

U.S. NAVAL BASE, PEARL HARBOR, DEGAUSSING RANGE
HOUSE
(U.S. Naval Base, Pearl Harbor, Naval Station, Facility No. 1)
Southern tip of Waipio Peninsula
Pearl Harbor
Honolulu County
Hawaii

HABS HI-408

HI-408

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HI-408

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN BUILDINGS SURVEY
PACIFIC GREAT BASIN SUPPORT OFFICE

National Park Service

U.S. Department of the Interior

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HISTORIC AMERICAN BUILDINGS SURVEY
U.S. NAVAL BASE, PEARL HARBOR, DEGAUSSING RANGE HOUSE
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(Facility No. 1)

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Location: Southern tip of Waipio Peninsula
Pearl Harbor Naval Base
City and County of Honolulu, Hawaii

U.S.G.S. Pearl Harbor Quadrangle, Hawaii, 1999
7.5 Minute Series (Topographic) (Scale – 1:24,000)
Universal Transverse Mercator Coordinates: 4.606640.2360370

Significance: Facility No. 1 was associated with the Navy's development of degaussing technology, which was used to protect ships from magnetic mines in World War II. The degaussing range house was linked to the deperming facilities built during the war at Beckoning Point, further north on the Waipio Peninsula. These facilities are representative of the great expansion of the Pearl Harbor Naval Base during WWII to include Waipio Peninsula and other outlying lands. The range house embodies distinctive characteristics of a unique building type, which controlled a new technology.

Description: Facility No. 1 was located on the southern tip of Waipio Peninsula, where the Pearl Harbor entrance channel splits into two branches, one to West Loch and one to the main part of the harbor around Ford Island. The building, when last visited in 1999, was surrounded by untended bushes and grasses, with several *kiawe* (mesquite) trees to its north and the main channel close to its east side. A small, deteriorated, wooden generator building (Facility No. 2) dating from the 1940s and a more recent shelter built with concrete masonry units (CMU) were the only other buildings near the southern tip. This CMU structure may have been a replacement for the fire pump shelter mentioned by a civilian working at Waipio Point during WWII (Karpeles 2004b). The building has been described below as it appeared when last field checked, although it was reported to have been demolished sometime after August 1999.

Facility No. 1 is a rectangular-plan building with foundations of wood posts on concrete blocks. Its footprint dimensions are approximately 56' x 30'. The Navy database lists its height as 11'. It is a single-wall structure with board and batten siding. The walls are stabilized by three narrow girts on the exterior, plus a single wider girt on the interior.

The building has a combination hip and gable roof, with a gable at the west end only. The eaves of the hipped roof on the east end shade the windows overlooking the degaussing range in the channel. The asphalt-shingled roof has wide overhangs with exposed, flush-cut rafters. A tall

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T-shape of metal piping extends above the southeast corner of the roof, and there are other smaller metal mounts and vents on the roof.

The main entrance to the building is on the south side, near the east end. There is a small landing outside this main entry. The wood entrance door has three panels and a large light at the top. All the windows in the building are wood-framed, but there are various types and sizes. To the east of the main door there is a narrow single-light fixed window and a pair of two-light sliding windows. On the west side of this door, there are two pairs of one-over-one-light double-hung windows of different sizes. Between these is a single one-over-one-light double-hung window plus a boarded-up opening. There are two heavy timbers visible on the east side of the western pair of windows, suggesting that additional structural reinforcement was needed in this corner of the building.

The west end the building is divided into three bays by two large timbers, which flank the central pair of one-over-one-light double-hung windows and the louvered vent at the top of the gable. On the north bay, there is a single one-over-one-light double-hung window, and on the south bay there is a boarded-up former door opening and an electrical equipment cabinet.

The north side of the building has no doors, and a variety of windows. The six windows closest to the west end are all one-over-one-light double-hung, but the three near the middle are more closely spaced than the other three. An opening which is boarded up (on the exterior and interior), a screened vent opening over that, and a narrow single-light fixed window are located to the east of those six windows. At the eastern end of the north side, and wrapping around the room on the east end, are pairs of two-light sliding windows. There is a sign under the east-end windows, which spells out in large letters: "Cable Crossing Do Not Anchor."

The interior layout includes a large room on the east end for observing the ships in the adjacent channel. There are several smaller rooms in the western portion of the building, including a bathroom. Apparently remodeled sometime after the war, during WWII the west-end rooms were used as living area for enlisted men and officers, and included bunk rooms, a dining room, and kitchen (Karpeles 2004a). The original wood floors can still be seen in many of the rooms, but a few rooms have vinyl tile flooring. The interior walls have battens like the exterior, but the interior girt is a wide board, rather than three narrow ones. The ceilings are panels of canec or similar material.

Historical Context: Refer to HABS No. HI-386 for a historical overview of the Waipio Peninsula. During WWII numerous Navy activities were established on this peninsula, including what was called Magnetic Proving Range on a 1942 map (Fourteenth Naval District 1942), but named Degaussing

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Station by 1945 (Navy Yard, Pearl Harbor 1945). After the war, the Navy's Degaussing Station, partly located at Waipio Point and partly at Beckoning Point, was one of the few activities that continued to function here.

Magnetic mines were one of the new weapons developed during WWII, and they required neither contact nor control by mine field operators to detonate. They were a big threat to ships leaving or entering their harbors, since enemy airplanes could plant them thickly within narrow channels at night. Magnetic mines were not attracted to ships, as some WWII newspaper articles reported. "They are simply fired by the ship as its magnetic field passes close to the mine" (Karpeles 1966: 5). Facility No. 1 was built as part of the Navy's attempt to thwart these kinds of attacks on its Pearl Harbor fleet. This building was the range house for the degaussing station at Waipio Point. This is where the magnetism of a ship could be measured, based on the currents read by the underwater coils or tubes in the adjacent magnetic range.

Ships carry permanent magnetism, which is hammered into them at construction; degaussing and deperming are terms for the process of neutralizing these magnetic fields so as not to set off magnetic mines. The word 'degaussing' derives from the name of Carl Gauss, the German mathematician and physicist who wrote important papers on the theory of terrestrial magnetism in the 1830s. A 'gauss' is a unit of magnetic flux density named after him. Degaussing reduces that flux density or intensity. "Degaussing is the broader term. It covers everything you do to a ship to protect it against magnetic mines" (Karpeles 1966: 5). Deperming is a term used to denote the reduction or reversal of the permanent magnetism that was built into ships. When the magnetism of a ship is close to zero, it can pass over a magnetic mine or torpedo without detonating it.

Besides the permanent magnetic field of a ship, there is also a field induced in it at all times by the earth's magnetic field, so it varies depending on the ship's latitude and heading. Ships can be equipped with current-carrying coils to neutralize this magnetic field variation. Ships still need to frequently pass over a degaussing inspection range to determine which coils needed adjusting. If the ship's magnetic field is too far out of calibration for the coils to adjust it, or if a ship does not have the built-in degaussing coils, then it has to be depermed. At the beginning of WWII, the effects of deperming only "lasted for a period of hours, and when we got good at it for a period of months. But ships had to be repeatedly depermed" (Karpeles 1996: 12).

Equipment, called fluxmeters, in the range house recorded the magnetic fields of the ships passing over the degaussing inspection range. These meters were on a bench under east windows. This equipment was long ago removed, as was the signal tower formerly on the south side of the

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range house. A physicist who worked in the building during WWII explained the routine for the ships in the Pearl Harbor channel.

Whenever a ship was moving in the channel, we had a signalman up [in the signal tower], communicating with the vessel, mostly by signal light, but occasionally by semaphore. We would ask the ship for her coil settings, which we could check for accuracy against the charts we had on file. If the coils were set correctly, the ship's signature would tell us whether the settings were still valid, or whether new charts should be issued.

There was a telescopic gunsight in the southeast corner of the building, aligned in a fixed position directly along the line of the underwater coils. A seaman would man this sight as a ship crossed the range, and would tap a telegraph key when the ship's bow passed the vertical cross hair, and again when the stern crossed. This key would produce a small blip in the trace on each of the fluxmeters, so that we could tell exactly which part of the trace corresponded to the ship actually over the range. When ranging a ship, everyone was busy. The signalman would be in fairly constant contact with the ship, and also with the office in the building. One of the physicists would start the paper rolling through the fluxmeters, and try to see that all were working properly with the pens recording along the zero line of the paper as the ship approached. As soon as the ship was off the range, while the ship was still in range of our signal light, he would turn off the meters and do a quick check to see whether or not the ship needed coil corrections. Then he would gather up the tapes in proper order, stamp them and staple them for more careful analysis later (Karpeles 2004b).

A 1945 drawing of the underwater range shows that it consisted of twelve tubes, measuring about 33' in length, buried in a vertical position at the bottom of the dredged channel. Thus, the bottoms of the tubes were at 81' depth and the tops were at 48' depth, spaced about 30' from each other in a straight east-west line. A notation on the drawing specified that the "tubes to be held to within one foot of planned location and are to be within one degree of vertical." In 1945 these 12 tubes had replaced 24 more closely spaced coils. [Tubes and coils have the same function, but the shorter coils simply rested on the bottom of the channel in weighted frames. "The trouble with the bottom-mounted magnetic coils was that they were too close to the keel of a capital ship" (Karpeles 2004b).] When ships passed over the range in a north-south direction, the small current induced in the tubes' or coils' circuits would be transferred by watertight cables to the Range House fluxmeters, to obtain a picture of the magnetic field of the ship. The engineers within the building

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calculated whether the ship's built-in magnetic coils could be adjusted, or if a deperming operation at Beckoning Point was needed to bring the ship back into calibration.

A builder involved in the construction of these facilities for the Navy gave a brief description and explanation of the Beckoning Point area:

A highly secret "degaussing" dock was to be built on the edge of Beckoning Point, large enough to accommodate the largest battleship. This ingenious device, to cost a million dollars, was to be something like a dry-dock, made of concrete, reinforced entirely with copper instead of the usual steel. Once moored in it, a ship would be subjected to extremely delicate magnetic tests, then demagnetized by electric currents sent through giant coils surrounding the whole area. It was a new idea, based on the work of NDRC [National Defense Research Council] scientists in university laboratories. It was hoped that it would end the menace of the magnetic mine by rendering iron ships non-attractive (Woodbury 1946: 340).

Deperming a ship consisted of wrapping the ship with solenoid coils and inducing currents to create a magnetic field opposite of that of the ship in order to bring the ship's magnetic field to zero. The level of effort expended in degaussing a ship depended on the type of vessel. "The transports were very carefully degaussed, but the cargo ships not. . . Minesweepers were degaussed down to a gnat's frazzle" (Karpeles 1966: 26 & 28).

In the late 1950s the Navy developed a portable degaussing range, carried on a converted minesweeper, so that the degaussing procedure could be carried out at ports without a permanent degaussing station. The USS *Surfbird* was not the only ship classified as a degaussing ship, but it "does have the distinction of being the first (and I believe the only) one that was ever deployed with a portable range" (USS *Surfbird*, 2002). Other missions for degaussing ships included "establishing and operating degaussing ranges in forward areas, [as well as] providing facilities and services for inspection calibration and adjustment of shipboard degaussing equipment" (*Our Navy* 1970: 16-17).

An acoustic range was also established in the waters adjacent to this Waipio Point range house in December 1941. This consisted of two brass-encased microphones (planted on tetrahedral frames of bronze tubing and held in place underwater by lead weights) connected back to equipment in the building (Karpeles 2004a & b). The microphones recorded the sound signatures of Navy ships. This was part of the research to defend against then-new acoustic mines; information about this topic was secret-level (Karpeles 1996: 36).

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Facility No. 1 was abandoned about 1987, when another degaussing range building (Facility No. 1471) was built on the other side of the channel, in the corner of the Shipyard near the old coaling dock. This Waipio Point range house has been demolished.

Sources:

No drawings for the range house were located. A map of the underwater magnetic range layout is included in this report.

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Navy Yard, Pearl Harbor

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Project Information: Commander Navy Region (COMNAVREG) Hawaii embarked on a program of documentation of historic properties within its area of responsibility, with the goal of recording historic information about each property type and establishing its context of significance. This report was prepared under a Historic Preservation Services contract (N62742-97-D-3502) awarded to AMEC Earth and Environmental, the prime contractor, by the U.S. Navy, Naval Facilities Engineering Command. The contract was funded through the Cultural Resources Program of COMNAVREG Hawaii. The photographic documentation was undertaken by David Franzen, of Franzen Photography. Maps were prepared by Nestor Beltran, of NAB Graphics. Between 1999 and 2001, the field work was done and the draft of this report was prepared by Dot Dye, AMEC Earth & Environmental, Inc. Further research on degaussing was done by Rebecca Graves in 2002-2003 and this final report was written in 2004 by Ann Yoklavich, both architectural historians at Mason Architects, Inc.

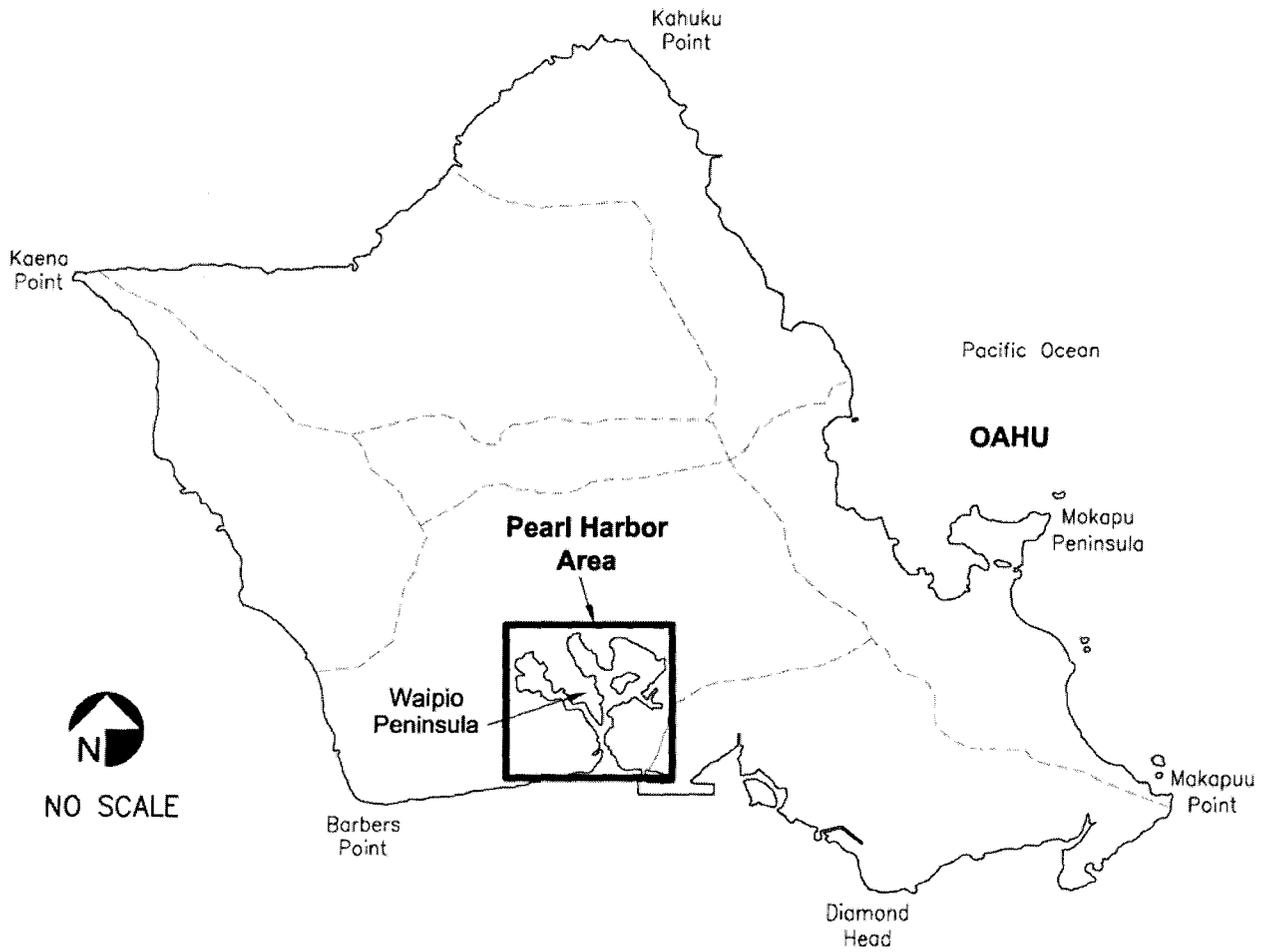
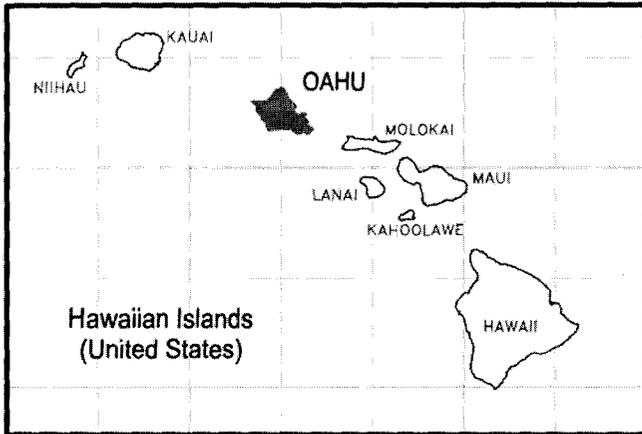
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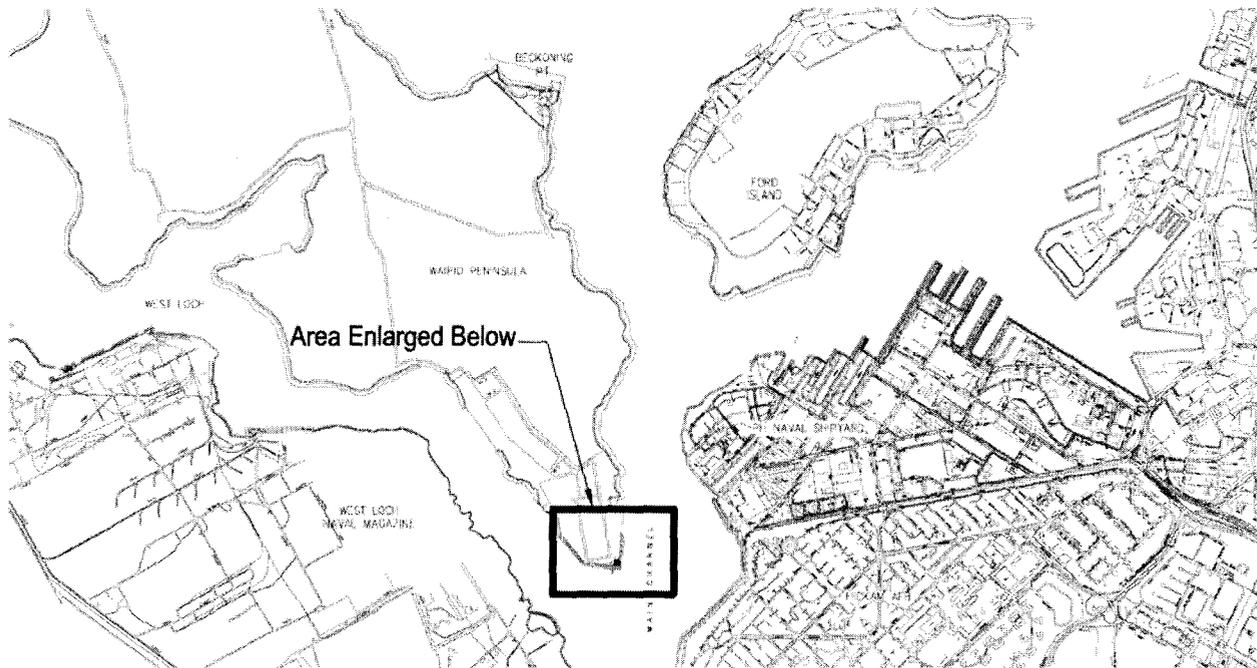
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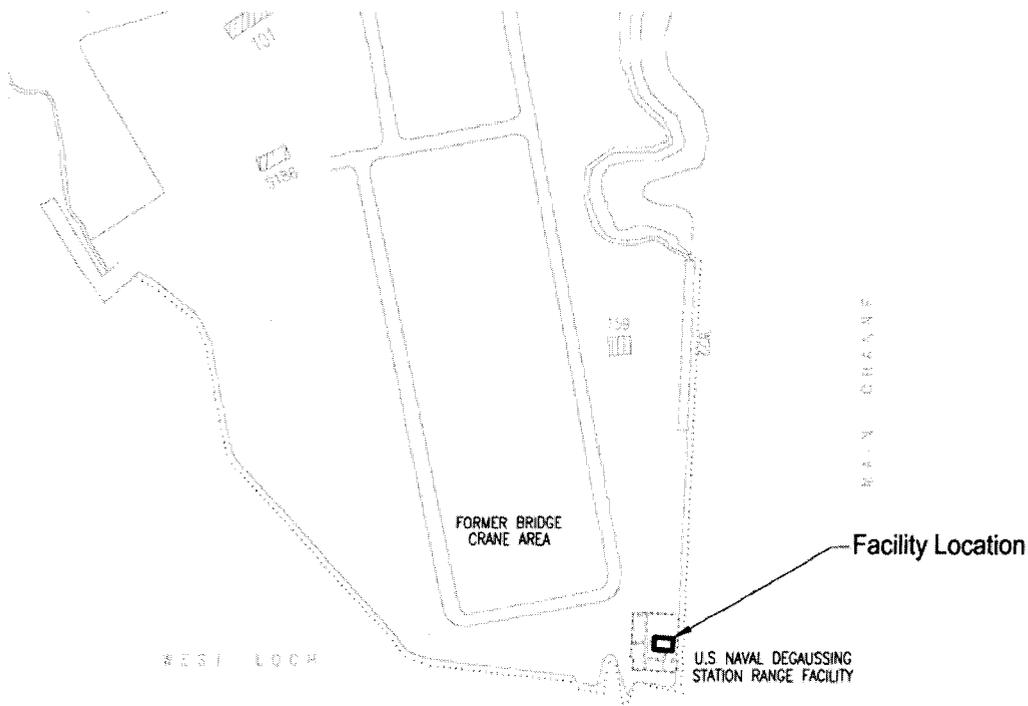
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Vicinity Map



NO SCALE



Site Map

