

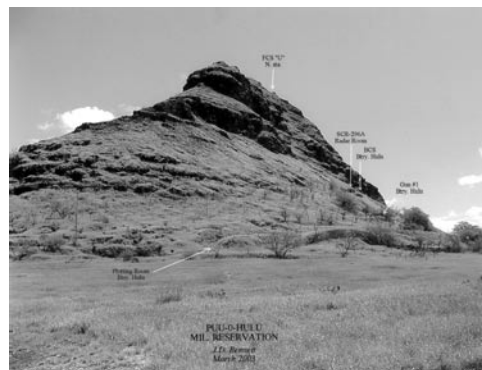
Puu-o-Hulu Military Reservation, 1923-1945

John D. Bennett

The Puu-o-Hulu Military Reservation (POHMR) was located on the Island of Oahu in the Territory of Hawaii, on the leeward or west coast at Puu-o-Hulu-Kai (hereafter: Puu-o-Hulu), an independent mass of basalt that is part of the extinct Waianae Volcano. The reservation was situated in the Lualualei *ahupuaa* (a traditional Hawaiian land division, smaller than a district; typically wedged-shaped, running from mountain to the sea), within the District of Waianae at Maili, between the Lualualei and the Nanakuli Homesteads, some 20 air miles W by N of downtown Honolulu.



Map of Oahu



Puu-o-Hulu-Kai. Author

The military reservation was established on April 27, 1923, when 0.15 acre (Tract A) was set aside for military purposes by Territorial Governor Wallace R. Farrington in Executive Order No. 144, duplicated by President Warren G. Harding's Executive Order No. 3885 of July 27, 1923. The army shortly

Triangulation Station "Puu-o-Hulu Makai," 856 feet above sea level.(1)

Tract B, 0.71 acre, was added to the military reservation by Governor's Executive Order No. 481

On March 25, 1938, a roadway easement totaling 0.35 acre (Tract C) was obtained from the Territory of Hawaii. Tract D, acquired on December 4, 1940, contained approximately 1.25 acres set aside by Governor's Executive Order No. 913. Tract E (0.20 acre) was acquired by an indenture with the Territory of Hawaii on December 31, 1941. The largest parcel (Tract F), consisting of some 65.25 acres, was acquired from the Territory of Hawaii by license on August 12, 1942. A number of rights-of-way (Tracts 1-3 and Tract H) were obtained from the George H. Holt Trust estate, Oahu Railway and Land Company, and the Territory of Hawaii between August 6, 1945, and February 3, 1951. Four additional fire control stations were subsequently built atop the 850-foot Puu-o-Hulu by the end of World War II.(2)

Battery Hulu, an emergency seacoast battery, was built at the POHMR during World War II and armed with two obsolete, well worn 7-inch 45-caliber naval guns. Battery Construction Number 303 (BCN-303), a two-gun modernization program 6-inch shielded barbette carriage battery was under construction by late spring of 1944 to replace Battery Hulu's 7-inch guns.

Bombproof support rooms for BCN-303 were to be within a series of tunnels dug into the west-facing slope of Puu-o-Hulu. At end of the war with Japan on September 2, 1945, all construction at the battery was totally abandoned, including the tunnel complex, which was listed as being in a "deferred status" by the Construction Service on the May 31, 1945.(3)

The majority of the structures at the POHMR were built on the crest, exterior, or within the northwestern slope of Puu-o-Hulu, about 900 yards from the coastline. Puu-o-Hulu overshadows

coastline until the 90-foot elevation; then rises steeply to meet near vertical cliffs almost half way up the slopes. The landscape is principally rock, with countless boulders strewn about. The eastern or reverse slope is also very steep.

The Lualualei *ahupuaa* was in the lee of the Waianae Mountain Range; more arid than the windward slope, it is typically hot and dry. Sparse growths of kiawe (*Prosopis Pallida*) and koa haole trees (*Leucaena Leucocephala*) grow in the area, and the lower slopes are covered, for the most part, by wild grasses some three feet high.

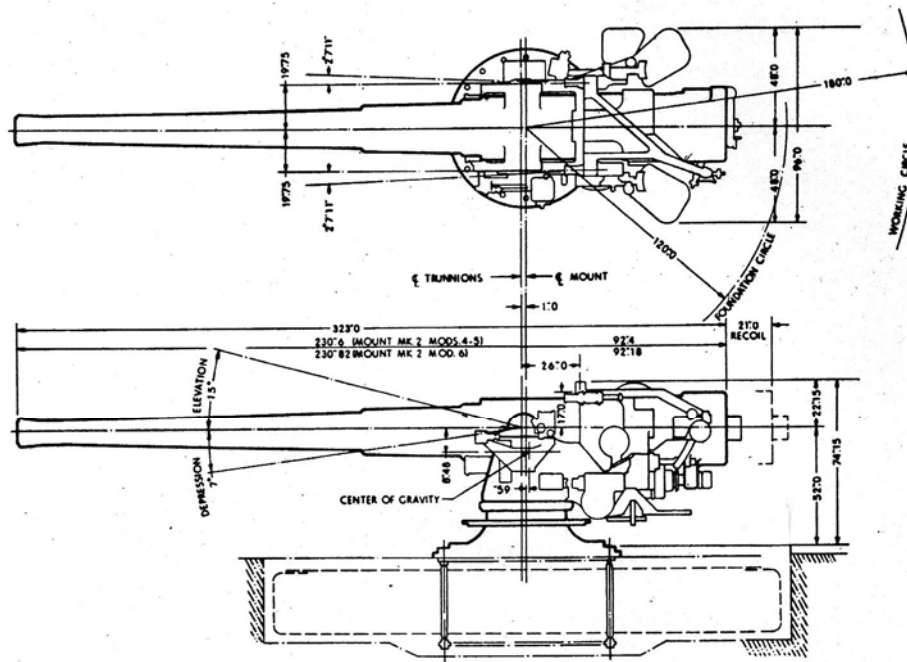
Battery Hulu

On December 31, 1941, Adm. Chester W. Nimitz assumed command of the U.S. Pacific Fleet. Shortly thereafter, the new commander of the Hawaiian Department, Lt. Gen. Delos C. Emmons, conferred with Nimitz, his superior as commander-in-Chief Pacific. The agenda most probably included discussion of the urgent need to expand the defenses to protect Oahu's 149 miles of shoreline, as well as the main ports and airfields on the outlying islands of Kauai, Maui, Molokai, and Hawaii.

Within one week after the December 7, 1941, Pearl Harbor attack, the navy provided the Hawaiian Department 50 light-caliber weapons varying from one-pounders to 3-inch/23s.(4) In addition, the navy offered to loan the Hawaiian Department obsolescent guns of several different calibers from its ordnance stocks, including guns to be salvaged from naval vessels damaged or sunk during the Pearl Harbor attack. The Hawaiian Department received 3, 4, 5, 7, 8, and 14-inch guns from the navy, including 13 obsolete 7-inch naval guns. Six were emplaced on Oahu: four at Battery Harbor on Sand Island, and two at Battery Hulu at Puu-o-Hulu. The Island of Kauai, some 90 miles northwest of Oahu, received two 7-inch batteries: two guns at Battery Ahukini between Ahukini Landing and Nawiliwili

gun tubes were worn out and unusable.

In early 1942, the Hawaiian Department Engineer presented two options for emplacing 7-inch naval guns at Puu-o-Hulu. Option No. 1, a costly tunneling job, required building a 3,000-foot mountain-type access road on a cliff at the 250-foot elevation. Option No. 2 involved the less costly method of building the emplacements and magazines at the 90-foot elevation and incorporating casemates into the design. When Option 1 was found to be structurally unsound, Option 2 was adopted.(5)



7-inch Mk2M4-6 Naval Gun. Alvin Grobmeier collection

Two 7-inch 45-caliber MkII naval guns (Serial Nos. 90 and 92) on MkIIMIV barbette carriages (Serial Nos. 64 and 84) were mounted in concrete emplacements at the POHMR in the spring of 1942. A third gun was to have been emplaced, but its bore was too worn. Reinforced-concrete casemates protected the guns and crews, primarily from falling rock that might be dislodged by an enemy attack. On October 21, 1942, HQ, Hawaiian Seacoast Artillery Command (HSAC), named the emplacements Battery Hulu, using a shortened version of its place name.(6)

Both casemates measured 41 feet wide by 34 feet deep, with thick roofs. Each casemate incorporated projectile and powder storage magazines at the rear, on the left and right respectively.(7) The magazines were equipped with T-shaped rooftop concrete pipe ventilators. Steel entry doors to both magazines included louvered central ventilation panels. A concrete floor-to-ceiling wall shielded the powder and projectile magazine entrances.

Battery Hulu's Gun No. 1 was on a graded, compacted plateau within a concrete emplacement dug below ground; the front faced the ocean in the westerly direction. It was approximately 150 feet to the right of Gun No. 2, at about 90 feet elevation.(8) Both 7-inch pedestal gun mounts were bolted to buried concrete gun blocks, cushioned by two-inch hardwood planking and two-inch steel plate atop

Battery Hulu, Oct. 1942. NARA.



Casemate No. 1, Battery Hulu, showing patio roof added. *Author, 2000*



later. Author, 2000



Emplacement No. 1, Battery Hulu, showing entrances to emplacement and steel mounting plate for pedestal mount. Author, 2000



Emplacement No. 1, showing mounting plate and parapet. *Author, 2000*



Emplacement No. 1's projectile magazine door, showing blast wall. *Author, 2000*

The gun emplacements were entered via concrete stairways at the rear of each emplacement, at the left and right sides. The stairways, equipped with pipe handrails, descended to the concrete loading platforms.

Parapets some four feet high ran around the perimeter of each emplacement, the top surfaces flush

west bank of the Honolulu Harbor entrance channel.(10) The completed battery transferred to the HSAC on July 3, 1943, consisted of two 7-inch naval guns complete with two casemates, two projectile and two powder rooms, one 16 by 16-foot generator building, a 14.5 by 19-foot battery commander's station, and access roads and utilities, including an electrical distribution system.(11)

During 1944, Battery Hulu fired a total of 66 AP and HE rounds during target practice.(12)

In October 1943, Maj. Gen. Henry T. Burgin, commanding the Hawaiian Artillery Command, surveyed the seacoast artillery and recommended the 7-inch batteries be eliminated from the Hawaiian Defense Project at a time to be selected by the commanding general, U.S. Army Forces Central Pacific Area (COMGENCECENTPAC). The proposal was approved by Lt. Gen. Robert C. Richardson, Jr., COMGENCECENTPAC.

On December 28, 1943, General Burgin noted in an inter-office memorandum that the 7-inch navy guns at Batteries Hulu and Harbor were "discards" from the navy and "wholly obsolete." Further, the guns of both batteries had been fired so many times they were inaccurate and a few almost smoothbore. In addition, the batteries' fire control systems were unsuited for seacoast use.(13)

The War Department's adjutant general, Maj. Gen. J.A. Ulio, authorized COMGENCECENTPAC to eliminate 13 batteries on Oahu equipped with 30 guns, "at a time to be selected by you." When eliminated, the batteries were to be turned over to the commanding general, Army Ground Forces, for disposition in accordance with current practices, except that Naval armament on a temporary loan basis will be returned to the Naval authorities.(14)

Specifications of the 7-inch (177.8 mm) 45 cal. Mk II Naval Gun

Elevation (on naval pedestal mounts):	+15° to -7°
Weight, incl. mount:	12.81 tons
Length:	26'9" (323 inches)
Shell:	165 lbs
Powder charge (bag):	58 lbs
Primer:	Mk. 15 Mod. 1
Muzzle velocity:	2,700 ft/sec
Range @ 15°:	16,500 yds (9.4 mi.)
Length of recoil:	21 in

Source: Navy Dept., BuOrd, Ordnance Pamphlet 1112 (2nd Rev.) *Gun Mount and Turret Catalog, 7 in 45 cal.*, corrected as of 15 January 1945.

Manning Battery Hulu

Battery Hulu was manned by a detachment of two officers and 42 enlisted men from the 808th

at Fort Weaver, was stationed at Battery Oneula, near Oneula Beach in the Ewa District about three miles west of Fort Weaver. On May 24, 1943, the detachment rejoined the main body of the 808th at

Oneula Beach, and the 808th was redesignated Battery B, 41st CA. Battery Hulu was then manned by a detachment of Battery F, 15th CA (HD), until August 15, 1944, when that unit was inactivated. Battery E, 53d CA (HD) Bn, activated that day at Battery Hulu with personnel from Battery F, 15th CA,

personnel were reassigned to the 608th CA (HD) Battery (Separate) and transferred to Fort Kamehameha. Battery Hulu was probably placed in maintenance status after the departure of the 608th CA (HD) Battery.(15)

By September 1, 1945, both 7-inch guns of Battery Hulu had been removed from their emplacements preparatory to renovations to accommodate a pair of 6-inch replacement guns.(16)



Plotting room, Battery Hulu. *Author, 2001*



Plotting room, Battery Hulu. *Author, 2001*



Interior of CWS room, showing bracket for blower motor. *Author, 2001*



Escape housing atop right rear of the plotting room. *Author, 2001*

Plotting Room, Battery Hulu

Battery Hulu's gasproof plotting room was NNW of Emplacement No. 1, at a lower elevation. The reinforced-concrete, single-story, 19 by 16-foot rectangular cut-and-cover structure was entered by a double-wall offset passageway at the northwest corner. A small air lock on the right (west) at the end of the passageway would have been equipped with Chemical Warfare Service (CWS) equipment. This was probably a collective protector system with a centrifugal air blower suspended from the ceiling by a metal bracket, connected to a filter canister attached below the blower unit that filtered the air before

canister came from a medium-size Tee-shaped concrete-pipe ventilator affixed to the roof.(17) A rebar staple ladder attached to the interior of the east wall at the southeast corner provided emergency egress via a small housing atop the roof with an east-opening doorway covered by a steel-plate door.

Battery Commander's Station

Battery Hulu's splinterproof battery commander's station (BCS) was at the 185-foot level, above and between the emplacements, somewhat closer to Emplacement No. 2. A cableway was built to haul materials to the site during construction.(18)

The BCS was a rectangular reinforced-concrete single-story structure with slab sides and roof and no eaves. Horizontal view slits 18 inches high ran the length of the front (west) wall, but were shorter on the right and left (north and south) walls. Exterior steel drop-shutter panels covered the slits, pro-

the structure, with stairs that descended to a landing. The steel-plate door attached to the right wall of the structure was entered by a right turn.



BCS at Puu-o-Hulu. Author, 2000



BCS at Puu-o-Hulu. *Author, 2000*



Interior of the BCS. *Lee Guidry 1994 (Herefter Guidry)*



Radar operating room at top and exhaust housing for BCN-303's alternators in foreground. *Guidry*

The paint on the structure's exterior walls was predominately earth camouflage, with spots of olive drab; a layer of earth atop the roof further camouflaged the structure.

The observation room was most likely equipped with a 15-foot or a 2-1/2 meter (8.2 ft.) coincidence range finder and an azimuth instrument. On July 30, 1942, in an effort to improve the fire control

that the "Navy is preparing 5-inch directors for use with the Sand Island and Puu o Hulu batteries." (19) It is unlikely the navy gun directors were installed at the batteries, as they proved unfit for the four

8-inch naval turret batteries built on Oahu during the war. A Mark 33 navy gun director, rangefinder, and loading machine from the destroyer USS *Cassin* (DD-372), badly damaged in a Pearl Harbor dry dock on December 7, 1941, were mounted ashore at Ewa and used in conjunction with a four-gun navy-manned 5-inch/38 AA battery. (20) Another navy gun director was placed ashore at West Loch and used with a battery of four navy 5-inch/25s, also initially manned by the navy until turned over to the army. Again, no report has been found as to how these directors functioned ashore.

The BCS was in all probability to be retained in conjunction with the replacement battery (BCN-303) and would probably have been reequipped with the standard coast artillery observing instruments used with the 6-inch modernization project batteries, one M2 depression position finder and one M1910A1 azimuth instrument.

Radar Operating Room

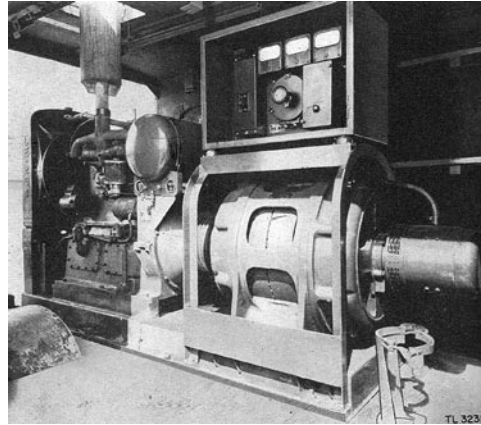
It was first planned to house the operating cabinets for the SCR-296A fire control radar set in a temporary shelter adjacent to the BCS, as the radar set was to be temporarily mounted at Battery Hulu for only one year, since it was assigned to Battery Pennsylvania, under construction in the Harbor Defenses of Kaneohe Bay at Mokapu Point. Although Battery Pennsylvania was initially scheduled for completion in late 1944, due to the many delays encountered during its construction, HQ HSAC chose to divert the radar to Battery Hulu to beef up coverage on the island's west coast. The radar was subsequently assigned permanently to Battery Hulu on the recommendation of Col. John Keliher, DCS/Operations, HSAC, who stipulated that a substitute SCR-296 radar be acquired for Battery Pennsylvania. Subsequently, a permanent structure to house the radar equipment was authorized for Battery Hulu.(21)

The one-story box-shaped reinforced-concrete 18 by 19-foot structure, started in the middle of 1943, roof, concealed by a wooden cylindrical structure with a conical roof that gave the appearance of a water tank. The antenna housing and radar room was most likely covered by draped camouflaged netting and garlands, as was done at Batteries Hatch and Wilridge and probably other batteries on the island.

The gasproof radar operating room was entered by concrete stairs adjacent to the right side wall stairs to a reinforced steel door attached to the right (north) side wall. The SCR-296A antenna was 205 feet above sea level, with a visual range to the horizon of 33,000 yards (18.8 mi.), and a clear field of view encompassing 177°.(22)

On September 14, 1943, the Hawaiian Department engineer reported the following completed works: concrete SCR-296 radar building, 18 by 19 feet, atop the range-finding building, including an antenna housing, 12 feet 6 inches in diameter by 11 feet 4 inches tall, and one PE-84 generator, complete with fixtures, connections, and ventilating and degassing equipment.(23)

coast battery sites on Oahu programmed in June of 1944 for an AN/MPG-1 radar set, under project number CP-21.(24) However, as far as can be determined, the replacement radar was never installed at the battery.



PE-84 Generator. TM 11-1306

Oahu was divided into North and South Defense Sectors, each defended by one of the two divisions newly created on October 1, 1941, from the old foursquare Hawaiian Division. The under-strength 24th (North Sector) and the 25th (South Sector) Divisions, both based at Schofield Barracks, were mobilized to pre-assigned battle positions shortly after the December 7, 1941, attack. The POHMR was within the South Sector.

In 1937, the 3rd Engineers built a winding mountainous road through Kolekole Pass, from Schofield Barracks to the west coast through the Lualualei Naval Reservation (LLNR). This road enabled army forces from Schofield Barracks to reinforce the island's west coast in an emergency.

Two important military facilities, part of the 9,200-acre LLNR, were located near the POHMR, the Naval Ammunition Depot (NAD) established in 1934 and a naval radio station.(25) Munitions for transported on navy railroad cars pulled by Oahu Railway and Land Company steam locomotives to the Waikele or the West Loch Branches, at Waikele Gulch and Pearl Harbor, respectively, via a navy branch line that connected to the OR&L's narrow-gauge single-track main line at the Lualualei road junction with the coast highway at Nanakuli.

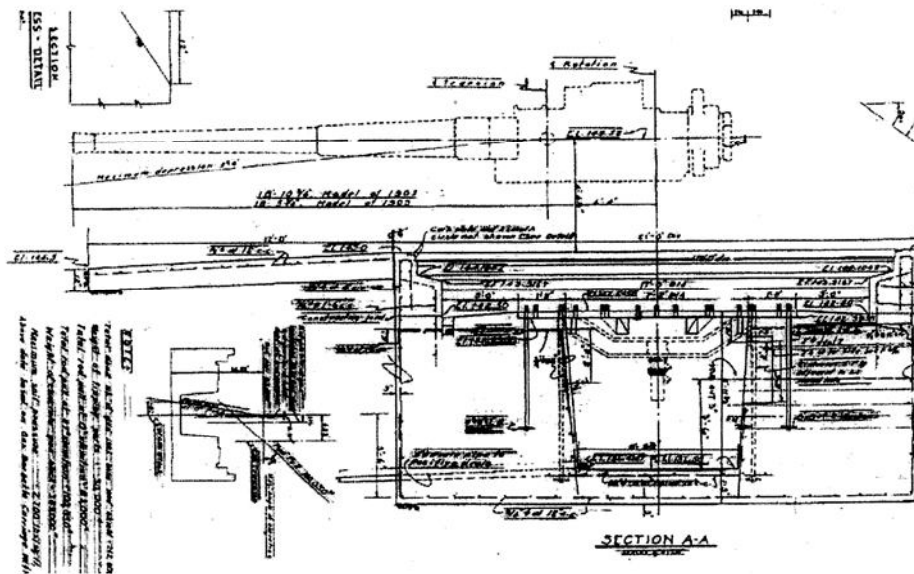


MG pillbox near Maili Point. Author, 2002

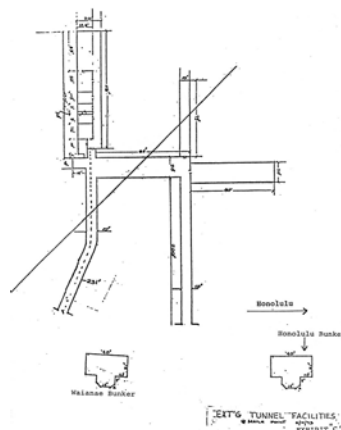


Pipe mount for .30-caliber MG above rear of cable hut U. Author, 2000

Battery Hulu, southwest of the LLLNR, was one of several seacoast batteries strung along the west coast, protecting the sea approaches to the LLLNR and defending against any beach landings on the island's West Shore. Beach and perimeter defenses near the POHMR included coils of barbed wire, a .30-caliber LMG position at the rear of Cable Hut "U," a concrete machine-gun pillbox just above the shoreline a little north of nearby Maili Point, and possibly tank traps.



6-inch M1903A2 gun showing mounting details for BCN-302. William Gaines



Tunnel diagram for BCN-303. *DERP-FUDS Report*

Battery Construction Number 303

Battery Hulu's 7-inch guns were to be replaced by two 6-inch 50-caliber M1903A2 guns, Serial Nos. 10 and 11, on M4 long-range shielded barbette carriages Nos. 25 and 26. The battery, known only as Battery Construction Number 303 (BCN-303), was authorized on December 18, 1943, when the commanding general, Army Service Forces, ordered modern seacoast armament installed at Puu-o-Hulu and several other locations.(26)

There were two possible locations for the 6-inch SBC gun emplacements for BCN-303. The first possibility was to mount BCN-303's guns in the concrete casemates of Battery Hulu, modifying the emplacements to accommodate the guns. Existing projectile and powder magazine at the rear of the

casemates, and ammunition service from the tunneled magazines to the guns would have been exposed to enemy attack. The second possibility was to build the gun emplacements fronting each tunnel portal to facilitate ammunition service from the magazines tunneled into the mountain.(27) The author is not aware of any archival material that establishes which design was selected.

The 6-inch SBC gun tube, carriage, and armored shield weighed some 142,600 pounds (71.3 tons). To fit the gun assemblies inside the extant casemates, which do not appear to be tall enough, would probably have required demolishing them and raising them to at least 19 feet, the height of the casemates at BCN-302. The height of Battery Hulu's casemates was not given, but each casemate measured 41 feet wide by 34 feet deep. BCN-302's casemates were 37 feet wide by 29 feet deep. Existing gun blocks would have to be demolished and replaced with reinforced concrete blocks 21 feet in diameter and ten feet deep, weighing 387,000 pounds of all-new concrete to withstand 3,000 psi, as recorded at BCN-302.(28) Trenches to accommodate electrical, data-link transmission, and air scavenging lines would have to be built to connect with electrical power, air compressors, and the gun data computer to be housed in the support tunnel complex.(29)

Constructing the emplacements in front of the tunnel portals would have facilitated the movement of projectiles and powder charges from the tunneled magazines directly to the rear of each gun.

Cols. Henry R. Westphalinger, GSC, chief, Seacoast Defense Projects Branch, and L.A. Whittaker,

Chemical Warfare Service, dated December 18, 1943, which recommended that six batteries on Oahu be replaced with modern weapons:(30)

1. Four 155 mm M1 (Battery Homestead)
2. Four 155 mm M1 (Battery Kahana)
3. Two 6-inch BC (Puu-o-Hulu)
4. Two 6-inch BC (Sand Island)
5. Two 6-inch BC (Ft. DeRussy)
6. Two 8-inch BC (Ft. Kamehameha).

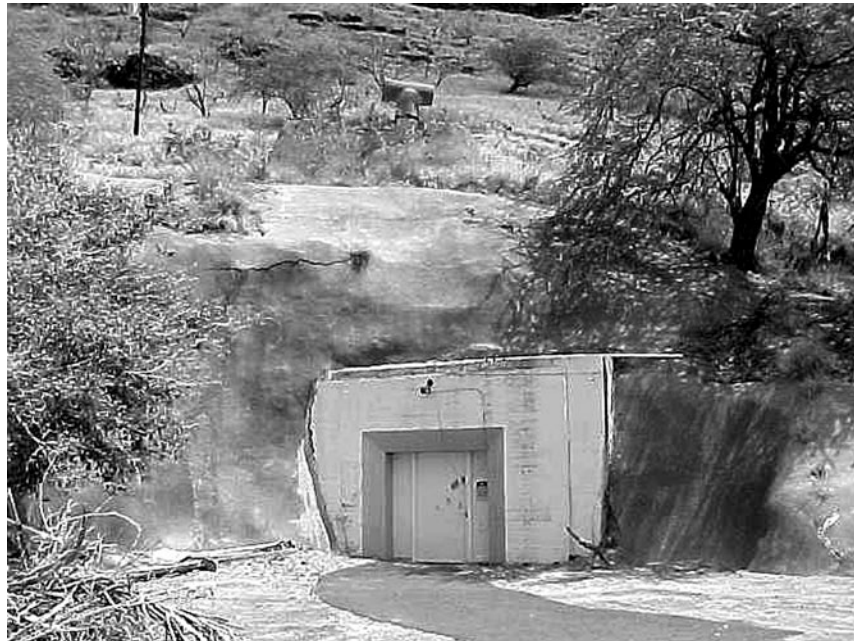
6-inch M1903A2 Gun on Barbette Carriage M4

Caliber:	50
Total weight:	20,550 lbs
Max. Range:	27,500 yards
Muzzle velocity:	2,800 fps
Elevation:	-5° to +47°
Loading Elevation:	+10°
Elevation:	Electrical-hydraulic/manual
Life of gun tube (Approx.):	1,000 rounds
Telescopic sight:	M31 Telescope
Projectiles:	90 lb HE or 105 lb AP
Propelling Charges (Bag):	32 lb and 37 lb
Firing rate:	3 rounds per min. @ +45° 8 rpm at +10°
Fuzes:	MkII or MkIIA1 delay or superquick
Primer:	MkXVM1 (electric or percussion)
Gas Ejection System:	Compressed air
Subcaliber weapon:	75 mm T-16

Source: TM 9-428

The standard 200/300 series batteries were to be issued 600 AP and 400 HE projectiles, along with propelling charges, primers, and fuzes.(31)

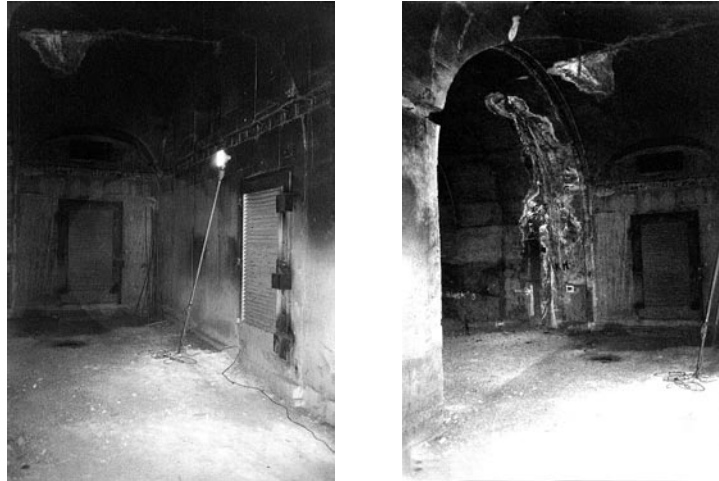
Fire control for the 200/300-series batteries included an M8C or M8G gun data computer, a backup plotting board, M7 data transmission system, spotting and correction boards, and a fire control switchboard. Optical FC instruments normally included M1910A1 azimuth instruments and one M2 depression position finder, located in the splinterproof BCS.(32) A 1994 photograph of the BCS shows front wall to mount observing instruments.(33)



Portal No. 1 to BCN-303's support tunnels. *Author, 2000*



Portal No. 2, BCN-303. *Author, 2000*



(Left) End of Corridor No. 2. *Guidry* (Right) Transverse tunnel on the left. *Guidry*

Support Tunnels (BCN-303)

Most of the 6-inch modernization program batteries on Oahu, BCNs 302, 303, and 304, deviated from the standard design of the 200-series batteries constructed in the Continental U.S. and elsewhere. These tunneled batteries included bombproof support rooms tunneled into mountainsides composed chiefly of basalt rock.

BCN-303's design incorporated a series of tunnels bored into the northwest slope of Puu-o-Hulu. Two access tunnels were dug about 90 feet above sea level. Additional tunnels were dug to house battery support functions, e.g. one powder and one projectile magazine, a compressor room for air scavenging, three generators for emergency power, plotting and fire control switchboard/radio room, ventilation and air conditioning room, first aid room, and equipment and storage rooms. While Continental 200-series batteries had only one latrine for officers and enlisted men, some, if not all, 300-series batteries on Oahu were to have separate latrines. This was the case for BCN 302 and is presumed to have been the intent at BCN 303. A galley might be added, depending on the distance from the base camp.(34)

Emergency power would be supplied by three 125 KVA 3-phase 440 V 60-cycle generators driven by diesel engines, the standard power units for 200/300-series batteries.(35) The exhaust from the diesel

exited above grade, north of the radar room's right sidewall.

Other equipment presumed scheduled for installation in the tunnel complex included evaporative coolers, fuel pumps, and switchgear, all standard equipment for the 200/300-series batteries. Diesel fuel, presumably at least 10,000 gallons for the generators, would be stored in an underground fuel tank.(36) The operations, projectile, and powder rooms all ran off the transverse tunnel; a niche at the northwest end housed the emergency water tank.

Tunnel Portal No. 1 was some 33 yards north of Battery Hulu's Emplacement No. 1. The portal included a thick rectangular concrete facade with a recessed steel door. Gunite sprayed on the outside of the portal's adit stabilized the cut in the slope and prevented rock from being dislodged.

Portal No. 2 was some 30 yards north of Emplacement No. 2. The corridor was arched, with slab walls and floors. The crown, sidewalls, and floor were covered with a layer of concrete. The portal, which did not include a concrete façade, was left unfinished, but gunite was applied to the exterior of

probably added after construction to prevent unauthorized entry.(37)

Photographs taken during a 1994 site reconnaissance by CDSG member Lee Guidry show that the tunnels, and projectile and powder rooms had a layer of concrete, and the partitioning of individual rooms in the operations tunnel segment had been started. The vertical vent/escape shaft from the transverse tunnel was completed and lined with concrete, with a series of staggered metal ladders to landings.

Updated Fire Control Radar Authorized

A study completed on May 31, 1945, by the 2274th HSAC, successor to the HSAC, recommended 6-inch and the 8-inch naval turret (NT) batteries were to be furnished the -1 model with a maximum tracking range of 28,000 yards, the -2 model was to equip all others. Since the 8-inch NT batteries had a maximum range some 3,000 yards greater than the AN/FPG-1's range, these batteries were also recommended for the -2 model. All existing SCR-296 radar sets were to be removed when the newer radar arrived.(38)

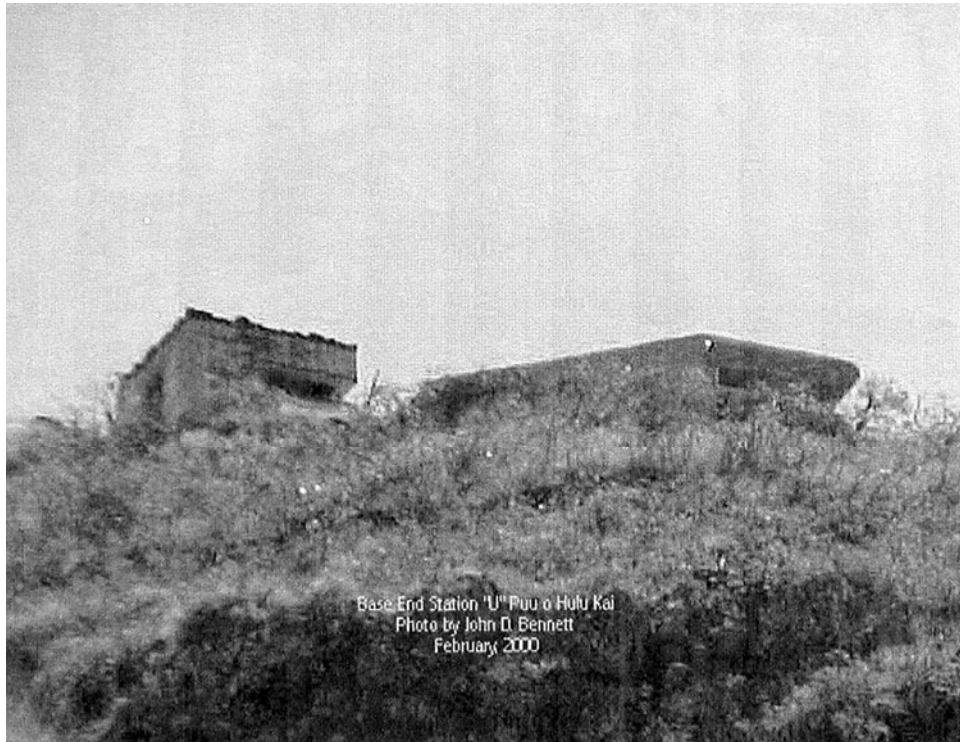
Project Shuts Down

Construction of BCN-303 slowed in late 1944 as the war moved closer towards the Japanese home islands and the threat of invasion to Hawaii continued to diminish. Construction, which had been proceeding slowly all along, was entirely suspended by May 31, 1945, when the battery was assigned a deferred rating. However, BCN-303 was initially to be retained in the post-war Hawaiian defenses. The May 31, 1945, study recommended completion of BCN-303. Remaining work consisted of installing the guns and power plant, constructing and finishing the interior rooms, and installing electrical wiring and Signal Corps equipment.(39)

tunnels and support rooms were abandoned. It is believed that neither 6-inch guns was ever mounted, although they had been shipped to Oahu.



Fire Control Station "U." Original station is above left and 1934 station is in the foreground. Guidry



Station "U" showing the southern-most 1920s station on the left with the Hulu Group CP on the right, *Author*, 2000

REPORT OF COMPLETED WORKS - SEACOAST FORTIFICATIONS (Fire Control or Torpedo Structures)

COAST DEFENSES OF PEARL HARBOR FORT WEAVER STRUCTURE: FIRE CONTROL STATION U FOR BATTERY WILLISTON

Form 2 Corrected to May 19, 1924.

Location : Puu o hulu. (3-1/2 Miles S.E. of Waianae)
Date of transfer : April 7, 1924.
Cost to that date : \$ 5,226.24

Type of construction:

(a) Roof
(b) Remainder of building

: Reinforced concrete.

How concealed

: " "

How protected

: Light earth covering.

Height above concealment

: Dug-out type.

Height above protection

: Not above.

Conspicuous at 500 yards.

: Not above.

Source of electric current

: No.

Kilowatts required

: Local battery (Wet, Edison #207)

Type of lighting fixtures

: Instrument lights only.

How heated

: Flash lights.

Connected to water mains

: None required.

Connected to sewer

: No.

Type of latrine

: No.

Permanent or temporary installation

: None.

Present condition

: Permanent.

Reference of site

: Good.

Reference of instrumental axis

: 856.5 Ft. (Top of earth cover)

Type of observing instrument

: 853.45 " (M.L.L.W.), Subject to check.

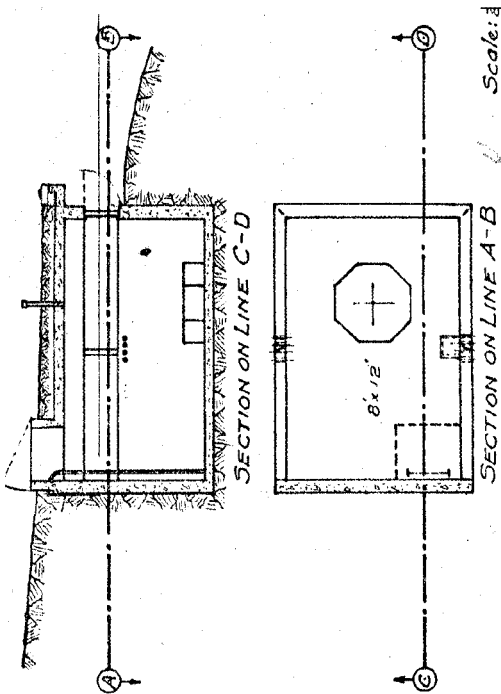
Type of plotting board

: D. P. F. intended.

Type of data transmission

: None.

: Telephones intended.



Scale: 1/4"

Fire Control Station “U” Complex

The original fire control station built atop Puu-o-Hulu-Kai in 1923 was designated Station “U.” All subsequent FC stations atop the ridge carried the same station designator, along with assigned reference numbers.

The first FC station served Battery Williston’s pair of 16-inch guns at Ft. Weaver, west of the Pearl Harbor channel. The single-story 8 by 12-foot concrete observation station at the peak 860-foot elevation was dug into the surrounding rock. The structure included a slab roof and overhanging eaves on the front (west) and sidewalls. The steel vertical shutters, outside the three narrow observation slits on the front and sidewalls, opened upward. The observation room was entered via a manhole on the roof. The station, with a single concrete pier for an M1907 DPF observing instrument, was transferred to the coast artillery on April 7, 1924.

The next two FC stations built atop Puu-o-Hulu were identical 8 by 12-foot single-story box-shaped reinforced-concrete observation stations completed in the late 1920s, with narrow view slits on the front and side walls protected by exterior steel drop shutters. Both stations were entered through steel doors in their rear walls. One station served Battery Closson (two 12-inch long-range guns, Ft. Kamehameha), while the other served the railway mortar positions on the Leeward Coast. Early in World War II, the station assigned to the newly casemated Battery Closson was reassigned as a base end station for the Browns Camp 8-inch railway battery. The station assigned to the railway mortar positions was reassigned to serve Battery Salt Lake (two 8-inch NT), 1/2 mile from the south rim of Aliamanu Crater.(40)

The fourth FC station was built in 1934 to service the two 16-inch guns of Battery Hatch at Fort Barrette, some 5-3/4 miles west of Pearl Harbor. The single-story reinforced-concrete double station, 16 feet wide by 15 feet deep and equipped with two DPF instruments, was located just below the original 1923 station. This station was reassigned in 1945 to serve the almost completed Battery Arizona (one 14-inch NT) at Kahe Point.(41) Its protected entryway was in the right rear wall.

The fifth FC station built on the crest was a single-story double station equipped with two DPF instruments, completed by December 3, 1940, with eaves and slit window openings covered by outside steel drop shutters. Between the pair of the 1920s FC stations, it included a room at the rear for a plotting board and FC switchboard. This Hulu Gun Group command post provided tactical control of the 8-inch railway guns at Browns Camp and their alternate firing position at Waianae, Battery Awanui’s four 155 mm guns at Browns Camp, the 5-inch and 155 mm guns at Nanakuli, and the 155 mm guns at Kahe Point. The CP was manned early in World War II by a detachment from HQ and HQ Battery, 1st Bn, 41st CA.(42)

Gun Group on July 27, 1944, and the Hulu Group was inactivated by GO No. 4, HD of Honolulu and Pearl Harbor, on August 30, 1944.(43)



Cable tram motor and cable reel, with generator building above the cable tram assembly. *Guidry*



Cableway steel support tower. The Lualualei Naval Reservation is in the background. *Guidry*



Generator building on reverse slope of Puu-o-Hulu. *Guidry*

Initial access to the FC stations was via a steep winding trail on the reverse slope. Later an aerial cableway powered by a 6-cylinder GMC gasoline donkey engine was built over a cable right-of-way on the reverse slope obtained in April 1931, to haul material up the steep slope more rapidly.(44) cableway's engine and cable reel were at the end of the line between the northern-most FC station and the Hulu Group CP.



Demolished building atop Puu-o-Hulu, believed to be mess hall and kitchen. *Guidry*



.30 cal. MG pipe-mount between cable tram landing and Hulu Group CP. *Guidry*

Several temporary buildings on the reverse slope below the crest that supported the men manning the FC stations included two wooden 40-man bunkhouses, a kitchen, storeroom, and a latrine that were completed just prior to December 1940. Electrical power was supplied by a 5 kW 110 V 60-cycle

just below the ridgeline NNW of the northern-most FC station. Several short trails connected the new buildings with the main trail.(45)

Perimeter defense of the FC station complex included two MG dugouts equipped with galvanized-pipe mounts, probably for .30-caliber MGs. One position was on the ridge between the cable tram landing and the Hulu Group CP, close to the trail; the second position was several feet east of the highest FC station.

Antiaircraft Intelligence Service Station No. 8 was established sometime before September 18, 1941, at one of the two highest FC stations.

Communication Lines

Wire communication lines were part of the Signal Corps' island-wide "Command and Fire Control Cable System." A 50-pair subterranean branch cable, No. 115, connected to the POHMR, including the FC complex, from the Maili FC Switchboard Hut "U" adjacent to POHMR's northwest corner. A

100-pair subterranean cable, No. 113, ran from the Ewa Plain up the west coast to Hut “U.”(46) The cable network continued up the coast to Waianae, connecting with a hut at Kaena Point.



Maili FCSB Room/Cable Hut “U.” *Author*



Possible transformer building on Maili MR. *Author*

The Maili Military Reservation (MMR) consisted of FC Switchboard/Hut “U,” completed in 1929 to service a 12-inch railway mortar-battery firing position at a nearby railroad siding.(47) In World War II, a MG position was established atop the mound adjoining the rear (south) wall of the cable hut. A .30-caliber MG was probably mounted on the galvanized pipe found embedded in the ground.

A possible transformer or generator building some 100 feet north of Cable Hut “U” had thick walls and a large open window on

the east wall, and a single doorway on the west wall at the southwest corner. An electrical distribution box was affixed to the upper south wall of the structure.

Searchlight Position

Targets were illuminated by 60-inch portable Seacoast Searchlights Nos. 57 and 58 atop concrete emplacements on Puu-o-Hulu's northwest slopes, just about the 100-foot elevation. HQ Battery, 41st CA, manned the searchlights until relieved by the newly activated Battery G, 15th CA, who manned the searchlights until the battery was inactivated in August 1944. The personnel, however, were reassigned to the 856th CA (SL) Battery (Separate), which continued to man the searchlights until the end of the war. On December 31, 1945, the 856th CA Battery was inactivated per G.O. No. 15, 2274th HSAC.(48)

Concluding Remarks

The Puu-o-Hulu Military Reservation consisted of approximately 69.48 acres.(49) The State of Hawaii owns the land upon which all extant structures are located, including the casemated gun emplacements, tunnels, fire control stations, and Cable Hut "U." The largest parcel now encompasses 97.014 acres, Tax Map Key: 87006006, and also a 5.637-acre parcel (Tax Map Key: 87006008). The former MMR included 19,840 square feet recorded under Tax Map Key 87006005. The City and County of Honolulu leases 1.377 acres, Tax Map Key: 87006032, of the former military reservation from the State of Hawaii as a construction equipment base yard for the Board of Water Supply.

Entry to the former POHMR is restricted due to the increased level of security since September 11, 2001. The City and County of Honolulu's Civil Defense Agency leases and occupies Battery Hulu's two casemates, and uses portions of the tunnel complex to store equipment. The extant structures of the POHMR remain in fair to good condition, with the tunnel complex left unfinished.

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End Notes

1. Defense Environmental Restoration Program For Formerly Used Defense Sites, "Findings and Determination of Eligibility, Puu-o-Hulu Military Reservation, Puu-o-Hulu, Island Of Oahu, Hawaii, Site No. H09HII030600," Jan. 1993, U.S. Army Engineer District, Pacific Ocean Division, Fort Shafter, Hawaii. (Hereafter: DERP-FUDS, Puu-o-Hulu.) Mary Kawena Pukui and Samuel Elbert, *Hawaiian Dictionary: Hawaiian-English, English-Hawaiian* (Honolulu: Univ. of Hawaii Press, 1957, Rev. 1986), p. 358, s.v. "pu'u. 1. v1. Any kind of a protuberance from a pimple (pu'u 2) to a hill: peak, cone, hump, mound...."
2. DERP-FUDS, Puu-o-Hulu. William C. Gaines and Peter D. Smith, "Installations and Organizations of the Coast Artillery Corps, U.S. Army, on the Island of Oahu, Territory of Hawaii, 1905 - 1946; Puu O Hulu Military Reservation," pp. 13-18, unpub. MS in author's collection. (Hereafter: Gaines and Smith.)
3. R.C. Garrett, CG 2274th HSAC, "Study of Seacoast Battery Requirements Hawaiian Islands," 31 May 1945, Predecessor Commands, 1942- RG 494, NARA. (Hereafter: HDE.) (All NARA citations from College Park, MD.)
4. E.R. Lewis and D.P. Kirchner, "The Oahu Turrets," *Warship International*, No. 3 (1992), p. 280.
5. Hawaiian Department Engineer to CG HSAC, "Type of Construction, 7-inch Naval Gun Battery, Puu-o-Hulu," Sep. 7, 1942, HDE.

6. Earl Fielding, AG, HQ, HSAC, memorandum to COs HDKB, HDPH, NS Gpmnt., and HD Hon, "Names of New Battery Positions," Oct. 21, 1942, HDE. The HSAC typically named World War II batteries for their locations, until the project batteries, e.g. BCNs 301, 405, etc. However, Batteries Arizona and Pennsylvania were named for the two *Pennsylvania*-class battleships.
7. Robert C. Richardson, Jr., *Historical Review, Corps of Engineers, United States Army, Vol. I, Covering Operations During World War II, Pacific Ocean Area: 7-Inch Naval Gun Batteries*, (War Department, n.d.), p. 322A, RG 494, Entry 125, NARA. (Hereafter: *Historical Review: 7-inch Batteries*.) Battery Hulu Site Plan dated October 1942, RG 338, Entry 43101, Box G-441, NARA.
8. The "front" of an emplacement was towards the enemy, the "rear" away from the enemy. Gun No. 1 was always on the right-hand side of the battery, viewed from the rear.
9. *Historical Review: 7-inch Batteries*, p. 322A. "History For the Year 1944 of the Harbor Defenses of Honolulu and Pearl Harbor," Records of the Office of the Adjutant General, RG 407, Entry 427, File No. 9-8 Dpl - 0.1, Box 423, NARA. (Hereafter: 1944 History of the HDs of Honolulu and Pearl Harbor.
10. John D. Bennett, "Sand Island's Military Past, 1916-1945," *CDJ*, Vol. 16, No. 3 (August 2002), p. 90.
11. Earl Fielding, AG, HQ, HSAC, to District Engineer, memorandum, "Transfer of Completed Work in the Vicinity of Puu-o-Hulu, Oahu T.H.," 5th Ind., n.d., HDE.
12. "Unit History 1944," 2274th HSAC, APO 956, San Francisco, CA, RG 407, Entry 427, File No. 98 CA-1 - 0.1, Box 422, NARA.
13. H.T. Burgin, inter-office routing slip, Dec. 28, 1943, HDE.
14. TAG to CG, Central Pacific Area, "Deficiencies in Seacoast Armament," Dec. 14, 1943, HDE. Battery Hulu was among the batteries to be eliminated.
15. Gaines and Smith, p. 17. 1944 History of the HDs of Honolulu and Pearl Harbor, p. 5.
16. Gaines and Smith, p. 17.
17. John D. Bennett, "Puu-o-Hulu Military Reservation, Site Reconnaissance Report," 2002, unpub. (Hereafter: Bennett, Site Recon.) In the plotting room, the remains of a metal bracket for a blower fan was in the air-lock, with a medium-size concrete T-shaped pipe vent on the ground outside of the west wall of the structure. *Historical Review: New Naval Gun Batteries*, pp. 321, 323. War Department, *Basic Field Manual: Defense against Chemical Attack*, FM 21-40, (GPO, 1940), p. 33.
18. *Historical Review: 7-Inch Naval Gun Batteries*, p. 323
19. Department Engineer to Capt. Garnett, (Dist.) Engineers Office, Punahou, "Notes on Fortifications Projects Pertaining to Hawaiian Seacoast Artillery Command," Item No. 10b, Jul. 30, 1942, Entry 46101, HDE. A 1994 Lee Guidry photo of the inside of the BCS shows two concrete brackets at either end of the front wall, flush with the top of the lower observation slit; these could have accommodated two observing instruments. An octagonal concrete mounting pier on the center-front floor probably mounted a 15-foot CRF.
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21. HSAC to DC/A, "Temporary Installation Battery Hulu," 1st through 13th Ind, Feb. 1, 1943, HDE.
22. *Ibid*.
23. C.D. Baker to CG HSAC, "Transfer of Completed Work at Battery Hulu," Sep. 14, 1943, HDE.
24. Everett W. Rosworth, AAG, HQ, U.S. Army Central Pacific Area to Chief Signal Officer, "Radar Equipment for Fire Control of Fixed Seacoast Batteries on Oahu, T.H.," June 1944, HDE.
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27. 2006, regarding the 6-inch emplacements being built fronting the tunnel portals.

28. John D. Bennett, "Battery Construction Number 302: The Sentinel of Kaneohe Bay," *CDSJ*, Vol. 17, No. 1 (Nov. 2002), pp. 51-52. (Hereafter: Bennett, BCN-302.)
29. Robert D. Zink, "The Six-Inch Part of the Modernization Program of 1940," *CDSGJ*, Vol. 8, No. 2 (May 1994), p. 22. (Hereafter: Zink.)
30. Westphalinger and Whittaker, Modernization Program.
31. G.M. Wells to Ordnance Officer, Hawaiian Dept., "Kaneohe Bay, Proposed Installation of 6-inch and 8-inch Batteries," May 5, 1942, HDE. Bennett, BCN-302, pp. 61-62.
32. Zink, p. 22.
33. Guidry photographed the extant remnants of the POHMR in 1994, including the interior of Battery Hulu's BCS.
34. *Historical Review: New Standard Seacoast Batteries*, pp. 310-311. A small base camp with Theater of Operations buildings was probably established at the reservation to house the men manning the guns and searchlights, most likely a kitchen eliminated the need to build one in the tunnel complex.
35. Zink, p. 22.
36. *Ibid. Historical Review: 6-Inch Batteries*, p. 312. BCN-302's power room was equipped with a 10,000-gallon underground storage tank (see Bennett, BCN-302), p. 56. The DERP/FUDS team discovered an excavation inside the transverse tunnel that was in all probability for a diesel fuel storage tank.
37. Bennett, Site Recon., p. 14.
38. HQ, 2274th HSAC, "Study of Seacoast Battery Requirements, Hawaiian Islands," May 31, 1945, p. 8, HDE.
39. *Ibid.*, p. 10.
40. Gaines and Smith, "Fire Control Station U," pp. 13-14. (Hereafter: Gaines and Smith, "Station U.")
41. *Ibid.*
42. *Ibid.*
43. 1944 History of the HDs of Honolulu and Pearl Harbor, p. 6
44. Gaines and Smith, "Station U."
45. James H. Reid, Assoc. Engineer, to Chief of Engineer Div., "Fire Control Stations, current construction program, report on planning....," Dec. 3, 1940, pp. 4-5, HDE.
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