy ridge.

To reach the station from the post office in Waimanalo, go northerly on State Highway 72 for 2.7 miles to a golf course on the right and the entrance to a riding stable on the left, turn left and go westerly up the driveway passing between the house and stables for 0.1 mile to a narrow lane leading northerly, continue ahead on the lane along the west side of a fence for 0.15 mile to a gravel pit and the end of truck travel. Pack southerly on a dim trail for about 150 yards to the crest of the ridge, bear left and continue along the ridge for about 75 yards to the highest point and the station.

The station mark is a standard disk stamped WAIMANALO RIDGE 1952 1969, set in a mass of concrete in the center of a 5 x 5 foot concrete pad which was part of the "C Type" Hawaii Territorial Survey Signal. It is about 6 inches below the surface of the concrete pad.

Reference mark 1 is a standard disk stamped WAIMANALO RIDGE NO 1 1952 1969, brazed to the top of a 2 inch soil pipe projecting about 1 foot. It is about 1 foot lower in elevation than the station mark.

Reference mark 2 is a standard disk stamped WAIMANALO RIDGE NO 2 1952 1969, brazed to the top of a 2 inch soil pipe projecting about 1 foot. It is about 1 foot higher in elevation than the station mark.

No measurement was made between the reference marks due to heavy brush on line.

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1042
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

Bench Mark
Designation T 2 RESET state Hawaii County Honolulu
Nearest town Waimanalo county Honolulu Chief of party W.R. Porter
Distance and direction from nearest town at Waimanalo Leveling date 6-11-63
Character of mark Standard brass disk Stamping T 2 1927
Established by U.S. Coast and Geodetic Survey RESET 1963
Detailed description At west end of the village of Waimanalo, 2.0 miles northwest along Kalanianaʻole Highway from the Waimanalo post office, thence 0.15 mile left, southwest, on Kakaina Street, thence about 55 yards left, southeast, on Poalima Place, at 41-1484 Poalima Place (the home of Mr. Charles Wago); at southeast side of concrete driveway, 12 feet northeast of center line of Poalima Place, 21 feet southwest of southwest corner of house, 3.2 feet southwest of a 7-foot-high, concrete block pillar, 1 foot northeast of end of driveway, 6 inches west of low, concrete block wall, 77.5 feet east of Bench Mark T 2 (which is under the house at 41-1495 Poalima Place), and cemented in a drill hole in concrete wing at edge of driveway, flush with the ground.
NOTE: This bench mark was established because bench mark T 2 is now under a house and practically inaccessible.

RECOVERY NOTE, BENCH MARK

BENCH MARK
Designation T 2 RESET State Hawaii County Honolulu
Nearest town Waimanalo Described in? Hawaii-1 Chief of party C. Symms
Distance and direction from nearest town 2.15 miles northwest Recovery date June 1969
Character of mark C&GS bench mark disk Established by C&GS Stamping T 2 1927 RESET
Also horizontal control point ☐ Present condition Good 1963
feet of corner of 1/4 SEC T R
Detailed report: 2.05 miles northwest along State Highway 72 from the post office at Waimanalo, thence 0.1 mile southwest along Poalima Street, thence 0.05 mile southeast along Poalima Place, at the residence of Mr. Agar Post 41-1484 Poalima Place, in the top of the concrete driveway, 12.0 feet northeast of the center line of the place, 21.0 feet southwest of the west corner of the house, 3.2 feet southwest of a 7-foot-high concrete block pillar supporting a garage, 0.6 foot west of a concrete block wall, and flush with the driveway.

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: BENCH MARK T 2 RESET

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | |
|---------------------|-------------------|------------|-------------|
| GEODETIC LATITUDE: | 21° 20' 58.56231 | ELEVATION: | 9.08 METERS |
| GEODETIC LONGITUDE: | 157° 43' 29.32656 | | 29.8 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|--------------------|
| STATE & ZONE | CODE | X | Y | S FOR Δ S1 ANGLE ° |
| HI 3 | 5103 | 593,649.43 | 66,529.65 | + 0° 06' 01" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH* (From south) | CODE |
|----------------------|----------------------------------|--------------------------------|------|
| WAIMANALO RIDGE | 124° 32' 50.8 | 124° 26' 50" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION WAIMANALO RIDGE

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 1043
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

See station WAIMANALO RIDGE

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-5

STATE: HAWAII

YEAR: 1969

SECOND

-ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|-------------------|------------|----|--------|
| GEODETIC LATITUDE: | 21 ° 20' 19.02361 | ELEVATION: | 85 | METERS |
| GEODETIC LONGITUDE: | 157 44 46.36693 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|----------------------------------|
| STATE & ZONE | CODE | X | Y | θ HOR Δ RI ANGLE * |
| HI 3 | 5103 | 586,373.11 | 62,527.96 | + 0 05 33 " |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH * | CODE |
|----------------------|----------------------------------|-----------------|------|
| WAIMANALO RIDGE | 206 ° 51' 45.6 | 206 ° 46' 13 " | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION WAIMANALO RIDGE

QG J43

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 1044
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

DESCRIPTION OF BENCH MARK

STATE SURVEY 4-6
Nearest town Waimanalo State Hawaii County Honolulu
Distance and direction from nearest town 2.05 miles northwest Chief of party C. Symms
Character of mark SS disk Leveling date July 1969
Established by State of Hawaii Stamping 4-6 1969
Detailed description
2.05 miles northwest along State Highway 72 from the post office at Waimanalo, near the junction of Poalima Street, in the lower part of a lawn on the west side of Waimanalo Plantation Store and Gift Shop, 15.8 feet north of the center line of the highway, 262 feet west of the extended center line of Poalima Street, 37 feet north and across the highway from power pole H 400-43-41, 9.3 feet west of a 30-inch palm tree, and set in the top of a concrete post flush with the ground.

FORM CGCS-438
(6-6-63)
USCGC-MOC 43254-P68

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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-6

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | |
|---------------------|-------------------|------------|-------------|
| GEODETIC LATITUDE: | 21° 21' 04.22992 | ELEVATION: | 6.52 METERS |
| GEODETIC LONGITUDE: | 157° 43' 29.26052 | | 21.4 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|--------------------------------------|
| STATE & ZONE | CODE | X | Y | θ HOR Δ ϕ ANGLE * |
| HI 3 | 5103 | 593,654.67 | 67,101.53 | + 0° 06' 01" |

* 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 |
|----------------------|----------------------------------|---------------------------------|------|
| WAIMANALO RIDGE | 118° 24' 56.1" | 118° 18' 55" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION WAIMANALO RIDGE

QG 044

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 1045
HAWAII
LATITUDE 21° 00' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

See Station WAIMANALO RIDGE

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-7

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|------------------|-----------|----|--------|
| GEODETIC LATITUDE: | 21° 20' 57.33710 | ELEVATION | 22 | METERS |
| GEODETIC LONGITUDE: | 157 44 09.94077 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|---------------------------------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ θ ANGLE ° |
| HI 3 | 5103 | 589,810.31 | 66,399.45 | + 0 05' 46" |

* 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 |
|----------------------|----------------------------------|---------------------------------|------|
| WAIMANALO RIDGE | 178° 44' 02.7" | 178 38' 17" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION WAIMANALO RIDGE

QG 045

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 1046
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

See Station WAIMANALO RIDGE

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-8

STATE: HAWAII

YEAR 1969

SECOND

ORDER

SOURCE: G-14543

NO OBSERVATION CHECK ON THIS POSITION

| | | | | |
|---------------------|--------------------|------------|---|--------|
| GEODETIC LATITUDE: | 21 ° 22 ' 50.00091 | ELEVATION: | 4 | METERS |
| GEODETIC LONGITUDE: | 157 42 34.35341 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|------------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ ± ANGLE ° |
| HI 3 | 5103 | 598,825.36 | 77,783.20 | + 0 06 21 ° |

* 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 |
|----------------------|----------------------------------|---------------------------------|------|
| WAIMANALO RIDGE | 46 ° 45 ' 07.8 | 46 ° 38 ' 47 " | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION WAIMANALO RIDGE

QG 046

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

HORIZONTAL CONTROL DATA

by the
National Ocean Survey
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1047
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

See Station WAIMANALO RIDGE

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: STATE SURVEY 4-33

STATE: HAWAII

YEAR: 1969

SECOND

ORDER

G-14543

SOURCE: NO OBSERVATION CHECK ON THIS POSITION

| | |
|--|---------------------|
| GEODETIC LATITUDE: 21 ° 21' 23.61975 | ELEVATION: 5 METERS |
| GEODETIC LONGITUDE: 157 ° 42' 36.15243 | NO CHECK FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-------------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ or ANGLE * |
| HI 3 | 5103 | 598,671.41 | 69,066.98 | + 0° 06' 20" |

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

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH * (From south) | CODE |
|----------------------|----------------------------------|---------------------------------|------|
| WAIMANALO RIDGE | 91 ° 00' 56.9" | 90 ° 54' 57" | 5103 |

POSITION DETERMINED BY TRAVERSE FROM STATION WAIMANALO RIDGE

46 047

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 1048
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

Form 526
(11-8-55)

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

R

NAME OF STATION: GAP
ESTABLISHED BY: Terr. of Haw. Year: 1952 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:

A "Type C" signal built by the Hawaii Territorial Survey about 1929 was recovered in good condition. A complete description follows:

Station is located about 3-1/2 miles west-northwest of the post office in Waimanalo and 1-1/4 miles south of Olomana Peak, on a knoll along Ani-ani Nui Ridge, which runs north-south between Olomana Peak and the Koolau Range. It is at about 650 feet elevation and 0.3 mile south of the saddle where an old track road crosses over the ridge.

To reach station from the post office in Waimanalo, go northwest on State Highway 72 for 2.3 miles; turn left on Kumuhau St. and go 1.0 mile to end of paved road at crossroad. Turn right, crossing a narrow bridge, and go west on dirt road for 0.15 mile to a very dim right fork, just after passing a side road left. Take this dim right fork and follow old road for 0.15 mile to a pole gate. Pass through gate and continue up grade for 0.3 mile to locked board gate in saddle on ridge top, and end of truck travel. Pack southerly along ridge line for about 0.3 mile to station.

Station is marked by a 2-1/2-inch iron pipe that projects 2 feet from the center of a 5-foot-square concrete platform flush with the ground. A removable, red and white, metal target is set into the pipe and extends about 7 feet above the platform. Station is on a very narrow-topped knoll, about 175 yards northeast of a large power line that crosses the ridge, about 125 yards south of where a water tunnel goes through the ridge, and above a small water-gage house that may be seen down in the canyon.

RECOVERY NOTE, TRIANGULATION STATION
TRAVERSE

NAME OF STATION: GAP
ESTABLISHED BY: H.T.S. YEAR: 1952 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 west-northwest of Waimanalo

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

The station was recovered as described and in good condition. The center of the 2 1/2 inch pipe, which was previously the mark was held, and a standard triangulation disk stamped GAP 1952 1969, was cemented in a drill hole in the center of a slab of concrete which originally supported the "Type C" Hawaiian Territorial Survey Signal.

A Geodimeter Traverse was made between GAP 1952 1969 and WAIMANALO RIDGE 1952 1969.

Geodimeter distance 2303.713 Meters or (7558.02) ft.

FORM C&GS-526 (9-68)
USCOM-DC 34496-P66

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

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: GAP

STATE: HAWAII

YEAR: 1952

SECOND

-ORDER

SOURCE: G-14543

| | | | | |
|---------------------|-------------------|------------|-----|--------|
| GEODETIC LATITUDE: | 21 ° 20' 42.20664 | ELEVATION: | 203 | METERS |
| GEODETIC LONGITUDE: | 157 45 16.08446 | NO CHECK | | FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-----------------------|
| STATE & ZONE | CODE | X | Y | 9 ° 00' Δ 41' ANGLE ° |
| HI 3 | 5103 | 583,560.01 | 64,662.67 | + 0 ° 05' 22" |

* PLANE AZIMUTH HAS BEEN COMPUTED BY THE 9 ° 00' Δ 41' FORMULA NEGLECTING THE SECOND TERM.

| TO STATION OR OBJECT | GEODETIC AZIMUTH (From south) | PLANE AZIMUTH (From south) | CODE |
|----------------------|----------------------------------|-------------------------------|------|
| WAIMANALO RIDGE | 234 ° 59' 14.7" | 234 ° 53' 53" | 5105 |

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

POSITION DETERMINED BY TRAVERSE FROM STATION WAIMANALO RIDGE

AND CHECKED BY ADDITIONAL OBSERVATIONS

QG 048

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 211575 STATION 1049
HAWAII
LATITUDE 21° 30' TO 21° 30'
LONGITUDE 157° 30' TO 158° 00'
DIAGRAM NF 4-11 OAHU

NO ORIGINAL TEXT

ADJUSTED HORIZONTAL CONTROL DATA

Form 526
(11-8-55)

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

R

NAME OF STATION: TANK
ESTABLISHED BY: H.T.S. YEAR: 1952 STATE: Hawaii
RECOVERED BY: M.C. Acopiado, YEAR: 1961 COUNTY: Honolulu
FF Cruz & Co.

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

The water tank apparently had been rebuilt sometime in 1957, according to information from people around the tank.
Observations prove that stellar azimuth between WAIMANALO RIDGE and TANK is off 6 minutes.

RECOVERY NOTE, TRIANGULATION STATION

NAME OF STATION: TANK
ESTABLISHED BY: Terr. of Haw. YEAR: 1952 STATE: Hawaii
RECOVERED BY: D.G. Rushford YEAR: 1964 COUNTY: Honolulu

| HEIGHT OF TELESCOPE ABOVE STATION MARK | | 1.63 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 | | | | |
| GAP 1952 | | | | 00 | 00 | 00.0 | |
| WAIMANALO RIDGE 1952 | NW | | | 26 | 00 | 35.5 | |
| R.M. No. 1 | SE | 89.880 | 27.396 | 221 | 58 | 29.1 | |

Two concrete, water reservoirs were found at the station site and each one had a chiseled cross on its flat top. An angle check proved the cross on the smaller and lower one of the two reservoirs to be the station mark. According to information from the Hawaii State Survey office the larger reservoir was built in 1954 and the cross on it was established by that office in 1956, but no tie was made between the two marks.

The station was re-marked with a standard station disk and the cross on the larger reservoir was marked with a standard reference mark disk. A complete description follows:

Station is located 1/2 mile west of the post office in Waimanalo, on the summit of a long low hill of about 162 feet elevation, on the north-west and smaller one of two green, concrete, water reservoirs, which is also the lower and less conspicuous of the two.

To reach station from the post office in Waimanalo, go northwest on State Highway 72 for 0.4 mile; turn left on Hihimanu Street and go 0.1 mile to crossroad by church; continue ahead on Hihimanu Street, which becomes a dirt road, for 0.25 mile; turn left on Waikupanaha St. and go 0.3 mile to gate on left. Pass through gate and follow track road up slope for 0.25 mile to top of hill and the reservoirs inside a wire mesh fence.

The reservoir on which the station is located is 38.3 feet in diameter and has a small gauge-house on northeast edge of roof. The station mark is a standard disk stamped "TANK 1952 1964", cemented in a drill hole in the concrete reservoir top, at center of old chiseled cross. It is 11.4 feet west-southwest of the northwest corner of the gauge-house, 15.5 feet west of the southwest corner of the gauge-house, and 7.25 feet from center of reservoir, in azimuth 160° 59'.

The reservoir on which the reference mark is located is 73.2 feet in diameter and has a small gauge-house on the northwest edge of the roof. Reference mark is a standard disk stamped "TANK 1952 NO 1 1964", cemented in a drill hole at the center of the chiseled cross. It is 6.15 feet from center of reservoir, in azimuth 317° 18' and is 3.9 feet higher than the station mark.

(Continued on next page)

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

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

USCOMMA-DC 27178-P89

NAME OF STATION: TANK

STATE: HAWAII

YEAR: 1952

SECOND

ORDER

SOURCE: G-14543

| | | | |
|---------------------|-------------------|------------|-------------|
| GEODETIC LATITUDE: | 21° 20' 08.32686 | ELEVATION: | 48.6 METERS |
| GEODETIC LONGITUDE: | 157° 42' 25.54351 | | 159 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-------------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ θ: ANGLE * |
| HI 3 | 5103 | 559,688.38 | 61,471.77 | + 0 06.24 " |

* 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 |
|----------------------|----------------------------------|---------------------------------|------|
| WAIMANALO RIDGE | 127 59 21.7 | 127 52 58 | 5103 |

THESE DATA OBTAINED FROM ADJUSTMENT OF OCT 1971

POSITION DETERMINED BY TRAVERSE FROM STATION TANK RM 1

AND CHECKED BY ADDITIONAL OBSERVATIONS

QG J45

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 1049
LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

TANK (Continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: TANK
ESTABLISHED BY: H.T.S. YEAR: 1952 STATE: Hawaii BENCH MARK(S) ALSO ☐
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1/2 mile west of Waimanalo

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

Station mark and reference number one were recovered and found in good condition. Reference mark number one was used for the station mark as did Mr. Hanson in 1964. The 1969 observation follows

| OBJECT | BEARING | FEET | METERS | DIRECTION |
|---------------------------|---------|-------|--------|-------------|
| WAIMANALO RIDGE 1952 1969 | | | | 0 00 00.0 |
| TANK RM NO 1 1952 | S | 89.89 | 27.398 | 195 57 50.5 |
| RM NO 2 | SSW | 72.95 | 22.237 | 221 58 40 |

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 1050
HAWAII
LATITUDE 21 ° 00' TO 21 ° 30'
LONGITUDE 157 ° 30' TO 158 ° 00'
DIAGRAM NF 4-11 OAHU

DEPARTMENT OF COMMERCE
U. S. COAST AND GEODETIC SURVEY
Form 699
Rev. Aug. 1965

DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: TANK RM 1

STATE: Hawaii

COUNTY: Honolulu

CHIEF OF PARTY: D.G. Rushford

YEAR: 1964

Described by: R.F. Hanson

HEIGHT OF TELESCOPE ABOVE STATION MARK 1.5 METERS.1

HEIGHT OF LIGHT ABOVE STATION MARK METERS.

| NOTE* | OBJECT | BEARING | DISTANCE | | DIRECTION |
|-------|----------------------|---------|----------|--------|------------|
| | | | feet | meters | |
| | GAP 1952 | | | | 00 00 00.0 |
| | WAIMANALO RIDGE 1952 | | | | 25 54 45.8 |
| | TANK 1952 | NW | 89.880 | 27.396 | 41 45 58.6 |

Station is located about 1/2 mile west of the post office in Waimanalo, on the summit of a long low hill of about 162 feet elevation, on the southeast and larger one of two green, concrete, water reservoirs. This reservoir is also the higher and more prominent one. It is 73.2 feet in diameter and is about 4 feet higher than the smaller reservoir, on which station TANK 1952 is located. There is a small gauge-house on the northwest edge of the flat top of the reservoir, measuring 4-1/2 x 7-1/2 feet, and 7 feet high.

To reach station from the post office in Waimanalo, go northwest on State Highway 72 for 0.4 mile; turn left on Hihimanu Street and go 0.1 mile to crossroad by church; continue ahead on Hihimanu Street, which becomes a dirt road, for 0.25 mile; turn left on Waikupanaha St. and go

0.3 mile to gate on left. Pass through gate and follow track road up slope for 0.25 mile to top of hill and the reservoirs inside a wire mesh fence.

The station is marked with a standard reference mark disk, stamped "TANK 1952 NO 1 1964", cemented in a drill hole in the concrete top of the reservoir, at the exact center of a 3-inch, chiseled cross. It is 6.15 feet from the center of the reservoir, in azimuth 317° 17' 48".

NOTE: The chiseled cross was established in 1956 by the Hawaii State Survey.

TANK 1952 is a standard disk, stamped "TANK 1952 1964", cemented in a drill hole in the concrete top of the smaller reservoir, at the center of a 3-inch, chiseled cross that originally marked the station. It is 7.25 feet from the center of the reservoir, in azimuth 160° 59'.

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

(Continued on next page)

ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: TANK RM 1

STATE: HAWAII

YEAR: 1952

FIRST

ORDER

SOURCE: G-14543

| | | | |
|---------------------|-------------------|------------|-------------|
| GEODETIC LATITUDE: | 21 ° 20' 07.60661 | ELEVATION: | 49.6 METERS |
| GEODETIC LONGITUDE: | 157 42 24.98395 | | 163 FEET |

| STATE COORDINATES (Feet) | | | | |
|--------------------------|------|------------|-----------|-------------------|
| STATE & ZONE | CODE | X | Y | θ OR Δ or ANGLE * |
| HI 3 | 5103 | 599,741.41 | 61,399.15 | + 0° 06' 24" |

* 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 |
|----------------------|----------------------------------|-------------------------------|------|
| US MON 1 | 163 ° 31' 03.1 | 163 ° 24' 39" | 5103 |

THESE DATA OBTAINED FROM ADJUSTMENT OF NOV 1970

QG 050

HORIZONTAL CONTROL DATA

by the
NATIONAL GEODETIC SURVEY
OLD HAWAIIAN DATUM

QUAD 211573 STATION 1050
LATITUDE ° ' TO ° '
LONGITUDE ° ' TO ° '
DIAGRAM

TANK RM 1 (Continued)

RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: TANK RM 1
ESTABLISHED BY: D.G.R. YEAR: 1964 STATE: Hawaii BENCH MARK ALSO ☐
RECOVERED BY: C.A. Annis YEAR: 1969 COUNTY: Honolulu
AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 1/2 mile west of Waimanalo
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 | |
| U.S. MON NO 1 1952 | | | | 0 00.00.0 |
| R.M. NO 2 | W | 40.19 | 12.249 | 287 42 03 |
| TANK 1952 | NW | 89.89 | 27.398 | 340 25 59 |
| R.M. 2 to TANK 1952 | | 72.95 | 22.237 | |

The station mark and reference mark 1 were recovered and found in good condition. Reference mark 1 was used for the station mark in 1964 by Mr. Hanson and was used by this party in 1969. The smaller tank on which the station mark is located is lower and could not see State Survey mark 4-2 without losing a lot of man hours so a traverse was made to reference mark 1. Reference mark 2 was established at this time. A new and complete description follows.

The station is located about 1/2 mile west of Waimanalo, on the top of a low hill on which two reservoirs are located, reference mark 1 is located on the largest of the two reservoirs. This mark is being used for the station.

To reach from the Post Office in Waimanalo, go northwest on State Highway 72 for 0.4 mile to Hihimanu Street, turn left on Hihimanu Street and go westerly for 0.1 mile to a cross street and a church on the right, continue west-northwest on Hihimanu Street for 0.25 mile to side street on the left (Waikauanaha Street). Turn left on Waikauanaha Street and go westerly for 0.3 mile to a gate on the left, turn left and pass through gate and go southerly for 0.25 mile to top of hill and a cyclone fence around two water reservoirs and station on top of the top of the largest of two reservoirs.

Station mark, a standard reference mark disk stamped TANK 1952 RM NO 1 1964 cemented in a drill hole on the top of a concrete reservoir which is the tallest of two reservoirs. It is 6.5 feet south of the center of the reservoir and 30.5 feet south of the center of a small building on the north end of the reservoir.

TANK 1952 is a standard disk stamped TANK 1952 1964 cemented in a drill hole on the top of the smallest one of two reservoirs. It is 7.2 feet south of the center of the reservoir.

Reference mark 2 is a standard disk stamped TANK NO 2 1964 1969 cemented in a drill hole set on the top of a rim around the largest one of two reservoirs. It is 28.6 feet southwest of the center of a small building on the north side of the reservoir, 15.4 feet west of the northwest manhole and 0.25 feet west of the west edge of the reservoir.