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DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

WASHINGTON

April 14, 1930.

Chief, Section of Library and Archives:

There is sent you herewith for filing a photostat copy (No. 7) of geographic positions and descriptions in the southern part of Oahu Island, T.H., which, at the request of military officials, are to be considered confidential in character.

These data are supplementary to Special Publication No. 156, "Triangulation in Hawaii."

N. Bowie

Chief, Division of Geodesy.

Declassified by authority of ltr 31 July 1952 U.S.E. Honolulu thru NSC & GS office Honolulu

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U.S. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

DEPARTMENT OF COMMERCE

CONFIDENTIAL

~~C O N F I D E N T I A L~~

GEOGRAPHIC POSITIONS AND DESCRIPTIONS OF STATIONS

ON

OAHU ISLAND

TERRITORY OF HAWAII

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1929

UNITED STATES COAST AND GEODETIC SURVEY

WASHINGTON, D.C.

1929

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CONFIDENTIAL STATIONS ON OAHU ISLAND

In the following pages are given geographic positions and descriptions of stations on the Island of Oahu, Territory of Hawaii, which are to be furnished only to responsible officials of the Army, Navy, federal and territorial surveys.

All references to these stations have been completely removed from the report on the triangulation of the Hawaiian Islands, which, it is hoped, will be ready for distribution early in 1930. The accompanying data should be used in conjunction with that report, which they supplement.

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GEOGRAPHIC POSITIONS

~~Accession No. of Computation:~~

Locality Oahu Island, Confidential Positions

Datum Old Hawaiian

~~State~~ Territory of Hawaii

STATION	LATITUDE AND LONGITUDE	SECONDS IN METERS	AZIMUTH	BACK AZIMUTH	TO STATION	DISTANCE		
						LOGARITHM (METERS)	METERS	FEET
	° ′ ″		° ′ ″	° ′ ″				
De Russey, 1927	21 16 55.269	1699.7	156 48 54.6	336 48 34.6	Punchbowl	3.603878	4016.8	13178.5
	157 50 11.886	342.6	312 41 36.8	132 42 05.7	Diamond Head	3.495035	3126.3	10256.9
Fort De Russey flagpole, 1927	21 17 03.870	119.0	155 30 29.4	335 30 09.6	Punchbowl	3.575974	3766.8	12358.2
	157 50 12.574	362.5	199 20 41.5	19 21 06.7	Tantalus	3.780464	6032.0	19790.0
			315 48 47.9	135 49 17.1	Diamond Head	3.521818	3325.2	10909.4
Salt Lake, 1873-1927	21 21 59.331	1824.7	19 28 50.6	199 28 24.9	Station "G"	3.785971	6109.0	20042.6
	157 54 39.147	1127.8	41 21 05.8	221 19 59.6	Pearl Harbor Entrance Datum Point	3.899779	7939.2	26047.2
			56 14 23.1	236 13 00.6	Puuloa 2	3.894887	7850.3	25755.5
			94 54 10.9	274 50 35.3	Kapuai New	4.232959	17098.5	56097.3
			112 57 46.9	292 56 12.2	Ewa Church	3.909750	8123.6	26652.2
			131 45 58.2	311 43 44.9	Waipio Uka	4.148842	14087.8	46219.7
			214 59 03.8	34 59 29.3	Halawa Barrel	3.545926	3515.0	11532.1
			275 04 15.9	95 06 52.5	Konahuanui 2	4.094509	12431.1	40784.4
			283 09 13.3	103 10 43.9	Waolani	3.866973	7361.6	24152.2
			289 18 51.1	109 20 53.4	Tantalus	4.011019	10257.0	33651.5
			301 54 49.5	121 56 41.3	Round Top	4.018477	10434.6	34234.2
			312 44 51.3	132 46 08.5	Punchbowl	3.920923	8335.3	27346.7
			318 10 44.9	138 11 51.6	St. Andrews Cathedral	3.898858	7922.4	25992.1
			318 54 13.7	138 56 19.8	Diamond Head	4.182351	15217.8	49927.1
			323 19 33.9	143 20 22.1	Pineapple tank	3.805911	6396.0	20984.2
			323 47 44.5	143 48 32.3	Red gas tank	3.807090	6413.4	21041.3
			325 57 26.8	145 57 58.7	Oahu Pen	3.653991	4508.1	14790.3
			328 42 40.0	148 43 31.9	Sand Island Light	3.898465	7915.3	25968.8
			329 03 50.8	149 04 42.4	Honolulu Light	3.900732	7956.7	26104.6
			349 34 57.9	169 35 13.0	Kalihi Channel Datum Point	3.821577	6631.0	21755.2

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STATION	LATITUDE AND LONGITUDE	SECONDS IN METERS	AZIMUTH	BACK AZIMUTH	TO STATION	DISTANCE		
						LOGARITHM (METERS)	METERS	FEET
	° ′ ″		° ′ ″	° ′ ″				
Scar, 1925	21 21 58.507	1799.4	289 19 33.7	109 21 35.1	Tantalus	4.007515	10174.5	33380.8
	157 54 36.423	1049.4	312 59 17.8	133 00 34.1	Punchbowl	3.917010	8260.6	27101.7
Aiea Mill, chimney, 1925-1927	21 22 59.239	1821.9	75 40 49.8	255 37 15.0	Palailai	4.243773	17529.6	57511.7
	157 55 46.891	1350.8	103 29 18.5	283 28 08.5	Ewa Church	3.754762	5685.4	18652.8
			131 23 06.9	311 21 18.4	Waipio Uka	4.057102	11405.2	37418.6
Balloon hangar, 1925	21 19 24.531	754.4	222 12 51.3	42 13 45.9	Salt Lake	3.808127	6428.8	21091.8
	157 57 09.078	261.6	274 53 51.5	94 56 03.3	Punchbowl	4.020375	10480.3	34384.1
Kam, 1927	21 19 19.840	610.2	98 00 55.0	278 00 06.4	Puuloa 2	3.589340	3884.5	12744.4
	157 56 12.142	349.9	211 05 12.4	31 06 11.7	Halawa Barrel	3.958615	9091.1	29826.4
			274 52 49.4	94 54 40.4	Punchbowl	3.946117	8833.2	28980.3
Fort Kamehameha flagstaff, 1925	21 19 28.716	883.1	164 42 58.9	344 42 31.9	Ewa Church	3.907723	8085.8	26528.2
	157 57 44.829	1291.9	229 06 20.4	49 07 28.0	Salt Lake	3.849840	7076.8	23217.8
Puuloa, 1873-1927	21 19 37.488	1152.9	35 31 15.	215 31 15.	Puuloa 2	0.288920	1.945	6.381
	157 58 25.583	737.3						
Puuloa 2, 1927	21 19 37.437	1151.3	118 58 14.6	298 56 01.7	Kapuai New	4.079735	12015.3	39420.2
	157 58 25.622	738.4	163 49 31.1	343 48 40.6	Waipio Uka	4.155676	14311.2	46952.7
			172 45 47.2	352 45 35.1	Ewa Church	3.880356	7592.0	24908.1
			229 40 59.7	49 42 47.7	Halawa Barrel	4.049176	11198.9	36741.7
			266 33 05.7	86 36 30.3	Tantalus	4.210458	16235.2	53265.0
			275 49 27.4	95 52 07.0	Punchbowl	4.104272	12713.7	41711.5
			293 14 20.0	113 17 48.3	Diamond Head	4.255082	17992.1	59029.1

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GEOGRAPHIC POSITIONS

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Locality Oahu Island, Confidential Positions

Datum Old Hawaiian

~~State~~ Territory of Hawaii

STATION	LATITUDE AND LONGITUDE	SECONDS IN METERS	AZIMUTH	BACK AZIMUTH	TO STATION	DISTANCE		
						LOGARITHM (METERS)	METERS	FEET
	° ′ ″		° ′ ″	° ′ ″				
Puuloa latitude station, 1887	21 19 37.94			175 01	Puuloa	1.157958	14.39	47.2
	157 58 25.66							
Weaver, 1927	21 19 19.904	612.1	178 22 59.1	358 22 56.2	Ewa Church	3.907085	8073.9	26489.1
	157 58 50.916	1467.3	233 30 20.7	53 30 29.9	Puuloa 2	2.957454	906.7	2974.7
			235 56 02.1	55 57 33.8	Salt Lake	3.942310	8756.1	28727.3
Pearl Harbor water tank "A",	21 21 13.602	418.3	149 21 02.8	329 20 28.5	Ewa Church	3.725663	5317.0	17444.2
1925	157 57 24.725	712.4	253 33 56.5	73 34 56.9	Salt Lake	3.696663	4973.5	16317.2
Pearl Harbor water tank "B",	21 21 14.770	454.2	149 41 46.5	329 41 12.9	Ewa Church	3.720698	5256.5	17245.7
1925	157 57 26.743	770.5	254 08 48.3	74 09 49.4	Salt Lake	3.700651	5019.4	16467.8
Pearl Harbor water tank "C",	21 21 14.768	454.2	150 01 45.8	330 01 12.6	Ewa Church	3.719236	5238.9	17188.0
1925	157 57 27.967	805.8	254 15 19.5	74 16 21.0	Salt Lake	3.703578	5053.3	16579.0
Pearl Harbor large water tank,	21 21 40.306	1239.6	12 13 47.3	192 13 37.0	Puuloa 2	3.587319	3866.5	12685.3
1925-1927	157 57 57.200	1648.0	154 15 35.4	334 14 34.5	Waipio Uka	4.043912	11064.0	36299.1
			154 41 09.8	334 40 47.4	Ewa Church	3.618197	4151.4	13620.1

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Locality Oahu Island, Confidential Positions *Datum* Old Hawaiian ~~*State*~~ Territory of Hawaii

STATION	LATITUDE AND LONGITUDE	SECONDS IN METERS	AZIMUTH	BACK AZIMUTH	TO STATION	DISTANCE		
						LOGARITHM (METERS)	METERS	FEET
	° ′ ″		° ′ ″	° ′ ″				
Pearl Harbor radio tower	21 21 12.516	384.9	19 21 02.7	199 20 49.7	Puuloa 2	3.491246	3099.2	10168.0
east, 1927	157 57 49.987	1440.3	85 30 13.3	265 27 23.4	Palailai	4.129673	13479.5	44224.0
			155 08 40.2	335 07 36.6	Waipio Uka	4.076478	11925.5	39125.6
			156 42 55.8	336 42 30.7	Ewa Church	3.700359	5016.0	16456.7
Pearl Harbor radio tower west,	21 21 16.122	495.8	13 10 54.0	193 10 45.0	Puuloa 2	3.493755	3117.1	10226.7
1927	157 58 00.956	27.5	84 54 50.5	264 52 04.6	Palailai	4.119713	13173.9	43221.4
			156 19 12.1	336 18 12.5	Waipio Uka	4.067983	11694.5	38367.7
			159 39 36.7	339 39 15.6	Ewa Church	3.680840	4795.6	15733.6
Pearl Harbor radio tower	21 21 05.411	166.4	15 56 01.8	195 55 52.0	Puuloa 2	3.449275	2813.7	9231.3
south, 1927	157 57 58.818	1694.7	86 21 40.5	266 18 53.8	Palailai	4.120910	13210.2	43340.5
			156 40 55.2	336 39 54.8	Waipio Uka	4.079948	12021.2	39439.6
			160 17 41.2	340 17 19.3	Ewa Church	3.709795	5126.2	16818.2
Waipahu Mill (Oahu Mill, 1909)	21 23 21.863	672.4	283 46 43.0	103 48 53.8	Salt Lake	4.027083	10643.5	34919.5
old stack, 1925	158 00 37.952	1093.2	296 26 52.1	116 30 20.0	Punchbowl	4.264490	18386.1	60321.7
Waipahu Mill, chimney,	21 23 22.072	678.8	59 43 23.5	239 41 34.1	Palailai	4.000224	10005.2	32825.4
1925-1927	158 00 36.488	1051.1	178 10 06.5	358 10 03.7	Waipio Uka	3.835004	6839.2	22438.3
			257 30 32.9	77 31 08.4	Ewa Church	3.459589	2881.3	9453.1
			331 22 09.7	151 22 57.3	Puuloa 2	3.896000	7870.5	25821.8
Ewa Mill, old stack, 1925	21 20 33.599	1033.3	224 41 54.9	44 43 07.5	Ewa Church	3.912066	8167.1	26794.9
	158 02 18.258	526.1	258 42 14.8	78 45 02.0	Salt Lake	4.129956	13488.3	44252.9

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GEOGRAPHIC POSITIONS

~~Accession No. of Computation:~~

Locality Oahu Island, Confidential Positions *Datum* Old Hawaiian ~~State~~ Territory of Hawaii

STATION	LATITUDE AND LONGITUDE	SECONDS IN METERS	AZIMUTH	BACK AZIMUTH	TO STATION	DISTANCE		
						LOGARITHM (METERS)	METERS	FEET
	° ′ ″		° ′ ″	° ′ ″				
Ewa Mill, chimney, 1925-1927	21 20 32.592	1002.3	91 40 00.6	271 38 48.3	Palailai	3.757979	5727.7	18791.6
	158 02 17.659	508.8	125 51 09.9	305 49 38.4	Manawahua	3.950456	8921.9	29271.3
			192 36 22.4	12 36 56.6	Waipio Uka	4.091519	12345.8	40504.5
			284 13 23.8	104 14 48.3	Puuloa 2	3.838735	6898.2	22631.8
Mooring mast, 1927	21 19 49.851	1533.1	107 16 16.0	287 15 15.8	Palailai	3.697886	4987.5	16363.2
	158 02 51.066	1471.6	152 12 12.2	332 11 36.0	Kapuai New	3.788435	6143.8	20156.8
			272 50 38.4	92 52 15.0	Puuloa 2	3.884167	7658.9	25127.6
Station X (Army), 1925-1927	21 18 41.018	1261.5	114 39 23.0	294 37 44.0	Palailai	3.935850	8626.8	28303.1
	158 01 04.257	122.7	141 48 23.3	321 47 08.2	Kapuai New	3.982715	9609.8	31528.2
			235 34 29.0	55 37 14.7	Halawa Barrel	4.201168	15891.6	52137.7
			241 11 13.9	61 13 34.1	Salt Lake	4.102526	12662.7	41544.2
			249 12 30.4	69 13 28.1	Puuloa 2	3.689302	4889.9	16042.9
Palailai, 1873-1927	21 20 37.977	1167.9	18 07 41.5	198 07 21.2	Barbers Point Light	3.713858	5174.4	16976.3
	158 05 36.353	1047.5	39 08 37.7	219 08 24.5	Gilbert	3.218341	1653.3	5424.2
			107 36 29.7	287 35 40.9	Kahe	3.607072	4046.4	13275.6
			163 24 02.8	343 23 43.7	Manawahua	3.722504	5278.4	17317.6
			205 37 12.3	25 37 36.3	Kapuai New	3.642052	4385.8	14389.1
			278 30 33.6	98 33 10.4	Puuloa 2	4.098672	12550.8	41177.1

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STATION	LATITUDE AND LONGITUDE	SECONDS IN METERS	AZIMUTH	BACK AZIMUTH	TO STATION	DISTANCE		
						LOGARITHM (METERS)	METERS	FEET
	° ′ ″		° ′ ″	° ′ ″				
Puu o Hulu, Makai, 1927	21 24 14.262	438.6	145 37 34.3	325 36 37.1	Lahilahi	3.902391	7987.1	26204.3
	158 10 21.340	614.6	157 59 54.1	337 59 19.0	Burns U.S.E.	3.868214	7382.7	24221.4
			159 44 36.7	339 44 14.1	Waianae Mill Chimney	3.711532	5146.7	16885.5
			165 25 37.1	345 25 12.8	Makaha	3.881543	7612.8	24976.3
			167 33 33.	347 33 23.	Mailiilii	3.554327	3583.7	11757.5
			179 52 10.9	359 52 10.8	Paheehee New	3.693903	4942.0	16213.9
			211 53 41.4	31 54 49.2	Kum	4.004148	10096.0	33123.3
			238 34 34.3	58 36 07.9	Kaua	3.936618	8642.1	28353.3
			283 21 49.6	103 23 14.5	Manawahua	3.838080	6887.8	22597.7
			321 15 41.0	141 16 36.1	Kahe	3.842505	6958.3	22829.0
Puu o Hulu N., 1875	21 24 25.313	778.5	290 08 08.4	110 09 15.1	Manawahua	3.749226	5613.4	18416.6
	158 09 31.663	912.0	333 07 29.8	153 08 06.8	Kahe	3.810543	6466.1	21214.2
Puu o Hulu S., 1875	21 24 14.207	436.9	283 21 05.0	103 22 29.9	Manawahua	3.838009	6886.7	22594.1
	158 10 21.314	613.9	321 15 26.8	141 16 21.9	Kahe	3.842392	6956.5	22823.1
Radio Corporation power plant,	21 42 33.301	1024.2	11 37 29.7	191 37 19.5	Puuki	3.596979	3953.5	12970.8
chimney, 1927	157 58 32.283	927.9	31 49 54.7	211 49 17.2	Lak	3.742863	5513.8	18148.9
			59 28 19.6	239 27 31.4	Opana	3.638994	4355.1	14288.4
Heeia high radio tower, 1927	21 25 51.169	1573.7	134 44 11.9	314 43 47.5	Heeia	3.431207	2699.0	8855.0
	157 48 24.777	713.5	248 33 16.8	68 34 51.9	Mokapu	3.905575	8045.9	26397.3
			336 33 02.3	156 34 00.5	Lanipo	4.063661	11578.7	37987.8

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DE RUSSEY (Oahu Island, L. G. Simmons, 1927).- A standard disk station mark in secret position.

SALT LAKE (Oahu Island, T.H., Hawaiian Government Survey, 1873; O. B. French, 1909; E. R. Hand, 1925; L. G. Simmons, 1927; J. H. Peters, 1928).- In the southern part of Oahu, about 1/3 mile south of the main Honolulu-Schofield road, on the northeast and highest part of the crater of Aliamanu (Leilono), and a short distance west of the Heiau of Leilono. It is about 2 miles northwest of Fort Shafter. The hill is easily recognized by a prominent scar or rock-slide (Station Scar) seen on its eastern face from vicinity of Honolulu. Marked originally by a granite post with cross in top, around which was later placed a concrete pier 6 feet square, extending 1 foot above ground, with 2-inch pipe set vertically in center over station. Reference marks set in 1927, standard disk reference marks with arrows pointing towards station, wedged in drill holes in outcropping bedrock, are at the following distances and azimuths from station: No. 1, 13.674 meters (44.86 feet), 198° 03'; No. 2, 21.533 meters (70.65 feet), 277° 24'. Remarked in 1929 with "Type A" signal. See note on page 15.

SCAR (Oahu Island, E. R. Hand, 1925).- A scar or rock slide on the S.E. slope of Salt Lake crater, which is a steep and well-defined hill between Honolulu and Pearl Harbor. A very prominent mark, visible from just south of Diamond Head to a line south from Pearl Harbor.

AIEA MILL STACK (Oahu Island, E. R. Hand, 1925; L. G. Simmons, 1927).- In southern Oahu, northeast of Pearl Harbor, an iron steel-colored stack rising from a large structure (sugar mill) of same color.

BALLOON HANGAR (Oahu Island, E. R. Hand, 1925).- In southern Oahu, on east side of Pearl Harbor entrance, at Fort Kamehameha, - a balloon hangar standing isolated in a low grassy flat.

KAM (Oahu Island, L. G. Simmons, 1927).- A standard disk station mark in secret position.

FORT KAMEHAMEHA FLAGSTAFF (Oahu Island, E. R. Hand, 1925).- In southern Oahu, on east side of Pearl Harbor entrance, the flagstaff at Fort Kamehameha.

PUULOA (Oahu Island, Hawaiian Government Survey, 1873; L. G. Simmons, 1927).- See description of Puuloa 2.

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PUULOA 2 (Oahu Island, T.H., L. G. Simmons, 1927).- On southern shore of Oahu, about 3/4 mile S.W. of Watertown, on western side of entrance to Pearl Harbor, under old windmill tower. There are two marks in this vicinity, practically the same, one directly under the old tower, and the other about 7 feet distant from the first. The one directly under the old tower was used in 1927 under the belief that it was the old Territorial Survey station. The difference was later discovered and the 1927 station marked with standard station disk, set in the top of a square post of concrete and stamped "Puuloa 2". The old Hawaiian Government (Territorial) Survey mark, a granite pier, is 1.945 meters (6.38 feet) from station in azimuth 150° 13'; while old brick latitude pier is N. 5° W. 47.2 feet from the Territorial Survey station. Three reference marks were set as follows: No. 1 in concrete base of beacon light is 48.023 meters (157.56 feet) from station in azimuth 61° 03'. Nos. 2 and 3 were standard reference disks **with arrows pointing toward station set in center of top of square block or post of concrete,** ~~set in concrete~~, ~~Note 11a~~, at the following distances and azimuths from the station: 22.050 meters (72.34 feet), 122° 42'; 31.732 meters (104.11 feet), 200° 25'.

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PUULOA LATITUDE STATION (Oahu Island, E. D. Preston, 1887).- See description of Puuloa 2.

WEAVER (Oahu Island, L. G. Simmons, 1927).- A standard disk station mark in secret position.

PEARL HARBOR WATER TANK "A" (Oahu Island, E. R. Hand, 1925).- In southern Oahu, on east side of entrance to Pearl Harbor, a water tank, gray, on high steel frame, the highest of three. No superstructure.

PEARL HARBOR WATER TANK "B" (Oahu Island, E. R. Hand, 1925).- In southern Oahu, on east side of entrance to Pearl Harbor, a water tank, gray, on high steel frame. Has superstructure.

PEARL HARBOR WATER TANK "C" (Oahu Island, E. R. Hand, 1925). In southern Oahu, east side of entrance to Pearl Harbor, a water tank, gray, on steel frame. The lowest tank of group of three.

PEARL HARBOR, LARGE WATER TOWER (Oahu Island, E. R. Hand, 1925; L. G. Simmons, 1927).- In southern Oahu, in Pearl Harbor on Ford Island, a lone tank on a very high frame. It has superstructure for observation purposes.

PEARL HARBOR, RADIO TOWER EAST (Oahu Island, E. R. Hand, 1925).- In southern Oahu, east side of entrance to Pearl Harbor, the most easterly of three radio towers.

PEARL HARBOR, RADIO TOWER WEST (Oahu Island, E. R. Hand, 1925).- In southern Oahu, east side of entrance to Pearl Harbor, the most westerly of three radio masts.

PEARL HARBOR RADIO TOWER SOUTH (Oahu Island, E. R. Hand, 1925).- In southern Oahu, east side of entrance to Pearl Harbor, the most southerly of three radio masts.

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WAIPAHU MILL, OLD STACK (Oahu Island, E. R. Hand, 1925).- In southern Oahu, at Waipahu, the lower of two stacks at sugar mill. Stack is black. This is station Oahu Mill of 1909.

WAIPAHU MILL, CHIMNEY (Oahu Island, E. R. Hand, 1925; L. G. Simmons, 1927).- In southern Oahu, at Waipahu, the higher of two stacks at sugar mill. Stack is light gray.

EWA MILL OLD STACK (Oahu Island, E. R. Hand, 1925).- In southern Oahu, west of Pearl Harbor, at the Ewa Plantation sugar mill, the smaller and lower of two stacks. It is dark colored.

EWA MILL, CHIMNEY (Oahu Island, E. R. Hand, 1925; L. G. Simmons, 1927).- In southern Oahu, west of Pearl Harbor, at the Ewa Plantation sugar mill, the larger and higher of two stacks. It is light gray in color, with black band at top.

MOORING MAST (Oahu Island, E. R. Hand, 1925).- In southern Oahu, midway between Pearl Harbor and Barbers Point, and in the flats, about one mile from shore - a steel structure painted with alternate black and white bands.

STATION X (Oahu Island, E. R. Hand, 1925; L.G.Simmons,1927).- In southern Oahu, a little over half way towards Pearl Harbor from Barbers Point, near the shore and among trees, a fire control station (artillery) consisting of a green house on iron frame.

PALAILAI (Oahu Island, Hawaiian Government Survey, 1873; U.S. Engineers, 1914; E. R. Hand, 1924; L. G. Simmons, 1927).- Near southern coast of Oahu, at the southern end of the Waianae Range, on the peak of Puu Palailai. It is on the summit of a rocky cliff, on the west side and highest point of an extinct volcano, north of the main road between Honolulu and Waianae, and north of the railroad station of Gilbert. A road leading from the pump house, Oahu Sugar Co., at the southeastern foot of the Range, up through some pineapple fields goes to within 300 feet (in elevation) of the station. The original mark, a redwood post and cairn of stones, had been replaced by the U.S. Engineers ~~by~~ with a concrete post 3 inches square and 18 inches long with nail in top. In 1927 the nail was replaced with standard disk station mark. (Note: Description conflicting. States marked with standard disk in concrete in outcropping bedrock; but the replacement indicated most probable.) Reference marks, standard disk reference marks with arrows pointing towards station, wedged in drill holes in outcropping bedrock, are at the following distances and azimuths from station: No. 1, 9.043 meters (29.67 feet), 351° 48'; No. 2, 5.855 meters (19.21 feet), 92° 25'. Remarked in 1929 with "Type A" signal. See note on page 15.

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PUU O HULU MAKAI (Oahu Island, L. G. Simmons, 1927).- Identical with old Army station, Puu o Hulu Makai (U.S.E.). On western coast of Oahu, on the summit of the westernmost of the two peaks of Puu o Hulu Ridge on the Waianae coast about 3 1/4 miles south of Waianae. Approached by trail from the main Waianae road leading around the north side of the ridge. The old army mark, an iron stake embedded in concrete, was replaced by a standard disk station mark set in an irregular mass of concrete. Reference mark No. 1, a standard reference disk in concrete steps of structure at summit is 1.737 meters (5.70 feet) from station in azimuth 163° 10'; Reference Mark No. 2, a standard disk reference mark with arrow pointing toward the station, wedged in a drill hole in outcropping bedrock, is 5.286 meters (17.34 feet) from station in azimuth 24° 30'.

HEEIA HIGH RADIO TOWER (Oahu Island, E. R. Hand, 1926).- On eastern coast of Oahu, at the U.S. Naval Radio Station at Heeia. The highest and closest to shore of the iron lattice work radio masts.

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Note.- In 1929 two stations, Salt Lake and Palailai, were remarked with combination signal and observing platform. The platform, intended for suport of both instrument and observer, is 5½ feet square, is of reinforced concrete, and is supported on masonry or concrete walls 3½ feet high. The signal consists of targets of sheet steel on a 2-inch pipe, 10 feet long. The pipe is supported in a vertical position in a sleeve of larger pipe which passes through the platform and rests in a socket centered above the station mark. This special remarking is known as "Type A" according to plans furnished by the Territorial Surveyor.

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