NPS Form 10-900 OMB No. 1024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in National Register Bulletin, *How to Complete the National Register of Historic Places Registration Form.* If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions.

1. Name of Property

Historic name: **Ewa Plain Battlefield**

Other names/site number: **Ewa Mooring Mast Field, Marine Corps Air Station, Ewa, State SIHP Site 5127**

Name of related multiple property listing:

(Enter "N/A" if property is not part of a multiple property listing

2. Location

Street & number: _____

City or town: Kapolei State: **Hawaii** County: **Honolulu**

Not For Publication: ☐ Vicinity: ☐

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended,

I hereby certify that this ___ nomination ___ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60.

In my opinion, the property ___ meets ___ does not meet the National Register Criteria. I recommend that this property be considered significant at the following level(s) of significance:

___national ___statewide ___local

Applicable National Register Criteria:

___A ___B ___C ___D

_____

Signature of certifying official/Title: **Date**

_____

State or Federal agency/bureau or Tribal Government

In my opinion, the property ___ meets ___ does not meet the National Register criteria.

_____

Signature of commenting official: **Date**

_____

Title : **State or Federal agency/bureau or Tribal Government**

"This material is based upon work assisted by a grant from the Department of the Interior, National Park Service. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the Department of the Interior."

4. National Park Service Certification

I hereby certify that this property is:

___ entered in the National Register
___ determined eligible for the National Register
___ determined not eligible for the National Register
___ removed from the National Register
___ other (explain:) _____

Signature of the Keeper — Date of Action

5. Classification

Ownership of Property

(Check as many boxes as apply.)

Private:	☐
Public – Local	☐
Public – State	☐
Public – Federal	x

Category of Property

(Check only **one** box.)

Building(s)	☐
District	x
Site	☐
Structure	☐
Object	☐

Number of Resources within Property

(Do not include previously listed resources in the count)

Contributing	Noncontributing	
0	5	buildings
4	0	sites
5	3	structures

Ewa Plain Battlefield | Honolulu, Hawaii
Name of Property | County and State

0	0	objects
9	8	Total

Number of contributing resources previously listed in the National Register 0

6. Function or Use

Historic Functions

(Enter categories from instructions.)

Defense, battle site
Defense, air facility
Defense, military facility
Transportation, air-related, railroad, road
Landscape, natural features

Current Functions

(Enter categories from instructions.)

Landscape, natural features
Transportation, road, railroad
Vacant/Not In Use
Commerce/Trade, business

7. Description

Architectural Classification
(Enter categories from instructions.)

_____
_____
_____
_____

Materials: (enter categories from instructions.)

Concrete and Wood _____

Narrative Description
(Describe the historic and current physical appearance and condition of the property. Describe contributing and noncontributing resources if applicable. Begin with **a summary paragraph** that briefly describes the general characteristics of the property, such as its location, type, style, method of construction, setting, size, and significant features. Indicate whether the property has historic integrity.)

Summary Paragraph

The Battle of Ewa Plain began just before 8 AM on December 7, 1941 and was part of the larger surprise attack by the Imperial Japanese Navy (IJN) on the United States of America (US) military base at Pearl Harbor and other installations on the island of Oahu, and other islands considered defensive positions within the Territory of Hawaii. The last of the Japanese threats from this campaign ended on December 31, 1941, when Japanese submarine forces ceased attacks in Hawaiian waters after a final bombardment on December 31 and then withdrew their boats and support craft back to Mainland Japan to regroup and resupply for the next phase of battle. The Ewa Plain Battlefield is located in the southwestern corner of Oahu, Honolulu County, in a geographic area referred to as Ewa Plain, approximately 5.5 miles southwest of Ford Island (middle of Pearl Harbor) (Figure 1).

While the Battle of Ewa Plain encompasses three main population centers: Ewa Field, Ewa Villages, and Ewa Beach, only Ewa Field retains sufficient architectural, archeological, and/or landscape integrity to convey its historical significance. This includes retaining its integrity of location, setting, design, and association.

Ewa Villages comprise the former location of a sugar mill plantation complex, worker housing and commercial buildings, dating from circa 1890s to 1970. As will be reported in subsequent sections, events on December 7, 1941 significantly affected not only the military stationed at Ewa Field, but the local civilian population at Ewa Villages and Ewa Beach as well. At times, both during and after the battle, the military and civilian establishment was closely intertwined working together to fight, defend, recover, and rebuild their community.

The Ewa Plain Battlefield boundary covers approximately 180 acres and includes portions of Ewa Field that retain physical features and characteristics dating to 1941 (Figures 2 and 3). This includes intact portions of the landscape such as airfield/runways, swimming pool, foundations, open fields, and transportation arteries, present during the attack.

In 1941, Ewa Field was a new Marine base comprised of an airfield, an assortment of airplanes, and a temporary Marine camp. The nearly square base established on a 3000-ft by 3000-ft parcel totaled approximately 200 acres and was situated within a dense forest of sisal, kiawe and native trees on a relatively flat, ancient coral limestone reef. Most of the woods within the base had been cleared in order to construct the camp and related aviation facilities. On December 7, 1941, the base was still under construction but nearly complete as initially planned as a temporary base. As a result, many of the work areas and aviation squadrons were housed in groupings of tents clustered along the airfields. At the time of the battle, the camp (located north of the runways) consisted of a mixture of quickly built wooden buildings and tents with wooden floors organized on a grid system containing several roads (either constructed or awaiting construction).[1]

While all of the buildings and structures at Ewa Field erected by December 7, 1941 have been torn down, the runways and road network are still visible. Moreover, they clearly convey their association with the battle including the presence of aircraft burn areas and strafing marks (cannon/machine gunfire) from Japanese aircraft on the former warm-up platform and there is the likelihood of spent bullets from the attack imbedded in the original pavement of the other attack areas. Although scrub growth and trees are becoming reestablished across the base, these are entirely reversible and do not significantly detract from the integrity of the resource. Contributing resources include the former airfield, concrete (building) foundations, a swimming pool, and an Oahu Railway and Land Company (OR&L) railroad spur still readily visible on the ground surface that help convey conditions at the time of the battle.

According to the Department of the Navy,

[1] Aerial Photograph of Ewa Mooring Mast Field, dated December 2, 1941 and Marine Corps Air Station Ewa, Oahu, Design map dated 1942.

> Site 5127 is the former MCAS 'Ewa Field which was among the sites attacked by the Japanese on December 7, 1941, precipitating U.S. entry into WWII. ... Within the portions of the site to be disposed, only a portion of the former runway and concrete warm up platform exists. No structures or buildings are located within the area to be disposed.
>
> The Navy has determined that MCAS 'Ewa Field (Site 5127) is eligible for listing on the [National Register of Historic Places] NRHP.[2] (Note: Bracketed information added.)

There are also later World War II resources and several, non-contributing post-World War II resources within Ewa Field including five Cold War-era structures (previously recommended as eligible for listing in the NRHP). Three other non-contributing resources, also dating after the period of significance, are present including the post 1941, World War II compass rose, solar array, and a large satellite dish, and a FAA transponder circle, the latter three surrounded by chain link fencing.

In the following paragraphs, contributing resources are listed by their location and association with Ewa Field (Figure 4). A historical description and current condition of each of these is provided below, the latter based on the results of a surface reconnaissance and geophysical survey conducted in June 2013. It should be noted that many of these resources exist as archeological features. The following sections will also briefly list non-contributing resources located within the proposed National Register boundary of the Ewa Plain Battlefield.

Contributing Elements

- Hangar*
- Runways and Aircraft Parking Aprons - Asphalt
- Warm up platform – Concrete Pad
- Mooring Mast - Control Tower*
- Open Fields
- Woodlots
- Barracks*
- Recreation and Parking Areas
- Latrines and Boiler Room*
- Flagpole (North Entrance Gate)*
- Fuel tanks*
- Compass Rose (1941-1943)*
- Storage Building*
- Road Network
- OR&L Company Railroad Spur
- Swimming Pool
- Road Network, 1941
    - Philippine Sea Road at Main Gate, formerly D Street
    - Ackerman Street, formerly Fourth Street
    - First Street
    - Vinson Road, formerly Second Street
    - F D Roosevelt, formerly North Hanson Road
    - Ticonderoga
    - Old Beach Access Road

*Denotes Archeological Resource

[2] Department of the Navy, Base Realignment and Closure, Program Management Office. *Final Environmental Assessment Disposal and Reuse of Surplus Property at Naval Air Station Barbers Point, O'ahu, Hawaii.* 2011, pp.3-16.

Narrative Description

Battle Action Summary

The Battle of Ewa Plain on December 7, 1941 is located on the leeward side of Oahu, approximately 5.5 miles southwest of former NAS, Ford Island at the heart of the Pearl Harbor Naval Complex. The following summary discusses the Ewa Plain Battlefield focusing on the contributing resources and defining battlefield features.

Air to air combat and responding anti-aircraft fire to waves of strafing Japanese planes were intense across Ewa Plain on the morning of December 7, 1941 and included attack aircraft delivering air-to-ground munitions and aerial combat in addition to anti-aircraft fire from ships stationed at Pearl Harbor. Most of the air-to-ground assault came in the form of strafing from IJN fliers resulting in return fire from marines at Ewa Field and the surrounding area. US Regular Army and National Guard soldiers manning weapons at Camp Malakole, located on the beach and side slope of the Waianae Range southwest and northwest respectively of Ewa Field, also fired at IJN aircraft circling above Ewa Plain (Figure 5). Moreover, the Japanese withdrawal plan called for planes to rendezvous off Barbers Point to give the illusion that Japanese carriers were located south of Oahu. This gave IJN fighters additional opportunities to discharge their weapons across Ewa Plain including the dropping of their remaining bombs at targets of opportunity as the planes headed west across the Ewa Plain to their rendezvous point. The concentration of planes circling in the vicinity of Ewa Field caught the attention of sailors in Pearl Harbor as anti-aircraft fire soon rained down on Ewa Plain and plantation areas between Ewa Field and Pearl Harbor (West Loch) and the village of Waipahu to the north.

The Ewa Plain Battlefield boundary measures approximately 180 acres and encompasses the battlefield with landscapes comprising open agricultural fields, roads, and woodlots (see Figures 3 and 4). This area represents the site of the most intense attacks on December 7, 1941 that continue to convey their appearance and integrity from that time period. The 180-acre Ewa Field is restricted to land within the secured perimeter fence line of the former Marine base (Ewa Mooring Mast Field) at the time of battle.

The battlefield area built environment contained a mix of residential, industrial, aviation, commercial, public, transportation, religious, and recreational uses. These included the airfield area, housing, squadrons and base operations, and other related facilities at the Marine base (Ewa Field). The National Register boundary encompasses the core of the Ewa Plain Battlefield, including the locations of the most intense air-to-ground assault where the landscape and defining features possess the highest level of integrity.

Environmental Setting

The island of Oahu has four main geographic features: Koolau Range on the east and Waianae Range to the west, bisected by Schofield Plateau, and the coastal plains along the Pacific Ocean.[3] Oahu's topography provided an open pathway for IJN aircraft approaching targets at Ewa Field, Pearl Harbor, and other military installations. During the initial assault, Japanese aircraft flew along the south shore of Oahu towards Pearl Harbor, with some of the planes strafing and bombing Ewa Beach houses (see Figure 5).

The battlefield is located in Ewa Plain, which occupies a former coral reef and varies in terrain from exposed coral to agricultural (sugar cane) fields. Ewa Plain topography is typically flat with gentle slopes lying at an elevation (in the battlefield) of between 30 and 50 feet (ft) above sea level (Photograph 1). In some locations, erosion of the coral has created karst topographic features such as fissures, subterranean caverns, and sinkholes. During the afternoon of December 7, 1941, several of the sinkholes or 'lava chutes' (as they were called by marines) served as improvised foxholes or bunkers.

[3] Foote, et. al., *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, August 1972, p. 6.

Most of the battlefield area is drained by the Kalo'i Ditch, a natural stream that had been channelized, served as a point of refuge and observation during the battle. In this area, the drainage feature measures, at least, 5 meters wide and 2 meters deep.[4] Since it does not have the capability to handle all of the runoff from the Waianae Range, Kalo'i Ditch has occasionally flooded Ewa Plantation during significant rain events.

The Marine base at Ewa Field was constructed on a former sisal (*Agave sisalana*) plantation, the fibers of which can be used to make ropes and rugs. In this area, a sisal and kiawe forest extended from the O&RL main line railroad right of way south to Ewa Beach. North of the OR&L railroad right of way, a vast complex of agriculture fields running from West Loch to the base of the Waianae Mountains were planted in a sea of green sugar cane and irrigated with water pumped from numerous wells drilled on the plantation. Some fields were being readied for harvest at the time of the attack and were easily set on fire when exposed to incendiary bullets, tracers and AA rounds.

In 1941, the marines with assistance from the Ewa Plantation cleared the land to expand and redevelop the Ewa Mast facility as an airfield, sometimes by cutting sisal by hand and digging out the roots (Figure 6). At other times, trees were blasted out of the ground with dynamite, exposing the underlying coral[5] (Figure 7). "Pick and shovel details frequently found ancient subterranean caverns, some of which were only three feet below the surface." As described in the history for Marine Corps Air Station, Ewa, "These caverns were sometimes large enough to house a freight car."[6] In 1941, the marines cleared the land to develop Ewa Field, sometimes by cutting sisal by hand and digging out the roots (Figure 6). At other times, trees were blasted out of the ground with dynamite, exposing the underlying coral[7] (Figure 7). By December 1941, the new Ewa Field contained two intersecting runways (3-21 & 11-29) forming a large black "X" in the middle of a square forest clearing of bright white coral terrain providing approaching Japanese aircraft with a clear visual reference point the air.

Ewa Mooring Mast Field (Ewa Field)

The approximately 180-acre Ewa Field section of the battlefield is restricted to land within the perimeter of the 1941 limits of Ewa Mooring Mast Field, which retains integrity, including the airfield complex and the initial support camp. The main camp area was located north of the runways. Most of the south and central areas of Ewa Field were occupied by the airfield complex, including runways, tiedown aprons and aviation support facilities, such as, windsocks, runway lights. Several ordinance magazines and early defensive revetments for aircraft were also situated around the south end of the base. The main entrance to the base was centrally located on the north perimeter fence. The back gate of the base on the south fence line was located on the historic road that ran from the main gate to the beach. The marines used this old beach access road to get to both training areas and a recreation area at the beach, which had a view of Diamond Head in the distance. Around the base perimeter were three ammunition magazines and a large ammo dump for bombs and bomb fuses. A very large Karst cavern found during construction was outfitted with shelves for storage of explosives.

Ewa Field had its beginning in 1925 when the U.S. Government sublet from Oahu Rail and Land Company approximately 206 acres owned by the James Campbell Estate, formerly a ranch and sisal plantation property in the Ahupua'a of Honouliuli. The intent was to develop a mooring mast for dirigibles and other lighter-than-air craft as part of the US Navy's submarine defense program.[8] Only 54 acres were initially

[4] Hammau, et. al., *Appendix D: Archaeological Reconnaissance of the 'Ewa Villages Project Site, Honouliuli, 'Ewa, O'ahu,* September 1990, p. 14. In R.M. Towill Corporation. *Final Environmental Impact Statement for the Ewa Villages Master Plan, Ewa, Oahu, Hawaii.*, February 1991.

[5] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1945*, (1944), 19.

[6] Jordan, History of the Marine Corps Air Station, Ewa, Oahu, 1941 – 1945. (1944), 34..

[7] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1945*, (1944), 19.

[8] Wayne Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1945*, 12.

cleared to make room for a portable mooring mast installed in 1925. However, by 1932, the mooring station started to be upgraded to an Auxiliary Class "B" Station with a number of modifications to meet the needs of the newer class of Navy airships planned to moor at Ewa Field during fleet exercises. Due to its proximity to Pearl Harbor and other military bases, an emergency landing field (cleared coral covered with oil) was constructed south of the mooring mast around 1935. No dirigibles, however, ever moored at the site due to three unfortunate crashes of the airships scheduled to be stationed in Hawaii. After the last dirigible was retired from service, the property continued to be maintained by the US Navy (14th Naval District). Access to the mooring mast was allowed to the US Army as an observation station for maneuvers and for target practice of mobile railcar gun batteries, an element of the Oahu Coastal Defense System along with coastal gun batteries, ranges and other elements located on the Ewa Plain.

The US Government leased additional property from the Campbell estate in September of 1940, bringing the total size of the facility to 200 acres, with the intention of developing Ewa Mooring Mast Field into a Marine air base. At the time of the marine takeover, the existing property contained a mooring mast, three large buildings (north of the mast), two small bungalows along the entrance road (Philippine Sea Road), several outbuildings and sheds, and an emergency landing field measuring 150 ft by 1500 ft[9] (Figure 8).

The initial forward echelon of Second Marine Aircraft Group (MAG-2) arrived from San Diego on board the USS ENTERPRIZE and embarked at Ford Island in January 1941. The forward echelon air group included a Headquarters and Service Squadron (Hq&SS- 2), a Bombing Squadron (VMB-2), a Fighting Squadron (VMF-2), and a Utility Squadron (VMJ-2). Rapid progress was made on the Ewa field runways between January 20 and February 10, 1941 as can be seen in aerial photographs (Figure 9). By early February, marines were bivouacking in tents at Ewa Field and the emergency coral landing field had been expanded and paved with a thin layer of asphalt to create an operational airfield. The Scouting Squadron (VMS-2), a unit of the Second Marine Division, did not arrive at Ewa Field until May 1941.[10] As marines and aircraft were processed and relocated from their receiving stations at Pearl Harbor and Ford Island to Ewa Field, development of the base began in earnest.[11]

The pre-1941 buildings and the shortened mooring mast designed for the Navy Z-Class airships were retained by the marines, including converting the latter into a temporary control tower platform. The three large buildings constructed adjacent to the Mooring Mast, two from the Campbell Estate, were repurposed into a storehouse, link trainer, and the mooring mast winch house, which was converted to a machine house. Later, another runway 3-21 was added crossing the previously constructed and expanded main runway 11-29 and forming a large "X" (Figure 10). The original circular apron area surrounding the northwest quadrant of the mooring mast was also paved in sections, to support the operations area and parking of aircraft north along runway 3-21 and to provide access to squadron tent. By this time, the airfield expansion, including a tie-down apron, occupied much of the south side of the operations area and installation.

Water storage tanks went up, and it was even expected that there would be enough water to wet down the baseball diamond that had been laid out north of the mooring mast.[12]

Between 1 July to 1 August 1941 all squadrons under MAG-2 were given new designations and MAG-2 became MAG-21. In July 1941, Admiral John Towers, responsible for naval air bases in the Pacific, visited Ewa Field to see the progress of the construction of the naval air facilities. Also Admiral Wilson Brown, commander of defensive scouting squadrons in the Pacific, visited Ewa Field.

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[9] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1944, (1944)*, 13.
[10] Hollingshead, "The Japanese Attack of 7 Dec. 1941 on the Marine Corps Air Station, Ewa, Oahu, Territory of Hawaii" (mimeographed monograph prepared by the Historical Division of the Marine Corps), (1946), 3.
[11] Wayne Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1945*, 19.
[12] Jordan. *History of the Marine Corps Air Station, Ewa, Oahu, 1941 – 1944*, (1944), 47.

In the fall of 1941, the government hired a contractor from the emergency funded consortium: Contractors, Pacific Naval Air Bases (CPNAB), Contracts NOy-3550 and NOy-4173 to work on the runways, warm-up platform, hangar reconstruction (Bldg. 123), underground gasoline storage tanks, a recreation building (Bldg. 101) and railroad spur, as well as much of the transportation infrastructure.[13] In a report from December 1941, work completed at that time included a recreation building and facilities, extension to the secondary runway (500 ft), improvements of electrical systems, a concrete warm-up platform (950 ft by 300 ft), a gasoline storage system (100,000 gallons), 28 barrack units (38 ft by 124 ft), a temporary storehouse, and extension of miscellaneous services (Figure 11). Later in this report, it was noted that "only four 5,000-gallon underground steel tanks were installed."[14] Only one hangar was provided – the old Army Hangar 79 moved from Luke Field (Ford Island) and re-erected at Ewa.

Permanent buildings constructed prior to 1941 and still standing (during the 1945 inventory of base facilities) included a guardhouse (Bldg. 201), guard office (Bldg. 202), two offices (Bldgs. 204-205), writing room (Bldg. 207), post exchange (Bldg. 208), storage building (Bldg. 210), mess hall for non-commissioned officers (Bldg. 212), and small arms storage (Bldg. 701). For the most part, these buildings had continuous concrete foundations with two exceptions: the writing room and the Post Exchange, which both had pier foundations.[15] Moreover, a photograph of the enlisted mess indicated that it was erected on wood piers, suggesting that it was replaced by a more permanent structure (prior to 1945) due to base expansion.

An aerial photograph, taken on December 2, 1941, provides the most accurate information on base facilities at the time of the attack (Figure 12). Names, functions, and/or building numbers for these facilities were identified from a June 30, 1948 (Figure 13), design map, June 1942 design map, and a June 30, 1941 plan of Ewa Field.[16]

> "Fourteen large barracks buildings, each 120-ft-long, were located to the northwest of that intersection and five more were further east, at the end of Vinson near present day Ticonderoga Road. At the northeast corner of Vinson and Philippine Sea was a large enlisted men's mess, and the enlisted men's recreation hall was at the southwest corner. North of the intersection, smaller buildings were along the east side of Philippine Sea while on the west side, within a circular walkway, was the installation's flagpole. Other buildings such as latrines, additional housing, and officer's mess, along with areas of tents, formed the concentration of architecture at Ewa Field. The excavation for the enlisted swimming pool was just south of the recreation hall."[17]

Information on structures built in 1941 and still standing in 1946 are also described in the Bureau of Docks Report for the Public Works of the Navy Fourteenth Naval District (1946: 1015-1018). Those listed in the report include: recreation building (Bldg. 101), pump house and bath house (Bldg. 103), Q.M. office (Bldg. 106), hangar (Bldg. 123), operating tower (Bldg. 133), storage building (Bldg. 206), latrine (Bldg. 209), dispensary (Bldg. 211), latrine and storage building (Bldg. 214), officers mess (Bldg. 215), mess hall storage (Bldg. 216), barracks (Bldg. 217), B.O. quarters (Bldgs 220-227), barracks (Bldgs. 250-252, 253-262 [five buildings only], 263), storeroom (Bldg. 270), latrine (Bldg. 271), cement

[13] Jordan. *History of the Marine Corps Air Station, Ewa, Oahu, 1941 – 1944*, (1944), 34-35.
[14] Pacific Naval Air Bases ... at the Naval Station Pearl Harbor Hawaii and Pacific Islands, *Volume 10, Appendix B, Appendix "A"* pp.968, 980.
[15] Public Works of the Navy, Fourteenth Naval District, Bureau of Yards and Docks, *NAVDOCS P-164*, 1945, pp 1015-1018.
[16] Fourteenth Naval District, Map of Marine Corps Air Station Ewa, Oahu, T.H. showing Conditions on June 30, 1948; Contractors Pacific Naval Air Bases, Ewa Mooring Mast, Area "O", Field Drawing BF SK 301, dated 11-7-42; AECOM and Mason Architects Inc. *Battlefield Evaluation of Ewa Field and Inventory and Historic Context*, Figure 2., March 2011, p. 26; Public Works of the Navy, Fourteenth Naval District, Bureau of Yards and Docks, *NAVDOCS P-164*, 1945, pp 1015-1018; and Pacific Naval Air Bases ... at the Naval Station Pearl Harbor Hawaii and Pacific Islands, Volume 10, Appendix B, Appendix "A"pp.968. (NAVFAC Pacific Library Microfilm Drawer VA69.5, 02, Vol. 6.)
[17] AECOM and Mason Architects Inc. *Battlefield Evaluation of Ewa Field and Inventory and Historic Context*, March 2011, p. 36.

storage (Bldg. 281), latrine and storage (Bldg. 304), officers' mess (Bldg. 305), B.O. quarters (Bldg. 306) and ready magazines (Bldgs. 605, 607-610). The cement storage building (Bldg. 281) and ready magazines are described as temporary buildings while others are described as permanent constructions. The operating tower (former mooring mast) and officers' mess were erected on pier foundations. The remaining buildings had concrete slab foundations.[18]

Conceptually, Ewa Field and associated contributing resources are divided into three main components: aviation facilities, camp area (north side of airfield), and other resources. (Since the OR&L railroad spur line is located in the northern portion of the base, it is included in the discussion of the camp area.)

In general, location of the former runways, road system, hangar foundation, swimming pool, and other archeological features within the base convey the Ewa Field landscape at the time of the attack, and demonstrate the overall integrity of resources within the base boundaries. As noted earlier, the presence of intact foundations at Ewa Field demonstrate the survival of archeological resources related to former buildings that date to December 7, 1941 in this area.

Aviation Facilities

In December 1941, Ewa Field aviation facilities included runways, parking apron, warm-up platform, hangar, control tower (former mooring mast), two support structures and wooden water tank (near the control tower), and a paved area (around the northwest quadrant of the control tower; this paved area was used for squadron tents, aircraft parking and aviation support) (see Figure 12). At the time of the attack there were five groupings of squadron tents/activity areas lining the north side of the Runways 11-29 and 3-21. The Headquarters & Service Squadron (Hq&SS-21) had their operations tents located close to the mooring mast, while the service squadron supporting headquarters staff aircraft parked just north of the mooring mast. The Marine Utility Squadron (VMJ-252) was positioned farthest north, occupying four tents along Runway 3-21 with a paved area made on the old mooring mast apron for parking of utility aircraft and aircraft under repair. Marine Scout Bombing Squadron-VMSB-232 was the center squadron, also made use of four tents. The rear echelon of Marine Fighting Squadron-VMF-211 operated within four tents and was positioned farthest west along the north side of the tie down apron (Runway 11-29). In 1941, this area along the apron was considered the Flight Line.

Runways, Warm-Up Platform, and Compass Rose

The most prominent feature of the base was a cleared 3000-ft by 3000-ft square parcel in the Ewa Plain and the airfield, containing two intersecting 300-ft-wide, paved asphalt landing strips forming a large "X" and comprising two runways, surrounded by exposed coral to the southwest, south, and east and to the north retaining some trimmed back woodland features encircling what was the previous mooring mast site. In aviation terms, Runways 3 and 21 and Runways 11 and 29 can each be described as one runway (i.e. Runway 3-21 and Runway 11-29). The ability to use one bearing or the other is based on the prevailing direction of the wind on any particular day. Runway 21, measuring 1600 ft, was the main and longest, followed by Runways 11 (parking apron) and 3, each measuring 1,050 ft in length (see Figure 4). Runway 29 was the shortest, measuring only 900 ft in length. Lt. Col. Merritt, base commander until mid-November 1941, described the runway construction as a "thin coat of oil over dust" as the macadam measured only two to three inches thick.[19] Two parallel lines, marking the length and width of a carrier landing surface, was painted on Runway 3-21 for both Navy and Marine pilots practicing carrier landings at Ewa Field. A compass rose, a circle with lines radiating from the center indicating 15° compass bearings, was set into Runway 29.

[18] U.S. Navy, *Public Works of the Navy fourteenth Naval District*, 1946, pp. 1015-1018.
[19] Jordan. *History of the Marine Corps Air Station, Ewa, Oahu, 1941 – 1944*, (1944), 18.

After Runway 11-29 became an active part of the expanded runway in 1942, the original 1941 compass rose was move to the taxi area just northwest of the south end of main runway 3-21. A later larger compass rose for the two engine and later four engine air transports was constructed just off the main runways in 1943 and is still present. Runway 11, the first area constructed with tie downs for aircraft placed at 20-ft intervals, served as the initial parking apron (Figure 14). A 300-ft-wide by 960-ft-long concrete warm-up platform, also with tie downs, was constructed along the southwest side of Runway 11 (see Figure 4). Typically, tactical aircraft were parked clustered together on the concrete warm up platform and aircraft associated with their individual squadrons were parked along the north sides of Runways 11-29 and 3-21. On December 6, 1941, planes were lined up for inspection and were in this position at the time of the attack.[20] The base was regularly scheduled for inspections on the first Saturday of each month.[21] Saturday, Dec. 6th was the first regular inspection under the new base commander, Lt. Col. Claude A. Larkin.

Current Conditions

The runways, warm-up platform, and parking apron locations remain visible on the ground surface. The surface of the concrete warm-up platform clearly displays spalling from IJN aircraft strafing and burning of aircraft at Ewa Field on December 7, 1941. There are large lineal pavement strikes believed to be from the low flying Japanese planes firing 20 mm cannons and tight clusters of spalls, thought to represent 7.7 mm strafing from fixed wing guns, as well as, consistently spaced lineal pavement strike patterns thought to represent near vertical strafing from 7.7 mm machine guns from tail gunners who systematically strafed the airfield. The concrete pavement markings on the warm-up platform were surveyed and photographed in 2013 (Photographs 2 and 3). (A recent report by AECOM and Mason Architects, mapped the location of these areas for each 20 by 20 ft concrete pad comprising the warm-up platform in addition to a large patch that may represent a bomb strike location.[22])

The above remnants of the 1941 attack were designated as State SHPD Site 5127 (in 1997) and were recommended eligible for listing in the NRHP under Criteria A and D.[23] Based largely upon the above information, the US Navy determined that the runways and warm-up platform within Marine Corps Air Station (MCAS), Ewa Field, retain integrity and represent part of Site 5127 that is eligible for listing in the NRHP under Criterion A.[24]

Following the georeferencing of a December 2, 1941 aerial photograph, a metal detector survey was conducted in the vicinity of the original compass rose. Survey results include the presence of strong signals that may indicate the location of this feature below a layer of asphalt.

Control Tower

The control tower and three pre-1940 ancillary buildings (machine house, storehouse, link trainer) were positioned just north of the intersecting runways. The shortened mooring mast, painted in broad stripes to enhance its visibility, served as an open air control tower platform for the airfield as noted earlier. It measured approximately 75 ft in height and was accessed via an exterior ladder on the side of the structure. This tower was stabilized with guy wires anchored into large concrete blocks positioned below ground. Due to its height, painted exterior, and

[20] Recorded interview with Major Maynard Hoffmann located on the World Wide Web at http://www.kitsapsun.com/videos/detail/pearl-harbor-survivor-maynard-hoffmann/#axzz2ThSAhYNm).
[21] Jordan. *History of the Marine Corps Air Station, Ewa, Oahu, 1941 – 1944*, (1944)
[22] AECOM and Mason Architects, Inc., *Battlefield Evaluation of Ewa Field, and Inventory and Historic Contexts.* 2011, pp.61-62.
[23] AECOM and Mason Architects, Inc., *Battlefield Evaluation of Ewa Field, and Inventory and Historic Contexts.* 2011, pp.61-62.
[24] Department of the Navy, Base Realignment and Closure, Program Management Office. *Final Environmental Assessment Disposal and Reuse of Surplus Property at Naval Air Station Barbers Point, O'ahu, Hawaii,* 2011, pp. 3-14 and 3-16.

location adjacent to the runways, the mooring mast would have been the most prominent structure at Ewa Field.[25]

Current Conditions

The location of the foundations of the former control tower and three support structures are currently covered in asphalt. It should be noted that a metal detector survey of the area produced many magnetic anomalies suggesting that archeological remains associated with these structures may survive beneath the surface.

Hangar

Rather than building a new aircraft hangar at Ewa Field, marines received a twice-recycled hangar – it once stood at Luke Field, Ford Island and at old Wheeler Field before that.[26] In 1941, the 200-ft long hangar (Bldg. 123) was placed just south of the concrete warm-up platform. At the time of the battle, the hangar was under roof but lacked the installation of sheet metal siding at its walls. Ironically, while the hangar survived the attack on December 7, 1941 it was later set on fire for the filming of an attack scene in the movie *Tora, Tora, Tora*.

Current Conditions

A concrete building pad containing the remnant bases of I-beam and a row of vertical cast iron piping are currently exposed at the location of the former hangar (Photograph 4). Spalling was observed on the concrete surface but their origin could not be determined. Based on design plans for the hangar, the linear row of cast iron sanitary pipe toilet flanges are in the approximate location of the (officers and enlisted) latrines situated in the northern portion of the building. The presence of this foundation is indicative of the archeological integrity of Ewa Field structures dating to the time of the battle.

Ewa Field Camp Area

The camp area, located on the north side of the airfield, refers to the living quarters, mess halls, latrines, boiler room, recreation areas, offices, swimming pool, fuel tanks, storage facilities, parking lots, roads, landscaped areas, flagpole, and facilities north of the runways. The OR&L railroad spur supply line is also located in this area, and is discussed below (Figures 15 and 16).

Some of the base road network is still present, providing a context for identifying archeological features to several structures noted above. As a result of a pedestrian reconnaissance of portions of the base, in conjunction with a limited geophysical survey (Appendix A), it was possible to identify numerous archeological remains associated with various camp features.

Barracks

As more of the base was cleared of sisal and scrub brush, marines erected a total of nine wooden, enlisted mens' single story barracks measuring 128 ft by 28 feet.[27] These were located west of the flagpole, south of Roosevelt Road (former North Hanson Road), and were positioned along two rows in the northwest quadrant of the intersection of E and Fourth (currently Ackerman) Streets. Five additional wooden barracks were eventually constructed over the former canvas hut area (west of D Street/Philippine Sea Road) in the southeast quadrant of this intersection (see Figures 15 and 16). As with others, these structures were supported on a wood pier with concrete pad foundations.

[25] Federal Preserve America Grant Application, 2007, pp. 2-3.
[26] Jordan. *History of the Marine Corps Air Station, Ewa, Oahu, 1941 – 1944*, (1944), 19.
[27] Jordan. *History of the Marine Corps Air Station, Ewa, Oahu, 1941 – 1944*, (1944), 39.

There were also four Bachelor Officer Quarters (BOQs) located southeast of the officers' tents (see Figure 16). These framed buildings, constructed in late November 1941, contained a concrete slab foundation and wood siding. A November 7, 1942 design map labeled these BOQ barracks as A-D, from north to south.[28] The December 2, 1941 aerial photograph depicts 14 enlisted men's barracks and four BOQ barracks (see Figure 12).

Current Conditions

Five of the enlisted barracks fall within an area covered by a paved lot while the other nine enlisted barracks are located within a grass field with several trees. No evidence was observed of the wood pier foundations to these structures in this area although it was heavily overgrown (Photograph 5) and the foundations may be buried. Concrete slab foundations (exterior dimensions - 28 by 150 feet) associated with the BOQs, however, were visible on the ground surface in an area containing a light scatter of trees and scrub growth (Photograph 6). A concrete slab connected BOQs A and B; BOQs C and D were paired together in a similar fashion. Design plans at the National Archives and Records Administration match foundation remains observed in the field and suggest the integrity of archeological remains associated with the bachelor officer quarters. Plans included conversion of the BOQs to family quarters with a laundry space placed between buildings. Also base plans shortly after 1941 indicate all barracks were combined in pairs with an intersecting latrine or laundry facility, which was a commonly done minor modification.

Latrines and Boiler Room

In the history of MCAS, Ewa, the author notes that one of the first uses of dynamite was for the construction of a latrine. As coral did not lend itself to the presence of drainages, a 50-ft-deep hole was created with explosives and then covered by a 12-hole, box-type latrine.[29] With the advice of the medical officer, this was expanded to 50 seats for the latrines, or one for every 13 men. The enlisted latrine building was constructed west of the enlisted tents (south and west of the enlisted barracks) whereas the officers' latrine was located near the officers' tents (north of the BOQs). The December 2, 1941 aerial photograph (see Figure 15) and plans of the base (dated 1941 and June 30, 1942) depict locations of enlisted and officers' latrines (see Figure 16).[30]

Current Conditions

There is currently a Cold War-era building overlying part of the former enlisted latrine. A geophysical survey along the side of the building suggests that at least part of the latrine area is intact below the ground surface (see Appendix A). Recovery of intact archeological deposits in this area could shed light on the nature of marine occupations during this period. Although the area of the officers' latrine was covered by scrub growth and trees (north of BOQs, east camp area), a concrete pad foundation was visible on the ground surface in this vicinity (Photograph 7). An additional concrete pad associated with the boiler room was identified east of the latrines. On the north side of the foundation were three concrete cradles for securing a fuel tank (Photograph 8).

Recreation, Swimming Pool, and Parking Areas

By December 1941, a recreation hall, swimming pool, and portable boxing ring were added to the list of camp facilities, the latter also serving as a pulpit for Sunday morning services. These

[28] Marine Corps Air Station Ewa, Oahu, Design Map dated 1942.
[29] Jordan. *History of the Marine Corps Air Station, Ewa, Oahu, 1941 – 1944*, (1944), 19.
[30] Aerial Photograph of Ewa Mooring Mast Field, dated December 2, 1941 and Marine Corps Air Station Ewa, Oahu, Design map dated 1942.

facilities were constructed west of D Street/Philippine Sea Road, south of the enlisted barracks.[31] The Recreation Building was one of the largest and earliest designed buildings at Ewa Field during the time of the battle (see Figures 15 and 16).

Excavation for an outdoor swimming pool was completed and under construction in the south-central part of the camp. Wood framing, for the concrete pour, was in place at this time. The swimming pool was a key cover and concealment feature for marines as it afforded some measure of protection. It also served as a point of observation and field of fire as it offered a vantage point for observing and targeting IJN aircraft. One of the few available battlefield photographs of Ewa Field depicts several marines at this location (Figure 17).

About one-hundred of the officers and enlisted men lived off base and many had their own vehicles and parking areas were located near the main gate to the north and west of the flagpole. The enlisted men parked their vehicles in a vacant area between the control tower and swimming pool (see Figure 15). Cars located in the enlisted personnel's parking lot (closest to airfield) were heavily strafed during the battle and it is possible that vehicles in the officers' and visitor's lot (main gate area) were damaged as well.

Current Conditions

The former recreation building constructed on piers with block foundations would have been located within a grassy field north of the pool area, but no evidence of the foundation remains were observed during the field reconnaissance. The reconnaissance identified the swimming pool surrounded by temporary construction fencing. Although the pool had been filled with soil, blue paint was still visible on its sidewalls. A cement deck/walkway surrounding the pool was in good condition (Photographs 9 and 10). The officers' and visitors' parking lot fall within a grassy field while enlisted parking is located in an area covered by shrub growth and trees.

OR&L Company Railroad Spur

In anticipation of war, hundreds of men were hired in the fall of 1941 under the Navy's nationwide contract for a massive construction effort, which especially focused on work associated with the airfield and other buildings and structures. The contractor built a 2,000-ft-long narrow gauge railroad spur that ran from the OR&L Company Railroad tracks (near the northwest corner of the base) southward to the airfield (see Figures 15 and 16). Among other uses, the railroad transported construction supplies for base improvements. The spur was part of the larger OR&L Line, which moved people and goods between various locations in Oahu and Honolulu. This included Ewa marines, as well as Ewa Plantation Company employees and plantation processed sugar headed for market.

[Though not involving the Ewa Field railroad spur, the OR&L Company Railroad right-of-way is listed on the NRHP; the right of way and railroad yard are listed on the State Register.[32] (NRHP listed resource H0169994 and Hawaii Register of Historic Places Site No. 80-12-9714, TMK: (1) 9-1-17:003 and (1) 9-1-069:001).]

Current Conditions

The railroad spur extended from the main OR&L Line to the vicinity of end of Runway 11 for a distance of nearly 700 feet. This area is currently covered by tall grasses. The railroad berm of the track bed was identified south of Roosevelt Avenue, situated along the northwest perimeter

[31] Aerial Photograph of Ewa Mooring Mast Field, dated December 2, 1941 and Marine Corps Air Station Ewa, Oahu, Design Map dated 1942.
[32] National Register of Historic Places Inventory - Nomination Forms for Oahu Railway and Land Company Right-of-Way, listed 1975 and Oahu Railway and Land Company Right-of-Way and Hawaiian Railway Society Ewa Railroad Yard.

of the base. While the tracks have been removed, railroad ties remain at regular intervals along the grade (Photograph 11).

Fuel Tanks

Design plans indicate the location of four underground gasoline storage tanks placed perpendicular to the east side of the railroad spur along the west edge of the camp. A December 2, 1941 aerial photograph depicts four long slot trenches with a fuel tank positioned in each (see Figures 15 and 16). There is no evidence to suggest that these tanks were attacked or even observed by IJN pilots on December 7, 1941 as they were likely buried by this time.

Current Conditions

During the reconnaissance, the area of the fuel tanks was identified within tall grasses, the northernmost of which was located within a 6-ft-tall earthen mound (Photograph 12). A vault with an access ladder, two vertical pipes extending above the ground surface, and a manhole cover was observed in this location (Photograph 13). A geophysical survey confirmed that at least one of the fuel tanks was still intact, buried beneath the mound (see Appendix A).

Flagpole (North Entrance Gate)

The flagpole and adjacent parking lot, to the north and west, were situated just west of the main entrance gate on Philippine Sea Road (see Figures 15 and 16). The flagpole was clearly a focal point for visitors to the base and the surrounding landscaping can be seen in aerial photographs as early as March 1941. It was set in the middle of a landscaped square with a coral-lined walkway encircling the flagpole. Additional coral stone lined walkways lead from the circular path to the flagpole. A photograph taken August 1941 clearly shows the work that went into creating the landscape in this vicinity (Figure 18).

Current Conditions

The flagpole area currently falls within a tall, grass-covered field (Photograph 14). Using a global positioning system unit loaded with the coordinates of georeferenced aerial photographs (dating to December 2, 1941), a geophysical survey was conducted in the approximate location of the former flagpole (see Appendix A). Survey results suggest that the base to the flagpole still remains in this area.

Ewa Field Other Resources

These refer to buildings and structures located to the east, south, and west of the airfield and not associated directly with aviation or camp facilities. By December 1941, most of this area had been cleared of vegetation, exposing coral at the surface.

Storage Building

A long, narrow storage building (Bldg. 602, March 1945 Plot Plan), was erected at an angle partially outside of the original base (west) boundary and the base fence jogged at this point to include the building. It appears on a December 2, 1941 aerial photograph (see Figures 12 and 15) under roof, and was situated west of the hangar (Bldg. 123) and Runway 11. The one-story building measured 193 ft by 50 ft by 14 ft tall and was constructed with a wood superstructure on a concrete foundation. Navy P-164 records for 1945 list the completion date for this storage building as 1942[33]. However, a December 2, 1941 aerial photograph shows this building was erected during the attack but may not have been occupied similar to the main hangar which was under roof but not completed at the time of the battle.

[33] Fourteenth Naval District, Plot Plan of Marine Corps Air Station Ewa, Oahu, T.H. showing conditions in March 1945; Public Works of the Navy, Fourteenth Naval District, Bureau of Yards and Docks, *NAVDOCS P-164*, 1945, pp 1015-1018.

Current Conditions

A pedestrian reconnaissance in the location of the former storage building was conducted in June 2013. Identified in an overgrown area, the concrete pad was in excellent condition (Photograph 15). The location of at least one interior wall was clearly discernable along with two interior doorways.

Open Fields and Woodlots

While most of the area around Ewa Field was cleared of vegetation, several woodlots remained, including a few located west of the rail spur (west perimeter of base), one situated in the northeast corner of the base, and a small curving woodlot just outside the mooring mast circle which surrounded the armory, nearby powder magazine, and small building of unknown function and base Motor Pool (north side of the tie down mat) (see Figure 12). These areas played a role on December 7, 1941 as marines described taking cover in the trees during the early part of the battle. Based on the position of these wooded areas, this was likely in the vicinity of the armory located on the north side of Runway 11.

Written accounts also describe the harrowing tale of an officer who was caught in an open field during the aerial assault. This was most likely located between the enlisted barracks and the railroad spur line, north of the underground fuel tanks (northwest quadrant of the camp area) as this area was being cleared for construction in early December 1941 (as shown on the December 2, 1941 aerial photograph) (see Figures 15 and 16). The officer reportedly received a minor head wound although bullets severed off part of his tie while he and another individual attempted to take cover behind a tractor.

Current Conditions

Over time, trees and vegetation have become reestablished. Trees and scrub growth is very thick in the vicinity of the former armory, nearby powder magazine, and small building noted above. The northeast woodlot is now a field covered by tall grasses with a few remaining trees (Figure 19).

The open area in the northwest quadrant of the camp area remains a grass field (Photograph 16). Clearings east and west of the runways have reverted back to trees and scrub growth. An area south of the runways is now part of a large field of recently installed solar panels. Although the open field and woodlots are not precisely the same as they were in December 7, 1941, the landscape of Ewa Field continues to be rural/undeveloped, much as it was at the time of the battle. The landscape could be restored with implementation of a landscape restoration plan.

Road Network

In the summer of 1941, the base road network was limited to First Street and the main entrance road (D Street, Fleming Road and finally when part of NAS Barbers Point it became later Philippine Sea Road), which ran in a general south-southeast direction from the main gate past the west side of the enlisted mess hall and east side of the barracks. Near the south end of the camp Philippine Sea Road intersected First Street, and was interrupted and terminated at the north side of the buildings surrounding the control tower (north side of runway intersections). D Street is the old Beach Access Road, which continued south of Runway 11-29, south all the way to the ocean. Currently a section of the pre-military Beach Access Road remains and continues south of the Ewa Field runways and passes through what is now the Barbers Point Golf Course. The enlisted men's parking lot was situated on the west side of D Street just south of the swimming pool (see Figures 15, 16 and 20).

A December 2, 1941 aerial photograph of the base indicates that new roads were quickly added to the base between the end of August and early December 1941. Fourth Street (later Ackerman Street) extended west-southwest from Philippine Sea Road and divided the enlisted barracks into two groups (nine north and five south) (see Figures 15 and 16).

Roosevelt Avenue (former North Hanson Road) runs just inside the north fence line of the base. Second Street ran east-northeast from Philippine Sea Road on the south side of the enlisted men's mess (north side of the junior officers' tents) and officers' latrines (north side of the BOQ barracks). Third Street (later Vinson Street) extended east-northeast from Philippine Sea Road along the north side of the enlisted men's mess. Both Second and Third Streets intersected B Street (later Ticonderoga Street), which ran from First Street northwest towards the fence line along the base's northern perimeter. The base also had a perimeter road along the fence line used for sentry patrols for the security of the base, which was called Hansen Road and today called Essex Road. When the Navy absorbed MCAS Ewa into NAS Barbers Point, they renamed all the streets throughout the entire base after Navy ships.

Current Conditions

Roosevelt Avenue, named for the visit of President Roosevelt in 1944, runs in the same location today, just south of the former north perimeter fence line of Ewa Field. Although the names of the roads may have changed, the same routes are followed for the former alignments of Philippine Sea Road (D Street), Ackerman Street (Fourth Street), and Vinson and Ticonderoga Streets (Third and B Streets, respectively) (Photograph 17). First Street and other unnamed roads appearing on the December 2, 1941 aerial photograph were also observed during the June 2013 field reconnaissance and are in the same location. Some pathways that show up on the 1941 aerials later became defined roads. The basic configuration of roadways and landscape north of the mooring mast closely reflect the 1941 plan.

Ewa Field Non-Contributing Resources

There are several non-contributing resources that fall within the boundary of Ewa Field (see Photographs 17 and 18). This includes a satellite dish, a post-1941 World War II compass rose, several Cold War-era resources, and a modern solar array (see Figures 3 and 4). These non-contributing resources are listed below.

- Five Cold War-era buildings and associated Parking lots (Buildings 972, 1767, and 1768, and two with unknown numbers);
- Cold War-era satellite dish, surrounded by a chain link fence;
- Compass Rose, circa 1943 (concrete slab for the compass rose constructed between June 6, 1943 and January 15, 1944 based on aerial photographs taken on these dates); and
- Temporary Solar Array (recently constructed and surrounded by chain link fence) with an anticipate life of 20 years (Photograph 18). The Solar Array was designed to be reversible back to cleared site condition that existed prior to its installation.

Integrity of the Ewa Plain Battlefield District

The Ewa Plain Battlefield is a district containing buildings, structures, and sites. In order to qualify as an historic site, the battlefield must possess historical significance, and possess the integrity to convey its historic identity (interpretative value) from the period of significance (1941). Below is a discussion of the resources associated with the district, and an evaluation of their individual integrity.

Contributing Resources

Integrity of individual contributing resources is measured by seven key aspects: location, design, setting, materials, workmanship, feeling, and association.[34] Location (place where the historic military event occurred), setting (physical environment or character of the battlefield landscape), feeling (battlefield's ability to express its historic sense), and association (direct link between the battle event and a historic property) are particularly important for conveying the sense of historic events at a battlefield. Manmade properties, such as buildings and structures, may possess aspects of design, materials, and workmanship if these individual historic properties were present at the time of the battle. A list of contributing resources (defining features) is provided in Table 1 below along with references to a KOCOA analysis of the battlefield and seven aspects of integrity.

A military terrain analysis, referred to as KOCOA (**K**ey Terrain, **O**bservation, **C**over, **O**bstacles and **A**venues of Approach), is frequently utilized to address the interpretative value of the battlefield landscape by identifying and assessing defining features (contributing resources). Traditionally, a defining feature for a military site must illustrate, at least, one of the following criteria:

- Key terrain (provides tactical advantage - typically high ground),
- Observation and fields of fire (observation potential and firing potential),
- Cover and concealment (protection from enemy fire and enemy observation),
- Obstacles to movement (can stop, delay or restrict an enemy threat), and
- Avenues of approach (can be used for troop mobility or to restrict easy ingress or egress by enemy, but must be defended). [35]

[34] Andrus *Guidelines for Identifying, Evaluating, and Registering America's Historic Battlefields*, National Register Bulletin 50, National Park Service, 1999.
[35] Andrus *Guidelines for Identifying, Evaluating, and Registering America's Historic Battlefields*, National Register Bulletin 40, National Park Service, 1999.

Table 1
Ewa Plain Battlefield Defining Features / Contributing Resources

Defining Features/ Contributing Resources	KOCOA Analysis	Date	Description	Integrity Aspects Maintained
Structures				
Runways	Avenue of approach, key terrain, objective, obstacle.	Runway 3-21 was built prior to 1941. Runway 11-29 was under construction on 2-28-41, and lengthened between 6-19-41 and 10-1-41.	Still extant although scrub growth and trees have become established. Although additional runways have been added and the existing runways lengthened, it is still possible to identify the December 1941 runway design through maps and aerial photographs.	Maintains location, design, setting, materials, feeling, and association.
Concrete Warm up Platform	Avenue of approach, key terrain, objective, obstacle.	The land was being prepared on 10-1-41 and it was completed prior to 12-2-41.	Concrete warm-up platform and metal tie downs still extant as well as spalling from strafing by Japanese pilots; provides insight into attack strategy.	Maintains location, design, setting, materials, workmanship, feeling, and association.
Swimming Pool	Key terrain, observation and field of fire, cover and concealment, objective.	Under construction on 12-7-41.	Still extant, complete with concrete apron around the pool.	Maintains location, setting, feeling, and association.
OR&L Company Railroad Spur	Key terrain, Avenue of approach, obstacle.	Was built in the fall of 1941 before 10-1-41 and was still evident on 9-30-44. [36]	A section running from Roosevelt Road, south of railroad grade, with intact, but burned, railroad ties still extant.	Maintains location, setting, design, feeling, and association.

[36] Date based on available aerial photographs and contractors work for the fall of 1941.

Defining Features/ Contributing Resources	KOCOA Analysis	Date	Description	Integrity Aspects Maintained
Road Network	Key terrain, avenues of approach, objective.	Pre-1941, 1941	Much of the December 7, 1941 road network is still evident. Although additional roads are present, the original road configuration maintains its 1941 appearance.	Maintains location, setting, design, feeling, and association.
Sites				
Open Fields	Key terrain, observation and field of fire, obstacle, objective	1941	Although former open fields are now covered by scrub growth and trees in some areas, these locations continue to reflect the rural and undeveloped nature of these areas on 12-7-41.	Maintains location, setting, feeling, and association.
Woodlots	Key terrain, observation and field of fire, cover and concealment.	Pre-1941	Although some woodlots are now covered by grassy fields in some locations, these locations continue to reflect the rural and undeveloped nature of these areas on 12-7-41.	Maintains location, setting, feeling, and association.
Recreation and Parking Areas	Key terrain, avenues of approach, objective.	1941	Mostly grassy fields and, in some locations, scrub growth and trees; these locations continue to reflect the rural and undeveloped nature of these areas on 12-7-41.	Maintains location, setting, feeling, and association.
Archaeological Site				
Hangar	Key terrain, cover and concealment, objective.	Under construction on 12-7-41.	Concrete foundation intact. Locations of I-beams for walls, door openings, and latrine plumbing inside structures evident.	Maintains location, setting, design, and association.
Control Tower (Mooring Mast)	Key terrain, observation and field of fire, avenue of approach, objective.	Pre-1941	Foundation remains covered by asphalt layer; subsurface signature of likely foundation identified during geophysical survey (see Appendix A).	Maintains location, setting, and association.
Barracks	Key terrain, cover and concealment, objective.	Four BOQs completed between 10-1-41 and 12-2-41.	Concrete foundation intact and free of vegetation. It was possible to identify internal wall locations and doorways.	Maintains location, setting, design, and association.

Defining Features/ Contributing Resources	KOCOA Analysis	Date	Description	Integrity Aspects Maintained
Latrines and Boiler Room	Key terrain, cover and concealment.	Enlisted men's latrines completed prior to 10-1-41 and officer's latrine and boiler room completed between 10-1-41 and 12-2-41.	A geophysical survey indicated, at least, part of the enlisted latrines survive as a subsurface feature (see Appendix A). Reconnaissance survey identified concrete foundations for officer's latrine and boiler room intact and generally free of vegetation. Cradle for boiler room fuel tank present.	Maintains location, setting, design, and association.
Flagpole (North Entrance Gate)	Key terrain, objective.	Constructed between 2-28-41 and 3-14-41	Geophysical survey indicated flagpole base survives as a subsurface feature (see Appendix A).	Maintains location, setting, and association.
Fuel tanks	Key terrain.	Under construction on 12-2-41	Geophysical and reconnaissance surveys indicated at least one fuel tank, an access vault, manhole, and two vertical pipes survive as subsurface features.	Maintains location, setting, design, and association.
Compass Rose	Key terrain	The compass rose was added to Runway 29 between 6-19-41 and 10-1-41 and was still evident on 9-30-44	Geophysical survey indicated compass rose brass pins likely survive below the upper asphalt layer of the runway (see Appendix A).	Maintains location, setting, and association.
Storage Building	Key terrain, cover and concealment, objective.	Under roof on 12-2-41 but likely still under construction on 12-7-41	Concrete foundation intact and generally free of vegetation. It was possible to identify the location of interior walls.	Maintains location, setting, design, and association.

Defining Features/ Contributing Resources	KOCOA Analysis	Date	Description	Integrity Aspects Maintained
Perimeter security fence line, including main, back and rail spur gates and perimeter security road	Key terrain obstacle.	Dates from 1925, but reconstructed in 1941. North fence line and gate posts remain from the period	Retained base fence line north of Roosevelt Road from period. Fence post holes likely remain around the perimeter of the 1941 base east, south and west sides as an archaeology features. The fence line also defines the former security road separating the base from the community.	Intact portion maintains design, location, setting, and association.
Karst features, such as sink holes	Key terrain, cover and concealment, objective.	Pre-December 7, 1941	Natural landscape feature in coral used by some marines as site of opportunity for defensive positions during and after 12-7-41 and also for storage of ammunition as stated in the official MCAS Ewa command history.	Maintains setting, feeling and association.

Contributing resources at Ewa Field include structures and sites consisting of runways, warm-up platform, swimming pool, fence line remnant, and the OR&L Railway Spur. Based on previous work, the US Navy considers the runways and warm-up platform portion of Site 5127 eligible for listing to the NRHP.[37] In general, these resources retain many of the seven aspects of integrity including location, design, setting, feeling, and association. The nearly pristine condition of the warm-up platform retains its integrity of workmanship as well. While a portion of the OR&L railroad spur has been disturbed and the rails removed, an extensive segment of the railroad grade remains intact.

Contributing sites include open fields, woodlots, Karst features, recreation and parking areas, and a road network in addition to Ewa Field's archeological resources. Given that the base was under construction at the time of the battle, it contained both open fields and woodlots. Karst features are still present, one was also observed north of the runways. While some fields remain, others have reverted back to scrub growth and trees. Similarly, part of the recreation area and parking lots are now overgrown. However, this situation is considered entirely reversible and does not detract from the integrity of the resource. Notwithstanding the presence of several post-1941 roads, the overall road network continues to reflect the cultural landscape at the time of the battle.

The archaeological component at Ewa Field was identified during a limited (eight-day) pedestrian reconnaissance and geophysical survey conducted in June 2013. Visible foundation remains associated with the hangar, storage building, (four) BOQ's, officers' latrine, and boiler room and fuel tank cradles were observed at this time. A geophysical survey targeted the location of specific resources appearing on a December 2, 1941 (georeferenced) aerial photograph and uncovered evidence of the control tower, flagpole location, fuel tanks, and 1941 compass rose. The preliminary geophysical surveys indicate a high likelihood that sites can be defined in greater detail through additional surveys (see Appendix A).

[37] Department of the Navy, Base Realignment and Closure, Program Management Office. *Final Environmental Assessment Disposal and Reuse of Surplus Property at Naval Air Station Barbers Point, O'ahu, Hawaii.* 2011, pp.3-14 and 3-16.

KOCOA Interpretation/Conclusions

For a battlefield to retain its integrity, the landscape must possess an ability to tell the military story - to understand actions on the battlefield. These actions can include movements, positions, engagement areas, staging areas, observation posts, command posts, signal posts, and field hospitals. For a military site, defining landscape features may be generally viewed as those above- and below-grade features that are important to unravel the story and one that a combatant would recognize.

Prior to the twentieth century, landscape was a predominant factor in determining battle actions as warfare generally occurred between ground forces in relatively close proximity to one another. However, the conflict at Ewa Plain on December 7, 1941 involved aircraft and ships, and the delivery of long distance munitions less dependent on ground conditions. For the purposes of this battlefield nomination, objectives consisting of armed forces, military positions, installations, barracks, enemy planes, fuel supplies, roads, railroads, industrial plants, civilians and their properties, are also included in the KOCOA analysis (see Table 1).

Many of the defining battlefield features possess multiple KOCOA attributes. For example, for IJN pilots, the runways, warm-up platform, and control tower operated as key terrain as well as serving as avenues of approach (strafing). For the marines, the control tower functioned as an observation post and provided a field of fire. Due to the open setting of the runways and warm-up platform, these areas also acted as obstacles for marines attempting to move about the base during the attack. The road network, railroad grade, and parking lots served as both key terrain and objectives for Japanese aviators while serving as avenues of approach for marines. Buildings and structures acted as cover and concealment and key terrain for marines and civilians but were considered objectives for IJN pilots. The IJN pilots, after destroying their primary objective of tactical aircraft at Ewa Field, had ample opportunity to attack secondary objectives as they circled around the mooring mast strafing secondary objectives and anything moving such as vehicles. The perimeter fence and gate posts were manned to keep non-military personnel from entering the marine base, especially during the battle.

Similar to the built features of Ewa Field, natural landscape features such as open fields provided a tactical advantage for IJN aviators (observation, field of fire) but operated as an obstacle to movement for marines and civilians. Conversely, woodlots and sinkholes (Karst features) provided a strategic advantage to marines as forested areas presented an opportunity for observation of incoming planes while affording cover and concealment.

The swimming pool area provided marines with a point of observation of incoming planes and a field of fire, while the framing and excavation (pool under construction) afforded cover and concealment. The gathering of marines in this area near the Privately Owned Vehicle (POV) parking area was surely a objective for IJN pilots.

The Flight Line, Tie Down Apron with aircraft parked closely together, and vehicles moved from the nearby Motor Pool were primary objectives for Japanese pilots. The marines made attempts to salvage aircraft from this area pulling aircraft and machine guns to set up defensive positions in the immediate area. Those marines in this area found little cover and concealment to protect them from Japanese strafing. There was an attempt to conceal an aircraft in the tents near the trees. Those marines caught out in this open area had to scramble for cover under whatever equipment they could find. Little remained undamaged in this area and the adjacent Utility Squadron area was hit just as bad. Planes and tents in the immediate area were riddled with bullet holes. Many of the senior marines were veterans of war and knew when to shoot and when to take evasive action, which was to their benefit and one possible reason there were so few causalities to marines exposed to direct fire.

Based on the information presented above, contributing resources within Ewa Field maintain sufficient integrity to support listing of the Ewa Plain Battlefield on the National Register of Historic Places. In conjunction with the importance of the battlefield, the property is considered historically significant and retains interpretive and archaeological integrity

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- [X] A. Property is associated with events that have made a significant contribution to the broad patterns of our history.
- [ ] B. Property is associated with the lives of persons significant in our past.
- [ ] C. Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- [X] D. Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)

- [ ] A. Owned by a religious institution or used for religious purposes
- [ ] B. Removed from its original location
- [ ] C. A birthplace or grave
- [ ] D. A cemetery
- [ ] E. A reconstructed building, object, or structure
- [ ] F. A commemorative property
- [ ] G. Less than 50 years old or achieving significance within the past 50 years

Areas of Significance
(Enter categories from instructions.)
A: Military
D: Archeology, Historic Non-Aboriginal

Period of Significance
1941

Significant Dates
December 7-31, 1941

Significant Person
(Complete only if Criterion B is marked above.)
N/A

Cultural Affiliation
Euro-American
Eurasian
Asian

Architect/Builder
N/A

Statement of Significance Summary Paragraph (Provide a summary paragraph that includes level of significance, applicable criteria, justification for the period of significance, and any applicable criteria considerations.)

The period of significance for the Ewa Plain Battlefield is 1941, which reflects events leading up to the United States involvement in World War II. Ewa Plain Battlefield attains importance as a nationally significant battlefield for the role it played during the surprise attack by forces of the IJN on US military installations on Oahu, Hawaii on December 7, 1941. Based on current knowledge of the battle, it appears that Ewa Field was attacked approximately two minutes before Pearl Harbor. Significant dates extend from December 7 through December 31 (1941), the latter date representing the last attack actions by the original force of IJN submarines deployed to Hawaiian waters cessation of the immediate threat of further attack including, what some believed, to be continued sea and aerial attacks and a possible land invasion. Ewa Plain Battlefield is eligible for listing in the National Register of Historic Places under Criterion A for its association with actions that precipitated the United States entry into World War II. Buildings, structures, transportation arteries, the surrounding landscape, and military personnel and civilians throughout the Ewa Plain Battlefield were all subjects of the Japanese air assault. The Ewa Plain Battlefield is also eligible under Criterion D for its ability to yield important information related to the history of the battle through a study of area historic archeological remains. This includes evidence of military hardware (bullets and shrapnel) from the battle, foundations to historic-period structures, and cultural deposits associated with military occupation. Based on a recent reconnaissance of the battlefield including a geophysical survey, it appears that intact archeological resources exist beneath the modern ground surface throughout portions of the battlefield.

The attacks on Oahu, Territory of Hawaii, which began on December 7, 1941, precipitated the entry of the United States into World War II and, therefore, is significant on the National level. The effect of this unheralded attack strengthened the ties between the Territory of Hawaii and the United States of America and is significant on the State level. The Ewa Plain battlefield extended over much of Ewa Plain and is significant on the local level also.

Ewa Plain Battlefield, which is composed of former Ewa Field, is the only major battle site from the Japanese attack on Oahu that is not currently listed in the National Register of Historic Places. Importantly, the battlefield comprising this nomination takes into account not only the Marine Corps airfield, but also the surrounding industrial and residential village that was likewise attacked on December 7th. Although the battle lasted only a few hours, the Ewa Plain Battlefield remained active for several weeks as marines, staff, and civilians from the nearby Ewa Plantation worked closely together to repair infrastructure, control fires, and care for the dead and wounded resulting from the attack. This area contains buildings and important landscape and structural features that figured prominently in the battle and, to a great extent, retains its physical appearance from that time.

The Marine Corps' Ewa Field, portions of Ewa Plantation, and the surrounding vicinity was one of several areas on Oahu that Imperial Japanese Navy forces targeted during their surprise attack on December 7, 1941. This attack along with simultaneous Japanese attacks on US forces in the Philippines and British forces in Malaya, Singapore, and Hong Kong, represented the first move in a larger strategy to destroy the Western Powers' naval forces and to expand a Japanese Sphere of Influence in the western Pacific. Japanese war planners believed that the destruction of US forces at Pearl Harbor and surrounding military facilities would allow them to consolidate their defenses including the seizure of Southeast Asia before the US could respond.[38] While the ultimate Japanese military objective was the temporary destruction of the American Pacific fleet, a initial objective included the targeting of aircraft (on the ground and in the air) at airfields on Oahu, including Ewa Field, to guarantee air superiority and ensure success of the mission.

As part of their preliminary attack wave, the IJN focused several units on the destruction of American aircraft lined up on Ewa Field runways. At times, Japanese fighters descended to within 20 to 25 feet of the Ewa Plain Battlefield. In response, Ewa marines, under the command of Lt. Col. Claude A. Larkin, prepared anti-aircraft defenses using machine guns and small arms in an attempt to slow any subsequent Japanese assault. Since the first wave was successful in destroying Ewa aircraft, the second wave focused on strafing buildings and personnel at both the airfield and neighboring Ewa Sugar Plantation and Villages. Ewa Field and the larger Ewa Plain Battlefield continue to convey various aspects of air-to-ground combat from the Japanese attack.

Ewa Field served as the forward Marine Corps airfield in the Hawaiian Islands during World War II and would become known to some as the 'Crossroads of the Pacific' for Marine Aviation."[39] It would go on to play a significant role in supporting aviation units as they deployed to the Pacific and participated in the US Island Hopping Strategy.[40]

As noted above, Ewa Plantation and Villages, which were also targets of Japanese forces within Ewa Plain, experienced several strafing encounters impacting a number of buildings, structures, recreational areas, as well as community residents. Damage caused by incendiary bullets, for example, resulted in no less than a dozen fires that the plantation fire company had to extinguish. In some cases, heavy strafing from Japanese aircraft required drivers to abandon cars and take refuge in adjacent sugar cane fields and a nearby irrigation ditch. In addition to various civilians, one of these individuals appears to have been base commander, Lt. Col. Larkin, enroute to Ewa Field from his home in Honolulu.

Patients' records of the Ewa Plantation Hospital on December 7, 1941, attest to injuries to more than 50 civilians from the Japanese attack in addition to an Ewa marine and US pilot that was shot down near Ewa Beach. Three of these individuals died from their wounds including the marine and two civilians, one being a six-year-old girl. Evidence of multiple attacks across Ewa Villages includes several fires to plantation sugar cane fields and the recovery of unexploded munitions throughout the plantation for up to eight months after the battle. This included both Japanese bombs as well as US anti-aircraft fire.

[38] Prange, *At Dawn We Slept: The Untold Story of Pearl Harbor* (1981), 349.
[39] Shettle, *United States Marine Corps Air Stations of World War II.* (Bowersville, Georgia: Schaertel Publishing Company 2001), 92.
[40] Collier, *The Second World War: a Military History*, (New York: William Morrow & Co, 1967), 480.

Ewa Field contains various resources dating from the Japanese attack including runways, structures, transportation arteries, and foundations, the latter constituting important archeological features.

Identifying archeological remains within the Ewa Plain Battlefield is facilitated by the relatively intact road network within Ewa Field. Archeological reconnaissance including a geophysical survey (ground penetrating radar) conducted in June, 2013 was successful in identifying several intact features in the Ewa Field camp area including the swimming pool, railroad spur, and foundations to the BOQ's quarters, hangar, and latrines (see Appendix A). It should be noted that a metal detector survey of these areas produced magnetic anomalies suggesting that archeological deposits associated with these structures may survive beneath the surface. This may also be the case for the location of tents and temporary wooden buildings that represented the earliest occupation at Ewa Field. Moreover, the recovery of cultural deposits associated with the latrine, in particular, could shed light on the nature of marine occupations during this period. Two Native Hawaiian Sites (Sites 3721 and 3722) have also been identified within Ewa Field vicinity indicating the survival of intact archeological resources in this area.[41]

The importance of the Ewa Plain Battlefield is reflected, to this day, in recognition and support by local governments, community groups, military historians, and the Hawaiian legislature. Ewa Field, in particular, has been acknowledged by the United States Navy when it determined that State SHPD Site 5127 (any portion retaining integrity) is eligible for listing in the National Register of Historic Places.

[41] Tuggle and Tomonari-Tuggle, *A Cultural Resource Inventory of Naval Air Station, Barbers Point, Oahu, Hawaii. Part I: Phase I Survey and Inventory Evaluation Summary,* 1997, pp. 112, 116.

Narrative *Statement of Significance* (Provide at least **one** paragraph for each area of significance.)

Historic Context

Introduction

Located on the island of Oahu, Ewa Plain is historically significant to many themes of American History. It was initially developed as part of the Ewa Sisal Plantation, but a portion was subsequently acquired by the Federal Government in the 1920s as a mooring station for lighter-than-air craft. Later, Ewa Field became a Marine Corps airfield and home to Marine Corps Aviation in Hawaii. During the Japanese attack of December 7, 1941, Ewa Field suffered serious damage to its infrastructure, aircraft, and support facilities; however, it quickly was rebuilt and later developed into the primary training and staging base for Marine Corps Aviation in the Pacific. After the war, Ewa was demobilized and became part of Naval Air Station (NAS) Barbers Point.

The battle resulted from the Imperial Japanese forces surprise attack on the United States of America's military installations on Oahu on December 7, 1941. These military assets included: United States Naval Base, Pearl Harbor; Ford Island, Hickam Field, Aliamanu Crater, and Fort Kamehameha in the immediate vicinity of the Pearl Harbor lochs; Ewa Field (southwest Oahu), Koko Head Radar site (southeast Oahu), Bellows Field, Kaneohe Naval Air Station, and Kaaawa Radar Site along the east coast of Oahu; Opana Radar Site, Kawailoa Radar Site, and Haleiwa Field along the northern side of the island; and Wheeler Field and Schofield Barracks in the north central part of the island.

Hawaii has 33 National Historic Landmarks (NHLs) as of September 2013. Seven NHLs are directly associated with this larger attack on Oahu military assets: U.S.S. Arizona (shipwreck), Hickam Field, Kaneohe Naval Air Station, Opana Radar Site, United States Naval Base, Pearl Harbor, U.S.S. Utah (shipwreck), and Wheeler Field.[42] Many other battlefield locations are listed in the NRHP including four batteries at Fort Kamehameha (listed individually), Bellows Field Archeological Site, and Schofield Barracks Historic District.[43]

Development of Ewa Plain, Oahu To 1940

The area of Ewa Field was previously identified as a Leina a ka Uhane, a sacred place that has been researched and documented through interviews and mapping by the HART commissioned Ewa Traditional Cultural Properties (TCP) study. This land is also the location of hundreds and possibly thousands of iwi kupuna burials. The underground resources of the former MCAS Ewa-Kanehili is of particular Native Hawaiian interest as it is known to contain Hawaiian Iwi prehistoric remains within its karst systems. Traditional Native Hawaiian places began to slowly disappear from the Hawaiian landscape in the late 1800s as the native language was replaced by English; traditional lands were divided into large plantations, communities, resorts, and military installations; and the overall demographics of the area were transformed.[44]

The land that contained Ewa Field was historically owned by the Hawaiian Royal Family.[45] In 1851, when Princess Kekau'onohi died, her husband Levi Ha'alele'a inherited the majority of Honouliuli, except for the parcels that Isaac Montgomery purchased in 1849 (kuleana and the 'ili of Pu'uloa). In 1864, Ha'alele'a's second wife, Anadelia Amoe, deeded Ha'alele'a's land to John H. Coney, probably a close relative of Amoe

[42] http://www.nps.gov/nhl/find/statelists
[43] http://www.nps.gov/nr/research
[44] Allen et al. A Study of Native Hawaiian Traditional Cultural Places, Hickam Air Force Base, Hālawa and Moanalua Ahupua'a, 'Ewa and Kona Districts, O'ahu, Hawai'i (Honolulu: International Archaeological Research Institute, Inc. 2005).
[45] Allen et al. A Study of Native Hawaiian Traditional Cultural Places, Hickam Air Force Base, Hālawa and Moanalua Ahupua'a, 'Ewa and Kona Districts, O'ahu, Hawai'i.

and Ha'alele'a. Given this familial connection, Honouliuli was owned by the same family line from its conquest in 1795 until the land was sold to James Campbell in 1877.[46]

John Coney organized the property and named it Honouliuli Ranch and included endeavors such as bee-keeping, limestone quarrying, and charcoal production. There is no historical evidence that Coney cultivated, leased, or in any other way developed the land.[47] By 1877, James Campbell had purchased the Honouliuli Ranch as well as other large holdings in the area to create the Ewa Plantation.

Development of Ewa Plantation (1877-1940)

Ewa Plantation was established on the leeward side of Oahu in 1890. James Campbell, a Maui business veteran, purchased the 41,000 acres from John Coney in 1877 for $95,000. Two years later Campbell saw an artesian well demonstration in California that would solve his greatest technical dilemma – the availability of an inexpensive water source for the ranch he proposed to establish on his land. Ewa's artesian well was constructed by James Ashley in 1879 and remained in service until it was capped in 1939.[48]

Instead of more intensive ranch operations, the land north of a former pre-historic shoreline has richer soils more suitable for sugar cane and agriculture production. This former ancient shoreline boundary roughly follows Roosevelt Road at the northern boundary of Ewa Field, as shown on Ewa Plantation maps showing sugarcane field locations. The Ewa Plantation was chartered on January 29, 1890, and W.J. Lowrie was named plantation manager. By 1929 there were 4,967 people living in various Ewa Plantation villages (Figure 21).

Oahu Railway and Land Company (OR&L) (1898- 1947)

Following the drilling and installation of an artesian well, Campbell was approached by Ben Dillingham who envisioned a rail system connecting Oahu. Dillingham was granted a charter by the Government of Hawaii for the Oahu Railway and Land Company in 1889, and in that same year Dillingham leased all of Campbell's land, both in Honolulu and Kahuku, for 50 years for $50,000 per year. Dillingham then subleased a portion of that land to W.R. Castle (below an elevation of 200 feet above sea level). The OR&L would serve as the primary transportation artery for agriculture and commercial transportation on the island. During World War II, the OR&L railroad rights were leased to the US government to support the troops and activities at various military bases.

Development of Ewa Mooring Mast Field (1917-1940)

On March 28, 1917, the US government set aside a portion of land at Aiea, district of Ewa, for military use. Four years later, the Chief of Naval Operations requested the 14th Naval District to supply a location for a lighter-than-air base in Hawaii. Based on reports prepared by the Naval District, the Commandant stated "that the most suitable site for the location of a rigid airship station in Hawaii is, on the south side of Oahu, between Pearl Harbor and Barber's Point."[49] Ironically, the Chief of the Bureau of Aeronautics stated that the proposed site was not acceptable because "they were open to attack from the sea."[50]

Even before a final site for the mooring was selected, the physical mooring mast was shipped from Philadelphia on an Isthmian Steamship vessel in August 1924. While the mooring mast was in transit, the Departmental Aeronautical Board reconsidered the locations, and recommended, "erecting the mooring

[46] Allen et al. A Study of Native Hawaiian Traditional Cultural Places, Hickam Air Force Base, Hālawa and Moanalua Ahupua'a, 'Ewa and Kona Districts, O'ahu, Hawai'i, 23-24.
[47] Allen et al. A Study of Native Hawaiian Traditional Cultural Places, Hickam Air Force Base, Hālawa and Moanalua Ahupua'a, 'Ewa and Kona Districts, O'ahu, Hawai'I, 24.
[48] Pagliaro, *Ewa Plantation: An Historical Survey 1890 to 1940*. (1987), 3.
[49] Ingram, *Monograph on the Mooring Mast and Lighter than air station*, 20 March 1931, p. 94, 100.
[50] Ingram, *Monograph on the Mooring Mast and Lighter than air station*, 20 March 1931, p. 101.

mast on land acquired by lease situated within the sector extending from Barbers Point, to West Loch and from the ocean to the Oahu Railway and Land tracks passing through Ewa."[51] Discussions continued on a proper site, but in late December 1924, the Bureau of Aeronautics informed the 14th Naval District that the airship, Los Angeles, would be arriving in Hawaii in the spring of 1925. Finally, in February 1925, the Navy signed a sublease with the OR&L for the new mooring mast. The lease allowed the Navy to construct the mooring mast along with temporary buildings; however, the OR&L Company was still allowed to graze cattle on the land when airships were not being docked.[52]

On May 4, 1925, the Navy contracted with Louis R. Smith of Honolulu "to erect the mooring mast, clear the site, erect buildings, and install incidental machinery and piping," for $29,880. Additional work was needed and the contract was modified; yet, the work was completed prior to July 29, 1925[53] (Figure 22).

The mooring mast, located at 21°-19' 02.74" Latitude and 158°-02' 43.18' Longitude, was similar in design to the ones at Fort Worth, San Diego, and Camp Lewis to support the airship U.S.S. Shenandoah's transcontinental flight. In addition to the mast, each site also had a building to house the generators, winches and tools needed to moor an airship.[54] Sometime later, the Navy also constructed an oil-surfaced, 150-ft by 1500-ft emergency landing field at Ewa.[55]

Approximately five years later, the Federal Emergency Relief Administration (FERA) began work on refurbishing the mooring mast to meet Class 'B' Auxiliary Field standards which included a circular railroad for tethering the airship and shortening of the mooring mast for the arrival of the U.S.S. Macon, a new class of naval airship that was headed to Hawaii to participate in Pacific fleet training exercises.[56] (Figure 23) The Honolulu Advertiser February 14, 1935, announced:

> Work on the reconditioning of the mooring mast at Ewa and the temporary quarters which were to house the Macon's crew during their stay here was ordered discontinued yesterday, pending further orders from Washington, as the result of the dirigible's crash Tuesday. Pilling and leveling the ground around the mast, however, will continue, it was learned yesterday. The same number of FERA workers will probably continue to work there. The field will be put in condition to make it suitable for emergency airplane landings.[57]

However, the crashes of the U.S.S. Akron (ZRS-4) and the U.S.S. Macon (ZRS-5) resulted in the Navy cancelling the program.[58] By January 1941, the field at Ewa only contained a small house, several outbuildings, a mooring mast, and a runway--but that was about to change.[59]

The Winds of War in the Pacific

After the calamity of the First World War and alarmed by increasing Japanese militarism in the western Pacific, the United States sought to prevent another arms race. In 1921, the American government invited Great Britain, Japan, France, and Italy to engage in discussions on naval disarmament. The Five Power Naval Treaty created at the Washington Naval Conference recognized the two ocean commitments of Great Britain and the United States, while seeking to limit the size of the Japanese Navy. The result was an agreement to have a 5:5:3 (U. S., Britain, and Japan) ratio of ships. Unfortunately, instead of facilitating disarmament, the results were fleet modernization programs and increased construction of

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[51] Ingram, *Monograph on the Mooring Mast and Lighter than air station*, 20 March 1931, p. 103.
[52] Ingram, *Monograph on the Mooring Mast and Lighter than air station*, 20 March 1931, p. 105.
[53] Ingram, *Monograph on the Mooring Mast and Lighter than air station*, 20 March 1931, p. 106.
[54] Ingram, *Monograph on the Mooring Mast and Lighter than air station*, 20 March 1931, p. 107.
[55] United States Bureau of Yards and Docks. *Building the Navy's Bases in World War II; History of the Bureau of Yards and Docks and the Civil Engineer Corps, 1940-1946* (Washington: U.S. Government Printing Office, 1947), 144.
[56] "Dirigible to Fly to Hawaii," *New York Times*, January 18, 1935.
[57] *Honolulu Advertiser* February 14, 1935.
[58] Rottman, *U.S. Marine Corps World War II Order of Battle Ground and Air Units in the Pacific War, 1939-1945* (Westport, Conn: Greenwood Press, 2002), 416.
[59] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 14.

ship types not covered by the agreement. Japan also eventually formed the Axis Alliance with Germany and Italy in 1936 and 1937. The American Joint Board and the Joint Planning Committeesubsequently developed a five-part series of war plans called the "Rainbow" plans. These plans were designed for allied forces to engage in a two-ocean, multiple enemy war.[60] In 1940, Pearl Harbor was the home base of the Hawaiian Detachment, and named the new home port for the Pacific Fleet resulting in an overhaul to its facilities. Development of defensive facilities for the U.S. followed the Hepburn Board Report to include the strengthening of U.S. defenses on outlying islands in the Central Pacific which was the basis for developing Ewa Field for Marine aviation to both support the fleet and support defensive bases at Midway, Wake, Johnston and Palmyra Islands as outlined by the Hepburn Board Report (see below).

Development of Aviation and Carriers (US and Japan)

By the early twentieth century, new technological developments such as the airplane, seaplane, the dirigible, the motorized vehicle, and the submarine had altered the nineteenth-century way of war. During World War I, all sides saw the importance of the new airplane for scouting, artillery forward observing, bombing, and aerial combat. At the same time that the airplane was expanding the battlefield into the sky, the German U-boat and their "Wolf pack" tactics, were creating new challenges to the Allied navies. These new weapons coupled with the efficiency of Western industries, allowed for the creation of new levels of warfare that would be greatly expanded during World War II.

Aviation in Post-World War I

The introduction of military uses for the airplane during World War I opened a new dimension for the battlefield. Originally used for reconnaissance and later as air superiority fighters and for close air support, some military theorists viewed the aircraft in other ways. Italian air power advocate Giulio Douhet published The Command of the Air in 1921, which argued for large-scale bombing of factories and the industrial might of a nation, making it impossible to continue a fight.[61] Douhet's beliefs were championed in America by Army General William "Billy" Mitchell, former commander of all American air-combat units in World War I. Mitchell illustrated his beliefs in February 1921, when he led 125 aircraft to sink a captured German battleship, the Ostfriesland. Mitchell would later sink other obsolete US ships illustrating the vulnerability of naval ships to aerial forces. After angering the Army and Navy leadership with his calls for a larger air force, Mitchell was court martialed for insubordination. However, as World War II started, unrestricted aerial bombardment became an important part of the war strategy of the Allies.

Development of Aircraft Carriers

While many in the Navy clung to the belief that the large floating gun platforms known as battleships were the only way to conduct combat on the seas, as early as 1910 officers in navies across the globe began to experiment with ships that could carry aircraft. In 1910, the US landed an aircraft on the U.S.S. Birmingham. The next year, the Royal Navy launched an aircraft from the HMS Hibernia. Finally, in 1914, the Japanese were the first to launch a naval raid, this being against German and Austro-Hungarian forces in China during the early part of World War I. After World War I, world powers attempted to limit the construction of large combat ships, reserving those hulls for aircraft carriers. By 1930, most of the major naval powers of world had developed aircraft carriers, which had the characteristic "flat top" that would be used during World War II and to this day. Ewa Field played a support role by providing carriers a landing practice strip for Navy and Marine aviators and by later providing fly-off space and revetment areas for carrier squadrons when in-port.

[60] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 39.
[61] Nalty, *Winged Shield, Winged Sword: A History of the United States Air Force, Volume I* (Washington, D.C.: Air Force History and Museum Program, 1997), 48.

Creation of Marine Corps Aviation (1912-1920)

Marine Corps aviation began in 1912 when First Lieutenant Alfred Austell Cunningham received aviator training at the Naval Aviation Camp in Annapolis, Maryland. By 1914, the US Navy established a Marine Corps Section of the Navy Flying School, and by the following year the Commandant of the Marine Corps authorized the first Marine Corps Aviation Company. During 1918, the Marine Corps Aviation Company split into two separate commands. The First Aeronautic Company, under Captain Francis T. Evans, was stationed at Naval Base 13, Ponta Delgada, in the Azores, to provide antisubmarine support for convoys. The First Marine Air Squadron was deployed to France as the newly renamed First Marine Aviation Force. The First Marine Aviation Force was formed at Marine Flying Field Miami under Captain Alfred A. Cunningham, and provided bomber and fighter support and became the Day Wing for the US Navy's Northern Bombing Group.[62] During World War I, Marine Corps aviators suffered a shortage of planes, but nonetheless shot down four enemy aircraft and performed the first recorded food-drop mission.[63] By the end of the war, the Marine Corps aviation branch had 282 officers and 2,180 men, with 2,107 aircraft, 15 dirigibles, and 215 kite and free balloons.[64]

After the war, the First Marine Aviation Force returned to the United States and was again headquartered at Marine Flying Field, Miami, Florida, where the unit was disbanded, and the remaining personnel and equipment were transferred to Parris Island and Quantico.[65]

In 1920, Congress established the strength of the Marine Corps at 23,360 marines; it also codified an additional 1,020 marines for the aviation branch and established permanent aviation bases at Quantico, Virginia; Parris Island, South Carolina; and San Diego, California. On October 30, 1920, Major General John A. LeJeune, Commandant of the Corps, authorized the Marine Corps' aviation organization with four squadrons each with two flights. The aviation force at Parris Island was designated Flight L, and was independent of the four squadrons.[66] The Parris Island aviation force served as the aviation detachment of the Marine Corps' Atlantic Coast Advanced Base and Expeditionary Forces. This interwar organization provided the United States with a coastal and naval base defense force designed to establish mobile and fixed bases in the event of a major landing operation within and beyond the territorial United States.[67]

Japanese Expansion and Military Preparedness

Imperial Japan and Formation of the First Air Fleet, 1930s

In the late 1930s, the IJN (日本海軍, Nihon Kaigun) contained the world's largest aircraft carrier fleet. The Japanese navy subscribed to the doctrine of "decisive battle" (艦隊決戦, Kantai kessen,) which called for meeting the enemy fleet, in this case probably the Americans and its allies, for a decisive Pacific battle that would destroy one of the Navy's fleets. Because of the geographical isolation of Japan, its naval leaders saw the aircraft carrier as a way to project its naval power by providing floating air force bases. These bases would later be complemented with the construction of naval airfields on captured islands throughout the Pacific. By the start of World War II, the IJN had 10 carriers, more than any other nation in the world.[68]

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62 Grossnick, *United States Naval Aviation, 1910-1995.* (Washington, D.C.: Naval Historical Center, Dept. of the Navy, 1997), 32, 34; Elizabeth L. Tierney. *A Brief History of Marine Corps Aviation.* (Washington, D.C.: Historical Branch, G-3 Division, Headquarters, U.S. Marine Corps, 1962), 2.

63 Tierney, *A Brief History of Marine Corps Aviation.* Marine Corps Historical Reference Series No. 18.

64 Grossnick, *United States Naval Aviation, 1910–1995,* 37

65 Tierney, *A Brief History of Marine Corps Aviation.* Marine Corps Historical Reference Series No. 18, 3

66 Condon, *U.S. Marine Corps Aviation.* (Washington, D.C.: Deputy Chief of Naval Operations (Air Warfare), 1987), 9.

67 Coletta, *United States Navy and Marine Corps Bases, Domestic.* (Westport, Conn: Greenwood Press, 1985), 421.

68 Evans, and Peattie. *Kaigun: Strategy, Tactics, and Technology in the Imperial Japanese Navy, 1887-1941.* (Annapolis, Md: Naval Institute Press, 1997), 315, 323.

In addition to the carriers, the IJN had been active during the Japanese attack on China. Historian Mark Peattie argued that naval aviation was critical in the success of Japanese Army operations in the late 1930s. Japanese pilots flew close air support, and tactical bombing and strategic bombing missions, all which they would use during the coming conflict with the US.[69]

On April 10, 1941, the IJN formed the First Air Fleet (第一航空艦隊, Dai-ichi KōKū Kantai) which contained Japan's aircraft fleet carriers (Akagi, Kaga, Soryu, Hiryu, Shokaku and Zuikaku) and over 450 aircraft.[70] Naval historian Anthony Tully described "this was a naval battle group with the single most powerful concentration of naval aviation in the world. The groundwork for the true carrier task force had been laid."[71]

Oahu, Territory of Hawaii's Strategic Importance to US

To counter the growing Japanese threat in the Pacific, in 1937 the US began again expanding the base at Pearl Harbor that had been slowed under the 1921 Washington Naval Limitation Conference. Because there are few other islands or harbors in the eastern Pacific that could have been used by the US Navy, war planners developed Pearl Harbor to serve as the primary American naval base in the region and the forward maintenance and storage facility for the US Pacific Fleet.[72] Oahu would remain an important American staging area throughout the war. Naval ships would return to the dry-docks at Pearl to be repaired, and men and machines would wait at the ports and airfields on the islands as they traveled west during the campaigns.

Development of Airfields and Other Bases in Hawaii (1912-1939)

In 1912, Pearl Harbor was opened as a major forward operating base, and began stationing troops in Hawaii to defend the port. The first contingent of troops was assigned at Schofield Barracks. By 1915, the Army had established Fort Ruger, Fort Kamehameha, Fort Armstrong, and Fort DeRussey as facilities to house coastal artillery positions. The Army constructed 15 batteries, housing 54 guns (14-inch and 12-inch guns, 12-inch mortars, and smaller rapid-fire weapons like the three-inch guns at Battery Hawkins, considered usable for antiaircraft defense); they also set up mine defenses for the Pearl Harbor entrance by constructing mine wharfs, casements, and warehouses at Fort Armstrong.

During the early twentieth century, airfields were established and maintained in Hawaii by the US military, the government of the Territory of Hawaii, and commercial airlines in the 1910s, 1920s, and 1930s. Many of these landing fields began as austere, cleared strips of land with few, if any, associated structures. By World War II, some had evolved into airports that were converted to Army or Navy airbases of vital importance (to war planning and operations), while others became auxiliary fields supporting larger military operations.[73]

Landing fields were present in Hawaii before World War I. The Army and the Navy were involved in the establishment of landing fields throughout the Hawaiian Islands beginning in the 1910s. In 1913, US Army Lieutenant Harold Geiger arrived in Honolulu with 12 enlisted men, an engine technician, and two seaplanes to establish seaplane operations at Schofield Barracks (Oahu). The area was determined unsuitable, and operations were transferred to nearby Fort Kamehameha. This venture was abandoned within four months, but the seed of US Army aviation in Hawaii had

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69 Peattie, *Sunburst: The Rise of the Japanese Naval Air Power, 1909-1941.* (Annapolis, Md: Naval Institute Press, 2001), 103.

70 For a discussion of the development of the First Air Fleet, see Mark R. Peattie, *Sunburst: The Rise of the Japanese Naval Air Power, 1909-1941.* (Annapolis, Md: Naval Institute Press, 2001), 151-152; and Paul S. Dull, *A Battle History of the Imperial Japanese Navy, 1941-1945.* (Annapolis: Naval Institute Press, 1978), 10-11.

71 http://www.combinedfleet.com/cvlist.htm

72 "Where the US Pacific Fleet is Centered." *The Glasgow Herald*, 8 December 1941. Electronic document, http://news.google.com/newspapers?id=LT9AAAAAIBAJ&sjid=cVkMAAAAIBAJ&pg=4211%2C4128593.

73 State of Hawaii, Hawaii Aviation: An Archives of Historic Photos and Facts. State of Hawaii, Department of Transportation, Aviation Division, 2005–2011.

been sown. Three years later, the Sixth Aero Squadron of the Army Signal Corps arrived with three seaplanes at Fort Kamehameha from San Diego in an attempt to reestablish the seaplane operation. In 1918, the unit transferred to Ford Island. A year later, in 1919, the Army airfield on Ford Island was named Luke Field in honor of World War I fighting ace Frank Luke, who had been killed in action. Luke Field had 150 planes by 1919.[74] In 1919 Major Sheldon Wheeler, the first Army commander housed on Ford Island, was killed in a crash with his co-pilot on Ford Island.

In the late 1920s and in the 1930s, the Army continued to expand its aviation presence in the Hawaiian Islands.[75] In 1923, the US Army completed work on Wheeler Field, the second airfield on the island of Oahu. In the early 1930s, the Army maintained two pursuit squadrons and an attack squadron here. The Army broke ground for a more than 2,000-acre airbase to be known as Hickam Field on Oahu in 1935. The first detachment arrived to the nearly completed base in 1937. By this date, the Army flying units at Luke Field on Ford Island had transferred to Hickam.

The US Army Signal Corps and the US Army Air Corps (USAAC) used the Port Allen Military Reservation on Kauai as a landing field in the late 1920s. Indeed, early military planners had come to view Kauai as a crucial location for advanced warning and early interception of enemy aircraft. The Army shared the facility with the Territory of Hawaii in the late 1920s and passed it on to the territory in 1930. In 1933, the landing field became known as Burns Field after Second Lieutenant J. G. Burns, a deceased Army aviator. Upolu Point Landing Field (Hawaii), established in 1927 by the US Army Air Service, also was transferred to the territory in 1930. However, the military opened new auxiliary airfields at both of these locations in 1933. Additional auxiliary airfields were opened in this year, bringing the number to five: Kauai (1)—Burns Field (Port Allen); Oahu (2)—Putnam Airfield (Fort Shafter) and Bellows Field (Waimanalo); Island of Hawaii (2)—Suiter Field (Upolu Point) and Morse Field (South Point) (Table 2).[76]

The first Navy aviation unit arrived in the Hawaiian Islands in 1919, when the Pacific Air Detachment, as it was known, established a temporary station at Naval Station Pearl Harbor. Consisting of four seaplanes and four officers, the unit was under the command of Lieutenant Commander Robert D. Kirkpatrick. The Navy obtained funding to expand nearby Ford Island for its use in 1920, and in 1923 the Navy flying unit at Naval Station Pearl Harbor relocated to Ford Island.[77] The Navy in 1935 listed the most important landing fields as Luke Field, Wheeler Field (Oahu), John Rodgers Airport (Oahu), Hilo (island of Hawaii), Maalaea (Maui), Hana (Maui), Lanai City (Lānai), Molokai (Molokai), Port Allen (Kauai), and Wailua (Kauai). Luke Field, on Ford Island, was one of several sites that were shared with Army aviation interests; however, in 1936 the Navy acquired control of all of Ford Island.[78]

Simultaneous to the military's development of landing fields and airports in the Hawaiian Islands were territorial and commercial projects. In 1927, the governor created a distinct entity, the Territorial Aeronautical Commission (TAC), which was, among other things, charged with promoting the establishment of landing fields. Most of the islands had at least one landing field up to this time, and various aviation milestones had been reached that would promote further development of facilities in the islands. Among the many "firsts" were the first inter-island flight in February 1920, the first night flight over Oahu in the same year, and the first attempt to fly to

[74] State of Hawaii, Hawaii Aviation: An Archives of Historic Photos and Facts. State of Hawaii, Department of Transportation, Aviation Division, 2005–2011.
[75] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 81.
[76] State of Hawaii, Hawaii Aviation: An Archives of Historic Photos and Facts. State of Hawaii, Department of Transportation, Aviation Division, 2005–2011.
[77] State of Hawaii, Hawaii Aviation: An Archives of Historic Photos and Facts. State of Hawaii, Department of Transportation, Aviation Division, 2005–2011.
[78] State of Hawaii, Hawaii Aviation: An Archives of Historic Photos and Facts. State of Hawaii, Department of Transportation, Aviation Division, 2005–2011.

the Hawaiian Islands from California in 1925. On Oahu, the territory also had sponsored the establishment of John Rodgers Airport in 1927.[79] The airport's namesake was the Commander of Naval Station Pearl Harbor, who had achieved fame in naval aviation for his attempt to reach Honolulu from San Francisco in a PN-9 in 1925. Rodgers and his crew ran out of gas and were forced to crash into the Pacific several hundred miles from shore. Though unsuccessful, Rodgers' flight was pioneering.[80]

Table 2
Territorial Airfields (or Landing Fields) of Hawaii

Island	Original Name (Alternative Names)	Year Established (Initial Developer)	Year Disestablished or Current Use
O'ahu	Bellows Field (Waimanalo Military Reservation)	1917 (US Army)	Bellows Air Force Station
	Ewa Mooring Mast Field (Auxiliary)(Marine Corps Air Station Ewa)	1925 (US Navy)	1952
	Ford Island (Luke Field; NAS Pearl Harbor; Naval Auxiliary Landing Field Ford Island)	1918 (US Army)	Naval Base Pearl Harbor
	Haleiwa Field	1940	1946
	Hickam Field	1935 (US Army)	Hickam Air Force Base
	John Rodgers Airport	1927 (Territory of Hawaii)	Honolulu International Airport
	Kahuku Air Base	1941 (US Army)	circa 1947
	Kaneohe Naval Air Station (Fort Kuwaaohe Military Reservation)	1918 (US Army)	Marine Corps Air Station Kaneohe Bay
	Kipapa Army Airfield (NAS Kipapa))	circa 1942 (US Army)	circa 1959
	Mokuleia Airfield (Camp Kawaihapai; Dillingham Field)	1922 (US Army)	Dillingham Airfield
	Putnam Airfield (Fort Shafter)	circa 1922 (US Army)	circa 1945
	Wheeler Field (Wheeler Army Airfield)	1922 (US Army)	Wheeler Army Air Field
Hawaii	Hilo Airport (Waiakea Landing Field; Lyman Field; Naval Air Station Hilo)	1925 (Territory of Hawaii and Hilo Chamber of Commerce)	Hilo International Airport
	Morse Field (Ka Lae or Kau Airport; South Point; South Cape)	1928 (Territory of Hawaii)	1983
	Upolu Point Landing Field (Suiter Field)	1927 (Territory of Hawaii)	Upolu Airport
Maui	Hana Landing Field	1934 (Territory of Hawaii)	1947
	Maalaea Landing Field	1927 (Territory of Hawaii)	1938
	Puunene Landing Field	1939 (Territory of Hawaii)	1955
Lāna'i	Lanai City Landing Field	1930 (Inter-Island Airways)	Lanai Airport
Moloka'i	Kalaupapa Landing Field	1934 (Territory of Hawaii)	Kalaupapa Airport

[79] State of Hawaii, Hawaii Aviation: An Archives of Historic Photos and Facts. State of Hawaii, Department of Transportation, Aviation Division, 2005–2011.
[80] *Honolulu Star Bulletin* 1927.

Island	Original Name (Alternative Names)	Year Established (Initial Developer)	Year Disestablished or Current Use
	Molokai Landing Field	1927 (Territory of Hawaii)	Molokai Airport
Kaua´i	Barking Sands Landing Field (Mana Airport; Barking Sands Army Air Base; Barking Sands Air Force Base; Bonham Air Force Base)	1921 (Territory of Hawaii)	PMRF Barking Sands
	Port Allen Military Reservation (Burns Field)	1928 (Territory of Hawaii)	Port Allen Airport
	Wailua	1926 (Territory of Hawaii)	1938
Source: Bennett 2011; State of Hawaii 2005–2011.			

In the summer of 1928, the Honolulu Star-Bulletin printed a map of the Hawaiian Islands that illustrated the location of 13 landing fields in the islands: Kauai (3)—Barking Sands, Port Allen, and Wailuā; Oahu (5)—Luke Field, Wheeler Field, John Rodgers Airport, Waimānalo (Bellows Field), and Kawailoa (Haleiwa); Molokai (1)—Hoolehua (Homestead Field); Hawaii (3)—Hilo, Upolu Point (Suiter Field), and South Point (Morse Field); Lānai (1)—Lanai City Airport. Maui lacked an official airport at the time despite several proposals. After several failed attempts, an inter-island air service that used amphibian planes was begun in 1929. In July 1934 President Franklin D. Roosevelt (FDR) with his sons made a special visit to Hawaii dubbed to the public as a vacation and U.S. good will tour to Hawaii and other key Navy strategic locations. Previously the U.S. government had been funding major infrastructure and park upgrades in Hawaii similar to efforts on the Mainland to support the depressed economy through public works projects. One major difference in 1935 was this special trip allowed FDR to observe first hand and also have direct talks with military, especially the Navy, on their future strategic needs in the case of a future war in the Pacific. After the visit in the second half of the 1930's U.S. funding that had been supporting more localized construction of infrastructure shifted to military and base construction as the highest priority.

The 1930s brought important advancements in Hawaiian aviation. In 1935, Amelia Earhart flew her Lockheed Vega aircraft from Wheeler Field to Oakland, California, and two years later, she returned to Hawaii from Oakland in her Lockheed Electra. Building on her pioneering flights, Pan American began to offer flights to Hawaii.[81]

Pacific Fleet Base of Operation Moved to Hawaii

The United States Navy began using Pearl Harbor as a major base in 1912, while the US Army began stationing troops in Hawaii to defend the ports. The Army increased its presence in Hawaii throughout the 1920s. In 1921, the Army organized the Hawaiian Division, consisting of 13,000 men divided into two brigades of two infantry regiments, three field artillery regiments, an engineer regiment, a tank company, and support troops. This number was set to expand to 20,000 men during wartime. Although the US Navy used Hawaii as a forward operating base since 1912, it was not until 1939 that the Hawaiian Detachment was based there; consisting of an aircraft carrier, eight cruisers, and 16 destroyers. In May 1940, President Roosevelt ordered the Pacific Fleet, its main base being in San Diego, California, to remain at Pearl Harbor in order to deter Japanese expansion. The Pacific Fleet was tasked with conducting decisive naval combat operations, and spent most of its time at sea training for its mission.[82]

[81] State of Hawaii, Hawaii Aviation: An Archives of Historic Photos and Facts. State of Hawaii, Department of Transportation, Aviation Division, 2005–2011.

[82] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 81-85.

Hepburn Board and Base Expansion in the Pacific (1938-1941)

The construction of what would become Marine Corps Base Ewa (Ewa Field) is associated with the US military and economic expansion into the Pacific region starting in the 1930s and early 1940s to counter growth of the Japanese Empire. During the 1930s, the Empire of Japan initiated both economic and military expansion within the Pacific Rim in hopes of creating a greater sphere of influence within the region. This expansion, known first as the New Order in East Asia (東亜新秩序), and later as the Greater East Asia Co-Prosperity Sphere (大東亜共栄圏), culminated in 1937 with Japan's invasion of mainland China, an ally of the United States. The US government, seeing threats to its strategic partners in Asia from the expansion of Japan, began revising its basic war plan and planning for new bases in the region.[83] In July 1938, Secretary of the Navy Charles Edison appointed Admiral Arthur J. Hepburn, former commander-in-chief of the fleet, to chair a board to review American defenses in the Pacific and make recommendations of how they might be strengthened.[84]

The Hepburn Board quickly, but methodically, reviewed the existing Naval War Plans for the Pacific (War Plan ORANGE) and other documents from various naval bureaus to determine the needs of the United States in protecting the Pacific. Regarding the review process, Hepburn stated, "I would say that every item that the board has suggested has been considered in the past some time by one department or another or by the Joint Board involved, and they have been put down as projects to be attained when they can get the money."[85] In December 1938, the Hepburn Board submitted its final report to Congress, which recommended: the establishment of new air bases and the expansion of existing bases to provide three major air bases on each coast, one in the Canal Zone, and one in Hawaii; with outlying operating bases in the West Indies, Alaska, and our Pacific island possessions of Wake, Midway, Palmyra and Johnston were considered the outlying defense perimeter bases for Oahu. All outlying bases were associated with deployed Marine defense forces with Ewa Field providing the key air support element for these bases. The board also recommended that the naval air training station at Pensacola be greatly enlarged and that possibly an additional air training station be established at Corpus Christi, Texas; new submarine bases be established in Alaska and the mid-Pacific area, and several existing stations be improved or retained. Some additional facilities were suggested for the existing destroyer bases at Philadelphia and San Diego. No new mine bases were considered necessary, but certain deficiencies were noted in existing bases. A general priority schedule was set up, based on the necessity for providing facilities when the ships and aircraft authorized by Congress in the Vinson bill would be completed. In addition, there was a list of projects, considered to be of immediate strategic importance, which should be undertaken at the earliest practicable date. These items were: (1) improvement of air facilities at Kaneohe Bay, Hawaii; (2) submarine and air bases at Wake Island, Midway Island, and Guam; (3) air facilities at Johnston Island and Palmyra Island; (4) air and submarine bases at Kodiak and Sitka; and (5) submarine facilities at San Juan, Puerto Rico.[86]

The report was met with excitement by the US public and political leaders. The New York Times called the report "the most complete ever written so far as the navy, air and submarine defenses of the nation are involved."[87] While the Hepburn Board determined that Guam, already surrounded by Japanese possessions, probably could not be defended by the United States, it

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[83] See Edward Miller, *War Plan Orange: The U.S. Strategy to Defeat Japan, 1897–1945* (Annapolis, MD: U.S. Naval Institute Press, 2007).

[84] Bureau of Yards and Docks, *Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corps, Volume 1*, 4.

[85] Arthur Hepburn quoted in Public Works Authorization Act. H.R. Committee on Naval Affairs Hearings, 76th Congress, 1st Session, 26 January 1939, p. 94; Bureau of Yards and Docks, *Building the Navy's Bases in World War II, Volume I*, 4.

[86] Bureau of Yards and Docks, *Building the Navy's Bases in World War II, Volume 1*, 4.

[87] "Navy Board Urges 41 Defense Bases for Entire Nation," *New York Times*,4 January 1939.

stressed the importance of the islands of Midway, Wake, Johnston, and Palmyra. The board also recommended the development of naval aviation bases on Oahu for five patrol squadrons to relieve overcrowding of aircraft at Ford Island, Pearl Harbor (the only permanent naval air station in Hawaii).[88]

The US Navy's plan for expansion of its bases was part of a larger mobilization of the American economy for war, which began in 1939, picked up sharply in mid-1940 after the Germans overran Western Europe, and finally achieved real efficiency in 1943.[89] Initially, the US Navy planned to construct an auxiliary field at Barbers Point, including the Ewa Mooring Mast, to serve as an outlying field for Ford Island; however, those plans were expanded to include the creation of a whole new Naval Air Station at the point.[90] Yet, because of the growing needs of Naval and Marine Aviation in the Pacific as part of the expansion to a 10,000 aircraft Navy, the Navy decided to make Ewa its own base for the marines, rather than a part of the larger Naval Air Station.[91] By 1941, Congress passed another $186 million for the expansion of naval bases in the Pacific, including the continued expansion of Ewa and the creation of a "new air base at Barbers Point, Oahu, the largest single aviation item in the bill ($18,605,000), and Barbers Point designed to provide the necessary landing field facilities for the plane complements of two aircraft carriers."[92]

It is interesting that in 1939, the Navy announced the construction of "a site selected at Barbers Point for establishment of a new communication center in the Hawaiian area. Other naval radio stations are at Lualualei, west of Ewa; Heeia, north of Ewa; Pearl Harbor naval air station and at Hilo on the East side of the Island of Hawai'i."[93] Historian Ann K. Yoklavich argued that the radio station was a cover for plans for the Ewa Field construction.[94]

Prelude to Battle of Oahu and Battle of Ewa Plain

Imperial Japan Prepares for War

Field Trials and Equipment Improvement

The Japanese military command began planning the attack on the Hawaiian Islands as early as 1940. The Japanese Admiral Isoroku Yamamoto (Figure 24) commanded the Japanese Combined Fleet, consisting of 10 subordinate fleets and units in 1941. The Combined Fleet was tasked with multiple operations, as war with the Western Powers became a certainty. The Pearl Harbor Attack Force, centered on the Japanese 1st Carrier Fleet and supported by the 6th Fleet, was to destroy the US Pacific Fleet at Pearl Harbor. By December 1941, American forces had seven fleet carriers and one escort carrier, of which three were assigned to the Pacific Fleet; Japanese forces had ten fleet carriers.[95]

To execute the attack, the Japanese Navy created the First Air Fleet on April 10, 1941 consisting of the First Carrier Division, the Second Carrier Division, and the Fourth Carrier Division. Vice Admiral Chuichi Nagumo selected Rear Admiral Ryunosuke Kusaka and Commander Minoru

88 "Island Defense Plans Alter Pacific Picture," *New York Times*, 12 February 1939.
89 Jeffries, "Part One: Mobilization and Its Impact," in *World War II and the American Home Front: A National Historic Landmarks Theme Study* (Washington, D.C., The National Historic Landmarks Program, 2007), 10.
90 Woodbury, et. al, *Builders for Battle, How the Pacific Naval Air Bases Were Constructed* (New York: E.P. Dutton and Company Inc, 1946), 174.
91 Bureau of Yards and Docks, *Building the Navy's Bases in World War II, Volume 2*, 139.
92 Bureau of Yards and Docks, *Building the Navy's Bases in World War II, Volume 1*, 34, 39.
93 *Star Bulletin quoted in* Ann K. Yoklavich, Historic American Buildings Survey Naval Air Station Barbers Point, Marine Corps Air Station Ewa HABS No. HI-279, p. 6.
94 *Star Bulletin quoted in* Ann K. Yoklavich, Historic American Buildings Survey Naval Air Station Barbers Point, Marine Corps Air Station Ewa HABS No. HI-279, p. 6.
95 Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 15-19.

Genda to join the First Air Fleet as air officers. Genda, in preparation for an attack on Pearl Harbor, gathered the best Japanese torpedo pilots in a problem-solving venture to reconfigure aerial torpedoes so they would descend to appropriate levels in shallow water. Japanese torpedoes were modified to have wooden fins that would break off when they hit the surface of the water, while torpedo planes would fly at an altitude of 30 to 60 ft. Genda also gathered a team of pilots to determine the best method for destroying a battleship.[96]

On September 15, 1941, Yamamoto exercised Operation HAWAII, a dress rehearsal for the attack. During the exercise, the first wave was intercepted by American reconnaissance aircrafts, and only caused minor damage to the US fleet, and resulting in an American counterattack in which American bombers sank two Japanese carriers and damaged another two. The second Japanese attack was not spotted by American forces until the Japanese had reached their intended targets. Japanese forces destroyed two American carriers, four battleships, three cruisers, and most of the American aircrafts. In response, the remaining American aircrafts launched a counterattack that sank one Japanese carrier.[97] These exercises showed that the attack was possible; however, tactical surprise was key to the Japanese being able to fulfill their military objectives.

Increased Japanese Hegemony in the Pacific

By the fall of 1941, the Imperial Japanese government felt it was isolated and contained by European and American spheres of influence in the Pacific. The expansionist elements of the Japanese government felt that they needed to attack the Americans and their allies too, as a means to gain control of the western Pacific. By October, most military and political leaders were convinced that an aerial attack of the US military bases in Hawaii would cripple the US long enough that the Japanese could consolidate power in the region. The IJN had been drawing up plans to attack Hawaii for years, but the short range of the aircraft, carriers and weapons made the attack unworkable. In fact, in August 1941, the IJN was conducting "intensive training of the designated air groups." Emphasis was placed on shallow water torpedo drops, on horizontal and dive bombing, and on strafing tactics."[98] Sensing this might be their hope to defeat the American Forces, the Japanese government agreed to the attack.[99] On November 3, 1941, Admiral Nagano, Chief of the Naval General Staff decided to attack Pearl Harbor if diplomatic negotiations with the United States failed, and the Naval General Staff granted the final approval on December 1, 1941.[100]

Tactically, the Japanese attack on the US military in Hawaii was primarily tasked with the destruction of the US Naval Fleet at Pearl Harbor. The Japanese orders called for the first targets to be battleships, then carriers, then aircraft on the ground or in the air.[101] The Japanese bomber and torpedo pilots were tasked with destroying their primary goals and then looking for targets of opportunity. Strategically, the Japanese attack on the US military bases in Hawaii on December 7, 1941, was part of a larger expansion of the Japanese Empire to achieve:

> complete hegemony in Asia and unchallenged supremacy in the western Pacific. Her strategic objectives were the subjugation of the Philippines and the capture of the immense

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96 Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America,52-54
97 Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America,58
98 United States Strategic Bombing Survey. *The Campaigns of the Pacific War.* (Washington: U.S. Strategic Bombing Survey (Pacific) Naval Analysis Division, 1946), 15.
99 Pearl Harbor Raid, 7 December 1941: Japanese Forces in Pearl Harbor Attack, http://www.history.navy.mil/photos/events/wwii-pac/pearlhbr/ph-ja1.htm
100 United States Strategic Bombing Survey. *The Campaigns of the Pacific War*, 14.
101 United States. *Pearl Harbor Operations: General Outline of Orders and Plans.* (Tokyo: Distributed by Office of the Chief of Military History, Dept. of the Army, 1953), 13

> natural resources of the Netherlands East Indies and Malaya...[and to develop] Japan's grandiose scheme of the Greater East Asia Co-Prosperity Sphere.[102]

The US military (after the war) contended that:

> The Japanese planned to isolate this region by destroying Allied naval power in the Pacific and Far Eastern waters, thus severing British and American lines of communication with the Orient. The unsupported garrisons of the Far East would then be overwhelmed and the areas marked for conquest quickly seized. Air attacks launched from progressively advanced airfields would prepare the way for amphibious assaults."[103]

The attacks on Pearl Harbor were seen as a way to cripple the US fleet in the Pacific, and destroy any means for an Allied counteroffensive. While the Allies worked to rearm their forces within the region, "the United States would be forced back to Pearl Harbor, the British to India, and China's lifeline would be cut."[104]

The stated mission of the attack on Pearl Harbor was:

> To render impotent the United States Pacific Fleet in order to gain time and to insure freedom of action in the South Seas Operation, (including invasion of the Philippine Islands), and to facilitate the defense of the mandated islands. The attack was conceived and proposed by Admiral Isoroku Yamamoto, CinC of the Japanese Combined Fleet. In January 1941, Rear Admiral Tokijiro Onishi, Chief of Staff of the 11th Air Fleet was ordered to make a preliminary study of the operation, and in the first part of September 1941 members of the Operations Section of the Naval General Staff and selected members of the Staffs of the Combined Fleet and the First Air Fleet commenced work on the details of the actual plan. [105]

The actual commander the Japanese forces was to be Yamamoto, one of the greatest admirals in Japan's history. Born in 1884, Yamamoto graduated from the Japanese Naval Academy in 1904. He was later wounded in action during the Russo-Japanese War. After the war, Yamamoto attended the Japanese Navy's Staff College and later studied at Harvard University. In the late 1920s, he served as Naval Attaché to the United States. During the 1930s, Yamamoto was promoted in the Navy and served in important positions in Japanese naval aviation.[106] It was this expertise with naval forces, naval aviation, and an understanding of the American Navy that made him the perfect person to lead the Japanese attack. Yamamoto knew that his forces needed the element of surprise to execute this attack. He organized his force as small as possible while using the most powerful air attack force available.[107] The unit that Yamamoto commanded was one of the largest naval aviation units of that time.

The Development of the Japanese Forces for the Attack, Fall 1941

Yamamoto selected Vice Admiral Chuichi Nagumo, an experienced, cautious officer, to command the Air Fleet and the overall operations. The attack fleet would contain carriers, fast battleships, cruisers and destroyers, support ships, and an Advance Expeditionary Force of large submarines.

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[102] MacArthur. *Reports of General MacArthur: The Campaigns of MacArthur in the Pacific.* (Washington, D.C.: U.S. Govt. Print. Off, 1966), 1. For more information on the strategic aims of the Imperial Japanese military see: Gerhard L. Weinberg, *A World at Arms: A Global History of World War II.* (Cambridge [England]: Cambridge University Press, 1994); Joyce Lebra *Japan's Greater East Asia Co-Prosperity Sphere in World War II: Selected Readings and Documents.* (Kuala Lumpur: Oxford University Press, 1975); and Paul S Dull. *A Battle History of the Imperial Japanese Navy, 1941-1945.* (Annapolis: Naval Institute Press, 1978).

[103] MacArthur. *Reports of General MacArthur: The Campaigns of MacArthur in the Pacific*, 2.

[104] MacArthur. *Reports of General MacArthur: The Campaigns of MacArthur in the Pacific*, 2-3.

[105] United States Strategic Bombing Survey. *The Campaigns of the Pacific War*, 13.

[106] Admiral Isoroku Yamamoto, Japanese Navy, (1884-1943), http://www.history.navy.mil/photos/prs- for/japan/japrs-xz/i-yamto.htm

[107] United States Strategic Bombing Survey. *The Campaigns of the Pacific War.*, 13-14.

The fleet left Japan on November 26, 1941, with orders to abort the mission if he was discovered. Appendix B provides a copy of the Japanese Order of Battle for the attack.

Oahu Intelligence Gathering

Providing highly valuable and detailed on the ground and in the air reconnaissance for the Imperial Japanese Navy was Honolulu Consulate agent Takeo Yoshikawa. His spying was done very discretely but nearly all done out in the open by driving to locations in the hills above military sites and sometimes using the services of private plane rentals to conduct "sightseeing" tours. A long distance swimmer, he completely covered the harbor installations, sometimes staying underwater for a long time breathing through a hollow reed.

Major attack decisions made as a result of Yoshikawa's reconnaissance on Oahu:

The Japanese military planners decided that the best attack was from the waters north of Oahu due to Yoshikawa's report that military air patrols rarely watched the waters north of Oahu when winter seas were thought to be too treacherous for an enemy approach. Yoshikawa could see by simple observation that US navy ships in the harbor along "Battleship Row" were moored in pairs to protect the inboard ships from torpedo attacks and that that the water in Pearl Harbor wasn't deep enough for ordinary torpedoes. The IJN planners decided to attack those ships with armor-piercing bombs dropped from dive-bombers and redesigned their torpedoes with special fins that would work in shallow water.

Yoshikawa could also see by observing Pearl Harbor operations that Navy ships commonly left the harbor for maneuvers on Monday and returned to the port at the end of the week with Sunday being the most likely day they would all be in port. Numerous oral histories of Pearl Harbor veterans all noted that the weekend lighting of Navy ships like Christmas trees made it an excellent target and easy for anyone to see which ships were in port.

In mid-November 1941, the Japanese liner Taiyo Maru arrived in Honolulu with Suguru Suzuki, a lieutenant commander in the Japanese Imperial Navy on board. His secret mission was to contact Takeo Yoshikawa about the Pearl Harbor defenses and obtain the very latest intelligence for the planned December attack. Suzuki passed a list of questions to Yoshikawa through Honolulu Consul General Kita and was given 24 hours to respond. Years later, in a 1960 article, Yoshikawa recalled some of Suzuki's questions and his answers: "Where are the airports? For this question, I was able to provide a map with every detail, plus aerial photos which I had taken as late as October 21, and considerable structural detail."[108]

Clearly this was extremely valuable information for Japanese attack planners. "We knew then that things were building to a climax and that my work was almost done," Yoshikawa said in an interview after the war. Ironically after the war Yoshikawa received no pension or credit for his work. "I have been wiped clean from Japanese history," he complained.[109]

The Japanese selected December 8, 1941 (December 7th Hawaii Time) as the best day for the attack because it would be a Sunday which would mean minimal activity by the Americans, and there would be maximum daylight for the operation and take-off time since the attack was set for 0800 Hawaiian time. The primary mission of the attack was to "put the United States Pacific Fleet temporarily out of action, the main force of the attack was to be directed at battleships and carriers."[110]

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[108] Savela, "The Spy Who Doomed Pearl Harbor," *Quarterly Journal of Military History*, Published online at Historynet.com 8 November 2011, Accessed 3 April 2014. http://www.historynet.com/the-spy-who-doomed-pearl-harbor.htm

[109] Savela, "The Spy Who Doomed Pearl Harbor."

[110] United States Strategic Bombing Survey. *The Campaigns of the Pacific War.*, 14

On November 26, 1941, the Combined Fleet left Hitokappu bay at 0600. The fleet refueled successfully on December 3, 1941 and the fleet did not encounter any merchant shipping during its trip. The Task Force arrived at the launching point 200 miles north of Oahu at 0730, December 7, 1941 (Hawaiian time).[111]

To protect the element of surprise, during the approach, the IJN Navy issued the following instructions:

1. If discovered prior to "X"-minus-2-day, the Task Force was to return to Japan without executing the attack.
2. If discovered prior to "X"-1-day, the decision as to what action to take was the responsibility of the Task Force Commander.
3. If discovered on "X"-minus-1-day or the morning of "S"-day the Task Force was to continue with the attack.
4. If at any time during the approach to Pearl Harbor the negotiations with the United States had been successful the attack would have been cancelled.
5. If, at any time during the approach to Pearl Harbor the American Fleet attempted to intercept the Japanese Task Force, the Japanese planned to counterattack. If the American Fleet advanced into Japanese home waters in pursuit of the Task Force it was planned to commit the Main Body of the Japanese Fleet as a support force.

If, after arriving in Hawaiian waters, it was found that the American Fleet was at sea and not in Pearl Harbor, the Japanese planned to scout a 30-mile radius around Oahu and attack if contact was made; otherwise they were to withdraw.[112]

Following a Japanese War Cabinet meeting on December 1, 1941, in which the Emperor made the decision that Japan would declare war on the United States, Great Britain, and the Netherlands, Yamamoto received a coded message on December 2, 1941 reading, "Climb Mount Niitaka 1208" which meant that war would begin on December 8, 1941 following failed diplomacy.[113] The attack was ready to commence.

US War Preparations in the Pacific

Pacific Military Assets

Because of the geography of the Pacific, before and during the war, the US military had to develop a series of installations in the Pacific to provide supplies and staging areas for its forces. These bases ranged from full-scale bases and airfields like those constructed in Guam to small, temporary airfields on islands that were later abandoned when they were no longer needed. Appendix C provides a list of American military airfields in the Pacific during the war. Most of these bases were constructed by the Navy before the war under congressional emergency funding. The Navy contracted a large consortium of private contractors under a contract called the Contractors, Pacific Naval Air Bases contract (CPNAB). This contract was used to initially expand Ewa Field. The contract was awarded several years prior to hostilities to implement the military's strategic plan for primary and secondary support air bases across the Pacific. After the December 1941 Japanese attacks across the Pacific, however, it was deemed politically unacceptable for loss of civilian lives, like in the case of Wake Island, which was deemed really a military effort. To solve this problem the Navy formed Construction Battalions (CB) or Seabees and the US Army expanded their Corps of Engineers. Many of the same people who were

[111] United States Strategic Bombing Survey. *The Campaigns of the Pacific War.*, 15-16.
[112] United States Strategic Bombing Survey. *The Campaigns of the Pacific War.*,15-16.
[113] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 62.

previous employed as private contractors were trained to work under possible battlefield conditions and were used to form the initial nucleus of the Seabees and the Corps that were instrumental in continuing the construction forward on air bases needed in the Pacific to implement the military's offensive war plan, relying heavily on air support as a critical element.[114] Ewa Field was a strategic support base to this larger military war plan in the Pacific.

Territory of Hawaii (Oahu) Military Installations

Because of its natural port, the island of Oahu provided military planners with an excellent base for naval as well as aviation and land units. After the establishment of Pearl Harbor in 1912, the US military developed other bases in Oahu, including Scholfield Barracks in the 1920s to house US Army units on the island as a means to project its power into the Pacific. While these bases were originally small in comparison to bases in the continental United States, they would serve as the nucleus of America's war effort in the Pacific.

Construction of Military Installations within Battlefield of Ewa Plain, 1941

Naval construction projects in Hawaii and the American islands of the Pacific, was conducted by Contractors Pacific Naval Air Bases (CPNAB) and was part of "the most stupendous building program ever undertaken in history."[115] Seeing the large scale of the construction work the Navy needed in the Pacific, and knowing that no one company was capable of it, a consortium of three construction companies, each a specialist in its own field, combined to design and construct defense installations in the Pacific Ocean area, including the islands of Hawaii, Wake, Johnston, and Midway. CPNAB's cost-plus-a-fixed fee contract, NOy-4173, began with a capacity of $31 million and expanded to over $200 million.[116] Because of the size of the projects, CPNAB subcontracted with the renowned industrial architectural firm Albert Kahn Associates to design facilities and in the case of Ewa Field local design fell to the 14th Naval District Design Division under noted Architect named Van Oort, and Morrison-Knudsen Construction Company was brought in, which constructed the Hoover Dam, as contractor.[117]

CPNAB officials described the initial layout of the airfield:

> The site-plan layout (by the Design Section of the Public Works Department, 14th Naval District) was determined by the existence on the site of the Ewa mooring mast and the small emergency landing field. From this field the main runway was developed, in the direction of the prevailing northeasterly trade winds. The first building areas were developed adjacent to this and the first cross runway.[118]

Even with the new base, US military leaders in Hawaii did not feel they had enough assets to defend Pearl Harbor. In May 1941 Admiral Husband E. Kimmel, Commander, Pacific Fleet, wrote the Chief of Naval Operations:

> The defense of the Fleet base at Pearl Harbor is a matter of considerable concern. We should continue to bring pressure to bear on the Army to get more anti-aircraft guns, airplanes, and RADAR equipment to Hawaii and to insure [sic] priority for this over Continental and expanding Army needs. The naval forces available to Commandant are meager to the point of nonexistence. A Fleet base is a place of rest, recreation, and resustenance and must afford protection of the Fleet at anchor and during entrance and

[114] Hule, Can Do!: The Story of the Seabees, Bluejacket Books, 1944.
[115] Anthony, *Hawaii Under Army Rule* (Honolulu: University of Hawaii Press, 1975), 3.
[116] Anthony, *Hawaii Under Army Rule*, 3; Bureau of Yards and Docks, *Building the Navy's Bases in World War II, Volume 2*, 121.
[117] Steve Spiller, "An Island Worth Defending," presentation to the Redlands Fortnightly Meeting, #1748, electronic document, http://www.redlandsfortnightly.org/papers/spiller07.html.
[118] Contractors Pacific Naval Air Bases n.d.: A-978 quoted in Ann K. Yoklavich, Historic American Buildings Survey Naval Air Station Barbers Point, Marine Corps Air Station Ewa HABS No. HI-279, p. 8.

> egress independent of the units of the Fleet. If units of a fleet must be employed for its own defense, in its base, its freedom of action for offensive operations is seriously curtailed possibly to the point where it is tied to the base by the necessities for defense of that base.[119]

While the admirals continued to debate the size of the defense force in the islands, the marines arrived at their new base. In January 1941, the Second Marine Aircraft Group, minus a rear echelon, sailed from San Diego for Hawaii. Lt. Col. Lewis Merritt's unit was quartered at Pearl Harbor, but a construction detail began on a work camp at Ewa. Major Ivan Miller was in charge of the work camp. The marines completed the landing mat at Ewa on January 24, 1941, and it was used for carrier landing practice.[120] Also in January, the marines opened a Post Exchange at Ewa. The next month, they constructed a 12-hole, box-type latrine and a sawmill to help with the much needed tent poles. Soon they had constructed rows of pyramidal tents "back to back separated by a space of three feet and facing a company street 21 ft wide (Figure 25)."[121] The marines also erected 59 walled tents for junior officers, hospital tents for field officers, and various size tents for storage, maintenance, and flight operations.[122]

The Second Marine Aircraft Group's aircraft arrived from Ford Island on February 3, 1941, and the rest of the personnel arrived by February 13th, the same night the mooring mast caught on fire, but did not cause much damage to the structure.[123] The airfield grew in February with construction of a water tower, mess hall and a parachute loft with 23-ft-tall drying tower. To beautify the camp, the marines used the native white coral and flowers and plants. The newly created base even had its own camp nursery and local gardens.[124] While working on the new area, Merritt stated that "some operational difficulties [at the field, including] the warming-up platform inadequate in as much as it is a thin oil coat over dust and can be practically washed away by gasoline."[125]

Although the newly constructed airfield was away from the other bases near Pearl Harbor, it was far from isolated. The Oahu Railway ran buses from the guard tent to town. There was also work-related traffic to NAS Pearl Harbor.[126] In regard to other recreation, the marines had a boxing ring at the field, and manager of the Ewa Plantation invited the men to the plantation's chapel for Sunday services until a naval chaplain was assigned to the field.[127]

Through the spring, the new airfield continued to expand. By May 7, 1941, a new era of permanence arrived at the base when a general order forbade the erection of any tent or other structure.[128] To assist in the construction of the runways, the Navy constructed an asphalt hot-mix plant with a 4,000-pound batch capacity at Barbers Point. The plant would supply 1,650,000 square yards of paving for the Ewa runways' expansion, and for all the roads, sidewalks, and parking areas in the southwestern portion of Oahu.[129] The grading of the new runway extension and new cross-runway at Ewa were completed by the spring of 1941; and in June 1941, the runways were paved and attention turned towards construction of facilities for personnel (Figure 26). The plan was to use the Ewa runways only until the Barbers Point air station was completed. Clearing for the Barbers Point runways and some paving was evident on

[119] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 86.
[120] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1944, (1944)*, 14-16.
[121] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1944, (1944)*, 19.
[122] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1944, (1944)*, 19-20.
[123] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1944, (1944)*, 20.
[124] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1944, (1944)*, 22.
[125] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1944, (1944)*, 16, 18.
[126] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1944, (1944)*, 24.
[127] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1944, (1944)*, 24-26.
[128] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1944, (1944)*, 29.
[129] Bureau of Yards and Docks, *Building the Navy's Bases in World War II, Volume 2*, 140.

December 7, 1941, but no other work had been started on this new station. In early 1942 it was decided to make Ewa a separate station; and in September 1942 it was established as Marine Corps Air Station Ewa[130] (see Figure 11).

Work begin in July on the construction of two barracks to house a total of 3,000 men, a bachelor officers' quarters to house 100 men, a storehouse, shops, a dispensary, mess facilities, and an operations building. Two additional runways were outlined at this time, along with the construction of a 300 by 950-foot warm-up platform, and the relocation of one hangar from Ford Island to Ewa.[131]

During the new construction, the Second Marine Aircraft group was designated the Marine Aircraft Group Twenty-One, but still retained the same mission: "building up an airfield and giving, at the same time, as much tactical and technical training as possible to all hands."[132]

In August 1941, the Navy authorized the expansion of the east-west runway (11-29) by 500 feet, the construction of a warming-up pad, a new hangar, underground gasoline storage, recreation building, and 2,000-foot spur line from the Oahu Railway.[133] The first hangar at MCAS Ewa, was an old metal hangar first used at Wheeler Field, then "moved from Luke Field, Ford Island, and re-erected at Ewa."[134] Historian Ann K. Yoklavich argued that the "re-use of an existing structure indicates that at this station 'the chief criterion was emergency construction of the cheapest and quickest sort.'"[135]

However, those initial plans were quickly changed to meet the growing needs of the US military. On October 15, 1941, foundations were laid at MCAS Ewa for nine 128 ft by 28-ft wooden barracks, while six were nearly complete. By the end of October, 700 enlisted men vacated their canvas tents and moved into nine barracks. The frames of the tents were cleared away for the construction of five additional barracks[136]. On November 29, 1941, the officers left their tents and moved into newly constructed bachelor officers' quarters. Hot water was installed in all showers by the end of November, while a night urinal building was still under construction.[137]

Headquarters, SS-21, VMSB-232, the rear echelon of VMF-211, and VMJ-252 were the only squadrons on Ewa at the time of the Japanese attack. On November 28, 1941, the forward echelon of VMF-211 under the command of Major Paul A. Putnam departed from Ewa Mooring Mast for Ford Island where they joined the U.S.S. Enterprise Carrier Group. On December 4, 1941 they launched from the carrier and landed on Wake Island. At the same time, 18 SB2U-3's of VMSB-231 under the command of Major C.J. Chappell, Jr. were aboard the U.S.S. Lexington with orders to do a fly-off of marine aircraft to Midway. After the Japanese attacks, not knowing the location of the Japanese fleet, the aircraft carrier was withdrawn and the on-board aircraft were ordered to return to Ewa on December 10, 1941. This order assumed there was a greater immediate need to protect Pearl Harbor and delivery to reinforce Midway could occur at a later safer time.

Major W.L.J. Bayler of Headquarters, SS-21 and 2nd Lt. R.J. Conderman of VMF-211, along with a group of 47 enlisted men, the majority of who were from the tactical squadrons on the Ewa

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130 *Star Bulletin quoted in* Ann K. Yoklavich, Historic American Buildings Survey Naval Air Station Barbers Point, Marine Corps Air Station Ewa HABS No. HI-279, p. 28.
131 Bureau of Yards and Docks, *Building the Navy's Bases in World War II, Volume 2*, 144.
132 Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1944, (1944)*, 33.
133 Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1944, (1944)*, 34-35.
134 Ann K. Yoklavich, Historic American Buildings Survey Naval Air Station Barbers Point, Marine Corps Air Station Ewa Hangar (Facility No. 1146) HABS No. HI-279-F, p. 1
135 Ann K. Yoklavich, Historic American Buildings Survey Naval Air Station Barbers Point, Marine Corps Air Station Ewa Hangar (Facility No. 1146) HABS No. HI-279-F, p. 1
136 Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1944, (1944)*, 39.
137 Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1944, (1944)*, 41.

station, were transported aboard the U.S.S. Wright on November 19, 1941 to Wake Island in order to establish a Base Radio Station for Air-Ground Communications. After Baylor completed this station he was transported to Midway to establish another Base Radio Station. Three enlisted men from Hq&SS-21 were assigned to each of these two stations as operators. Second Lt. L.D. Everton along with detachment of 60 enlisted men of VMSB-232 were transported to Midway on November 19, 1941 aboard the U.S.S. Wright. The VMF-221 squadron embarked on the U.S.S. Saratogo for Pearl Harbor on December 8, 1941, and arrived at Ewa on December 15, 1941.

By December 6, 1941, although still partially under construction, MCAS Ewa was a fully functioning temporary defensive airfield working in coordination with forward echelon Marine air units deployed to the outlying defensive bases at Wake and Midway. The marines had 48 remaining or rear echelon aircraft stationed at Ewa, most of them new SBD dive-bombers or F4F fighters (Table 3). These planes made up three squadrons of the 21st Marine Aircraft Group. The Ewa Field's ability to launch defensive aircraft and the possibly of retaliatory strikes represented a real threat to any attacker, and so the Japanese raiders marked the airfield for destruction.

Table 3
American Aircraft Present at Ewa Field, December 7, 1941.[138]

Aircraft Type	Number Present
SBD-2	3
SBD-I	20
F4F_3	10
SB2U-3	8
R3D.... 2	2
JO-2	1
J2F-4	2
JRS-1	1
SNJ	1
Total	48

Non-Military Installations within Ewa Plain Battlefield Area

In addition to the military construction at Ewa Field, the primary developments within Ewa Plain were associated with the Ewa Plantation. The HABS documentation of the plantation described the industrial center of the plantation during the 1930s as:

> In the late 1930s and the 1940s new industrial buildings were all built along or near the dirt road that ran from Renton Road to the Ewa train depot along the OR&L Co. line. Six buildings and a lumber rack were built abutting the right-of-way of the dirt road. Five buildings had their gable ends facing the road, and one was oriented at 90 degrees from the others, with its longer side along the road. Two small buildings were built circa 1939 immediately behind these buildings, and by 1948 a larger storage building and adjacent small electrical building had been erected, farther west than the two 1939 buildings.[139]

In addition to the industrial center, the Plantation contained a mill village located north of Ewa Field.

Additionally, the U.S. Coast Guard operated a lighthouse at Barber's Point to aid navigation around the Southern shore of Oahu to Pearl Harbor. The original lighthouse was established in 1888; however, a new 72-foot tower was constructed in 1933 and the old coral lighthouse was

[138] Hollingshead, "The Japanese Attack of 7 Dec. 1941 on the Marine Corps Air Station, Ewa, Oahu, Territory of Hawaii" (mimeographed monograph prepared by the Historical Division of the Marine Corps), (1946), 5-6.
[139] Mason Architects, Ewa Plantation Company, Industrial Center HABS- No. HI-384, p.4

removed to its foundation that same year. During the attack on December 7, 1941, John M. Sweeney, the U.S. Coast Guard Station Keeper at Barbers Point Light Station, stated he saw Japanese and American planes flying overhead as well as parachutists landing near the light. This was thought to be the crew of a Japanese dive bomber damaged during the attack but more likely what was observed from afar were the USS Enterprise aviators parachuting in the area. Sweeney was warned not to go outside by Army defenders of the 55th or 251st during the attack. After the battle, the Army reinforced its defensive positions around the lighthouse including additional machine gun emplacements.[140]

Roles of Army and Navy in Oahu/Hawaii

General George Marshall, Chief of Staff of the Army, informed Lt. Gen. Walter C. Short that the primary goal of the US military in Hawaii was the protection of the fleet, and that the Army should work with the Navy to ensure the protection of the fleet and its facilities. Soon after Short's arrival, Major General Frederick L. Martin and Rear Admiral Patrick Bellinger prepared the Martin-Bellinger Report that described the Japanese threat to Hawaii.[141] They predicted:

(a) A declaration of war might be preceded by:

1. A surprise submarine attack on ships in the operating area;
2. A surprise attack on Oahu including ships and installations in Pearl Harbor; or
3. A combination of these two.

(b) It appears that the most likely and dangerous form of attack on Oahu would be an air attack. It is believed that at present such an attack would most likely be launched from one or more carriers, which would probably approach inside of three hundred miles.

(c) In a dawn air attack there is a high probability that it could be delivered as a complete surprise in spite of any patrols we might be using and that it might find us in a condition of readiness under which pursuit would be slow to start.[142]

To counter the Japanese threat, Short and Bloch published the Joint Coastal Frontier Defense Plan (JCFDP) on April 11, 1941. The JCFDP was a comprehensive plan for the defense of Hawaii by the Army and Navy. The plan detailed the task of holding Oahu as a main outlying naval base, while also controlling and protecting shipping in the Coastal Zone. The plan provided the two military branches with a plan for the defense of Pearl Harbor and other installations in Hawaii; however, the plan was flawed in two ways – its success depended upon good intelligence and advanced notice of an attack.[143]

As part of the JCFDP, the Army established the Advanced Warning System; composed of air-warning centers, radar stations, and observation posts. Six SCR-270 mobile radar station and three SCR-271 fixed radar sites were established by December 1941. The system was tested on November 12, 1941 when the Navy launched aircraft from a carrier 80 miles from Oahu and they were seen by radar. A mock counterattack was launched within six minutes, confronting the "enemy" 30 miles from Oahu.[144]

On July 26, 1941, military forces on Hawaii including marines at Ewa Field, participated in a field exercise conducted under the joint supervision of Lt. Gen. Walter C. Short and Admiral Husband E. Kimmel. A message was sent to Ewa Field that two (hypothetical) enemy battalions landed at Kahuku (the northern tip of Oahu). The drill practiced five different types of communications:

[140] Barbers Point Light, electronic document, http://www.uscg.mil/history/weblighthouses/LHHI.asp.
[141] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 88.
[142] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 89.
[143] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 90.
[144] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 92.

teletype, radio, telephone, observation plane, and motorcycle. The teletype message arrived two minutes before the radio message and three minutes earlier than the telephone message. The observation plane message and motorcycle messages arrived later. As part of the exercise, a squadron from Ewa Field and a squadron from Ford Island practiced dive bombing the enemy and then left the 21st Infantry to practice eliminating any remaining enemy forces at the beach. Then, both airplane squadrons simulated an attack on Pearl Harbor to give air raid defenses practice. These two squadrons also practiced strafing front-line infantry and local reserves, as well as dive bombing some artillery positions. Both Lt. Gen. Short and Admiral Kimmel considered the field exercise a success.

Furthermore, both the Army and Navy had numerical alert systems that ranged from one to three. Within the Army's system, (1) indicated a minor alert, while (3) indicated a major alert. The numerical system was opposite for the Navy with (1) indicating a major alert and (3) indicating a minor alert. This numerical difference would cause communication problems during December 1941.[145]

Battle of Ewa Plain, December 7, 1941

Introduction

On the morning of December 7, 1941, two military forces were hours away from a dramatic battle; however, only one side was prepared for the fight. The Japanese Armada was steaming to within striking range of the American bases. The Japanese reported the weather at 0530 on December 7, 1941 to consist of winds coming at 14 meters from the east, with a ceiling of 1,700 meters and 70 percent cover.[146]

The weather would be acceptable for the attack. The Japanese also had the element of surprise since they knew that most military personnel were off duty on Sunday. As the carriers began to launch their aircraft, the Japanese military set in motion an attack that would result in the United States entering World War II and ultimately tipping the scale of the war towards the Allies.

Midnight to 7:40 AM Hawaii Time

IJN at Sea

In the early morning of December 7, 1941, the Japanese forces were poised to strike. At 0530, Japanese cruisers Tone and Chickuma from the 1st Air Fleet launched the first seaplanes 230 miles from Oahu to scout the area. The first reconnaissance plane, flying at a high altitude, reported nine battleships, a heavy cruiser, and six light cruisers in the harbor. Its pilot also provided a favorable weather report of the area.[147] The other plane surveyed the Lahaina Bay anchorage, where the Pacific Fleet sometimes anchored, and found no Fleet ships were anchored. The Japanese plan would need no revision. Thirty minutes later, the first wave of Japanese airplanes was launched consisting of 183 planes, which included high-level bombers, dive bombers, torpedo bombers, and fighters. The fleet continued sailing south, as the second wave aircrafts were brought up for launch. The second wave launched at 0715 and consisted of 167 aircraft (Figure 27). Japanese submarines off the southern shore of Oahu launched five midget submarines through the patrolling U.S. ships at watch. The Coast Guard Cutter USS Tiger was the sentry ship stationed that morning just off shore of Ewa Field and Barbers Point and responded to usual activity on their recently installed sonar prior to the air attack

[145] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 94.
[146] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 99.
[147] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America99.

Japanese submarines off the southern shore of Oahu launched five midget submarines through the patrolling U.S. ships at watch. The Coast Guard Cutter USS Tiger was the sentry ship stationed that morning just off shore of Ewa Field and Barbers Point and responded to usual activity on their recently installed sonar prior to the air attack.

IJN Attack Plan

The Japanese air attack was organized with three waves each composed of three air groups (Figures 28, 29, and 30). They also maintained a combat air patrol as well as six reconnaissance flights by ship-based seaplanes (Table 4).

Table 4
Reconnaissance Aircraft Used by the Japanese During December 7, 1941 attacks. [148]

Type Aircraft	Number of Aircraft	Ships	Mission
Type Zero recon seaplane	1	*Tone* and *Chikuma*	Reconnaissance of Pearl Harbor and Lahaina anchorage just before attack
Type 91 recon seaplane	4	*Hiei* and *Kirishima*	Patrol waters around Oahu during attack.

Appendix D lists the objectives of the Japanese attack plan, including targets at Ewa Field.

The two waves of attacking aircraft contained three types of planes:

+ The fighter aircraft were Mitsubishi A6M;
+ The dive bomber aircraft were Aichi D3A; and
+ The level bomber aircraft were Nakajima B5N.

Each aircraft type was tasked with certain missions based on their armament. For example, fighters were tasked with protecting the level and dive bombers by engaging any US aircraft that would become airborne to challenge them (air control) and also strafing parked aircraft. The dive bombers attacked ground targets at Pearl Harbor (Ford Island) and Wheeler Field as well as ships in the harbor. The level bombers attacked capital ships in the harbor and also land targets at Ford Island, Hickam Field, Ewa Field, and Kaneohe.[149]

Most of the aircraft that attacked Ewa came from the Japanese aircraft carriers, Hiryu, and Kaga (Figure 31). Appendices E and F provide information on the two carriers and three types of aircraft used in the attack on Ewa Field.

Ewa Field

At Ewa Field, most of the marines were either still asleep or had already arose for their daily tasks. Marines were entering the chow hall while others were planning what they were going to do on Sunday, their day of rest.

Enterprise and its Planes

At 0615, 18 planes from the U.S.S. Enterprises' Scouting Squadron Six (VS-6) and Bombing Squadron Six (VB-6) took off 215 miles west of Oahu with a mission to search a sector 058°-095° and then head to the Naval Air Station at Ford Island. None of the Enterprise's planes observed the Japanese fleet until the US planes arrived at Barber's Point at 0820.[150]

[148] United States Strategic Bombing Survey. *The Campaigns of the Pacific War.*, 13-14.
[149] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 43.
[150] Commander, Enterprise Air Group, Report of Action with Japanese Air Force at Oahu, T.K., December 7, 1941. Dated December 15, 1941.

B-17 Planes coming from California

To bolster US forces in the Philippines, the War Department had ordered eight B-17 aircraft of the 38th Reconnaissance Squadron (Heavy) and eight B-17s from the 88th Reconnaissance Squadron (Heavy) to fly from Hamilton Field, California to the Philippines. On December 6, 1941, 12 of the planes began the first leg from California to Hawaii. After a long trip, the B-17s arrived at Hickam Field at 0745 and spotted Japanese aircraft in the Ewa Field and Pearl Harbor area. The Japanese attacked the formation and destroyed two B-17s.[151] Figures 32 and 33 depict IJN aircraft taken by Lee Embree, a B-17 crew member.

Ships in Pearl Harbor (and Carriers not at Pearl Harbor)

As the Japanese forces approached Pearl Harbor, the bulk of the American Pacific Fleet was in the harbor (Appendix G). Absent were three Pacific Fleet aircraft carriers: U.S.S. Enterprise (CV-6), U.S.S. Lexington (CV-2), and U.S.S. Saratoga (CV-3). The U.S.S. Enterprise, along with the heavy cruisers Northampton (CA-26), Chester (CA-27), and Salt Lake City (CA-24) and nine destroyers were ferrying the 12 Grumman F4F-3 Wildcats of Marine Fighting Squadron (VMF) 211 to Wake Island. On December 7, 1941, the Enterprise and its group was 215 miles west of Oahu. The U.S.S. Lexington supported by heavy cruisers Chicago (CA-29), Portland (CA-33), and Astoria (CA-34), and five destroyers were approximately 500 miles southeast of Midway on the mission to ferry 18 Vought SB2U-3 Vindicators of Marine Scout Bombing Squadron 231 to Midway Island. Finally, the Saratoga, was at NAS San Diego [North Island] preparing for the trip to Pearl Harbor.[152] The marines and aircraft enroute from Marine Corps Air Station Ewa to other Pacific military installations survived the December 7th attack on Oahu to contribute elsewhere in the war efforts.

Radar Sites

By December 1941, the US Army operated six SCR-270 mobile radar stations, and three SCR-271 fixed radar sites lacking equipment. These radar and operations posts were connected by telephone to the Air Warning Center at Fort Shafter. Radar operators for these sites were sent aboard Navy vessels in order to learn how to operate the equipment, and to maximize its full potential. The Hawaiian Department created the Interceptor Command to enhance radar potential. Commanded by BG Howard C. Davidson, Commander of the 14th Pursuit Wing, the Interceptor Command was most associated with determining if an aircraft was either a friend or enemy.[153]

At the Opana Radar Station, Private Joseph Lockard had been instructing Private George Elliot on operating the radar. When the two learned that their transportation would be late, Lockard decided to keep the station operating to continue training. At 0702 Elliot observed a large formation of airplanes approaching Oahu from the north (the first Japanese attack wave). They called the command post at Shafter who informed them it was the B-17s coming in from the states. Elliott and Lockard continued to track the Japanese until 0739 when they shut down the radar. The warning never reached the Navy.[154]

Meanwhile, USS Ward (DD-139)[155] under the command of LCDR William W. Outerbridge, fired the first American shot in World War II, when she engaged and sank a Japanese submarine at about 06:45 AM off the Ewa shore near the entrance to Pearl harbor. A dispatch by voice transmission

[151] McKillop, "The B-17 Flight," Electronic document, http://homepage.ntlworld.com/andrew.etherington/articles/level1/pearl_harbor_the_b17_flight.htm.
[152] "Pearl Harbor Attacks, 7 December 1941 Carrier Locations," Electronic document http://www.history.navy.mil/faqs/faq66-9.htm.
[153] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 91-92
[154] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 97-98.
[155] http://www.history.navy.mil/docs/wwii/pearl/ph97.htm

was sent to Commandant, Fourteenth Naval District at 0645 which stated: "We have attacked, fired upon, and dropped depth charges on a submarine operating in defensive sea areas." [156]

7:40 to 10:00AM Hawaii Time

Air – Ground Assault

First Wave, 0740

The first wave attack on military bases in Hawaii had two missions. First, Japanese fighters would strafe and destroy American planes on the ground and in the air at major airfields. Fighters would also protect the slower dive bombers and torpedo aircraft that were tasked with attacking the battleships and other ships in the harbor. The general order stated that fighters of the first wave would first acquire air superiority by destroying any American aircraft in the sky, then "In the event that no enemy aircraft are encountered in the air, the units will immediately shift to the strafing of parked aircraft"[157] (Figure 34).

During an interview in 1950, Jinichi Goto, who led the second group of torpedo planes from the Akagi Carrier during the first attack wave stated:

> "Just as they passed over Barbers Point the altitude of Goto's plane was slightly under 500 meters; he [Goto] could see the parked planes clearly in the sunlight [at Ewa Mooring Mast Field]: there were no signs of activity on the ground. Goto thought that the Americans were perhaps still at Sunday morning breakfast."[158] (Bracketed information added.)

Goto was correct; some of the marines were still in the mess halls having breakfast. The aerial attack on Ewa Field preceded the attack at Pearl Harbor by about two minutes because of the location of the base near Oahu's south shore. At 0740, the Mitsubishi A6M Zeke single-seater fighter planes under Fuchida split into two formations at Kahuku Point. No less than 43 Zekes (later called Zeros) headed to Wheeler field, 11 headed to NAS Kaneohe, and the 18 remaining fighters headed to Ewa.[159]

The first aircraft sighting reported by John Hughes was observed from outside the front door of his barracks. His barracks was the first barracks across the road from the recreation hall. As he looked north he observed a low flying torpedo bomber with the striking red emblem as it flashed between trees as he looked out the main gate of the base toward the cane fields north of Verona Village.

At 7:53 a.m. (or 7:55 am) Ewa's officer of the day, Captain Leonard Ashwell, looked up from the mess hall and saw a line of 18 Japanese torpedo planes at an altitude of approximately 1,000 ft, heading for Pearl Harbor. The aircraft were south of Ewa and Barbers Point traveling up the beach towards the Pearl Harbor Naval Base.[160] It was then Ashwell saw the second formation of Japanese aircraft coming from the hills in the direction of Nanakuli to the northwest. The formation (single-seated fighters) passed just to the north of Ewa, wheeled right and attacked this camp (Ewa Mooring Mast Field) from a string formation."[161] Ashwell turned back into the

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[156] Gudmens, Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America, 97-98.
[157] Military History Section, Headquarters Army Forces Far East, *Pearl Harbor Operations: General Outline of Orders and Plans, Japanese Monograph No. 97*, 13
[158] Prange, Interview notes for Jinichi Goto, interviewed 17 January 1950.
[159] McWilliams, *Sunday in Hell: Pearl Harbor, Minute by Minute* (New York: E-Reads, 2011).
[160] Hollingshead, *The Japanese Attack of 7 December 1941 on The Marine Corps Air Station at Ewa, Oahu, Territory of Hawaii*, (1946), 6.
[161] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1945*, (1944), 45.

mess, shouting: "Air Raid... Air Raid! Pass the word!" before heading to the guardhouse, to have "call to arms" sounded.[162] At 0755, Ewa's bugler sounded "Assembly the Colors."[163]

The Japanese formation was composed of two squadrons of Mitsubishi A6M Zeke single-seater fighter planes for machine-gun strafing of aircraft and hangars.[164] Lieutenant Commander Shigeru Itaya led the Carrier Akagi's nine Zekes (Zeros) and Lieutenant Yoshio Shiga headed another division of nine Zekes from the Carrier Kaga.[165] The fighter aircraft descended from 1000 feet to within 20 to 25 feet of the ground, attacking the parked planes on the ground with short bursts of gunfire.[166] Twenty-one Zekes made repeated passes at Ewa's parked aircraft, firing one after the other until a good half had been destroyed or seriously damaged. Gas spilled from the tanks and soon the area flamed with blazing puddles.[167] The fighters used incendiary, explosive and armor piercing bullets from their 7.7mm and 20 mm machine guns.[168] Itaya's group probably carried out only one pass at Ewa before moving on to the Army Air Forces' Hickam Field, the headquarters of the Hawaiian Air Force's 18th Bombardment Wing[169] (see Figure 30).

Japanese fighters were tasked with preventing American planes from becoming airborne during the attack. Fortunately, the Japanese fliers on their first strike at Ewa Field concentrated their fire on tactical planes first (rather the personnel and facilities), according to the CO of MAG-21, who reported that "Enemy airplanes approached as low as 20 to 25 feet over the ground, attacking single airplanes with short bursts of gunfire."[170] After such a foray, the Japanese would "pull up over the tree tops, reverse their course, and attack from the opposite direction."[171] After the tactical planes were struck, the Japanese turned their attention to any other aircraft and the marines. Although some Ewa pilots hoped to get airborne, most aircraft were either afire or riddled beyond any hope of immediate use.[172]

It was apparent to the Ewa Marines that the primary mission of the Japanese first wave attack was the destruction of all aircraft lined up on the northwest portion of the apron/runway. It was standard operating procedure for the aircraft to be parked close together on the runways and ramps to protect them from sabotage, which was seen as a bigger threat than an aerial assault. They were also lined up for an inspection that occurred on December 6, 1941. Unfortunately, this expedited the destruction of almost all of the American planes (at Ewa) on the ground by Japanese pilots. Marine Corps Historian Billie Hollingshead argued that:

> So precise and well executed were the individual attacks that it appears as though each plane previously had selected its particular target; and aimed at the wings of the aircraft on the ground with the purpose of riddling them, and setting fire to the gas tanks, in order to render them useless for pursuit and interception.[173]

Lt. Col. Claude Larkin, USMC, commander of the base, stated that the Japanese aircraft formations were about one to two miles apart, which would indicate there were several smaller

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[162] McKillop, "U.S. Marine Corps Aviation In Hawaii," Electronic document, http://homepage.ntlworld.com/andrew.etherington/articles/level1/pearl_harbor_us_marine_corps_aviation_in_hawaii.htm
[163] McWilliams, *Sunday in Hell: Pearl Harbor Minute by Minute, 2011.*
[164] The number of aircraft in this wave is reported as 19 or 21.
[165] McKillop, "U.S. Marine Corps Aviation In Hawaii,"
[166] Some accounts state it was the northwest which is more keeping with the maps of the attack.
[167] Prange, *At Dawn We Slept: The Untold Story of Pearl Harbor* (1981), 524.
[168] Hollingshead, The Japanese Attack of 7 December 1941 on The Marine Corps Air Station at Ewa, Oahu, Territory of Hawaii, (1946), 9.
[169] McKillop, "U.S. Marine Corps Aviation In Hawaii"
[170] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1945*, (1944), 46.
[171] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1945*, (1944), 46.
[172] Creasman and Wenger, *Infamous Day: Marines of Pearl Harbor, 7 December 1941.* Marines in World War II Commemorative Series, (1992), p. 17.
[173] Hollingshead, *The Japanese Attack of 7 December 1941 on The Marine Corps Air Station at Ewa, Oahu, Territory of Hawaii,* (1946), 8.

waves within the larger attack.[174] Lt. Col. Larkin commented that marine aircraft were "parked around the perimeter of the landing areas" and unlike other bases in the area they were not anchored down.[175] It appears that the Japanese planes made eight passes over Ewa Field during the First Wave[176] (Figures 35, 36, and 37).

At 0825, Lieutenant C.E. Dickinson, USN (Pilot of 6-S-4) was approaching Barbers Point from the south at 1500 feet altitude when he noticed numerous shell splashes in the water by the entrance to Pearl Harbor. "I then looked for the source" he stated in an after action report "I saw numerous anti-aircraft bursts above Pearl Harbor. Ewa Field was on fire sending up dense smoke as high as 5000 feet above Barbers Point" [177] (Figure 38).

Records indicate that Japanese aircraft flew over the treetops (probably on the east side of the base), and reversed their course, attacking from the opposite direction.[178] Based on the size of the base and turning radius of the aircraft, it can be assumed they did not venture that far east of the base.[179] The Japanese war planners feared the American aircraft and wanted to ensure that their forces had achieved air superiority before the next wave. The first wave only lasted 10 to 15 minutes, and Larkin commented that after the initial destruction, the attack "concentrated on personnel, VJ types, and aircraft that were obviously out for repairs."[180]

Not everyone at Ewa understood at first the base was under attack. Technical Sergeant Henry H. Anglin, the noncommissioned-officer-in-charge of the photographic section at Ewa was taking photos of his son when the attack happened. Anglin described the attack as "mingled noise of airplanes and machine guns." Anglin went outside to investigate and thought it was Army pilots showing off.[181] Later, Anglin was injured during the attack.

PFC Lewis D. Graham described the attack this way:

> Had just returned to barracks from Mess Hall as they started to raise the colors. Our barracks was located next to the guardhouse and a small group (three or four) of myself and comrades were watching the ceremony through the screened window. We observed a three plane formation flying low to the north and immediately noted the "Rising Sun emblem, and heard a short burst of gun fire - Then "All Hell Let Loose". The Bugler, (SGT. Sachs) after completing the Raising of Colors, began blowing Battle Stations, to which most of us had already responded. Having been issued rifles but no ammunition, a small group headed for Transportation, where a truck was obtained, loaded it with ammo from the nearby Ammo Dump and drove up and down the streets kicking it off to make available to any concentration of fellow marines. In a few short minutes Rifle Squads were formed and

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[174] United States. *Pearl Harbor Attack. Hearings Before the Joint Committee on the Investigation of the Pearl Harbor Attack, Congress of the United States, First Sessions : Pursuant to S. Con. Res. 27 (79th Congress) : a Concurrent Resolution Authorizing an Investigation of the Attack on Pearl Harbor on December 7, 1941, and Events and Circumstances Relating Thereto. Volume 23 (*Washington: U.S. G.P.O., 1946), 709.

[175] United States. *Pearl Harbor Attack. Hearings Before the Joint Committee on the Investigation of the Pearl Harbor Attack, Congress of the United States, First Sessions : Pursuant to S. Con. Res. 27 (79th Congress) : a Concurrent Resolution Authorizing an Investigation of the Attack on Pearl Harbor on December 7, 1941, and Events and Circumstances Relating Thereto. Volume 23.* 709.

[176] McWilliams, *Sunday in Hell: Pearl Harbor Minute by Minute*, 2011.

[177] http://www.cv6.org/ship/logs/ph/ced19411207.htm

[178] United States. *Pearl Harbor Attack. Hearings Before the Joint Committee on the Investigation of the Pearl Harbor Attack, Congress of the United States, First Sessions : Pursuant to S. Con. Res. 27 (79th Congress) : a Concurrent Resolution Authorizing an Investigation of the Attack on Pearl Harbor on December 7, 1941, and Events and Circumstances Relating Thereto. Volume 1*, 44; Claude Larkin, "Report of Action on December 7, 1941." After action report. Appendix L of document History of the Marine Corps Air Station Ewa, Oahu, T.H., 1941-1944. (December 30, 1941), 1.

[179] Military History Section, Headquarters Army Forces Far East, *Pearl Harbor Operations: General Outline of Orders and Plans, Japanese Monograph No. 97*, 13.

[180] Larkin, *Report of Action on December 7, 1941*, 1.

[181] McKillop, "U.S. Marine Corps Aviation In Hawaii,"

> defense was begun for what we feared would be an attempt to land troops by the enemy. The next several hours (or days) we built defenses (sand bag, machine gun emplacements, etc.).[182]
>
> Sgt. Maynard Hoffman described the attack this way:[183] Suddenly, an aircraft banked around a nearby flagpole, flying no more than 100 feet off the ground. Knowing that the front guard shack by the flagpole would have some ammunition they ran that way. Hoffmann said they were strafed on the way and he could hear the bullets flying by like "angry bees."[184]

There was an officer, Hoffmann stated in an interview, who had acquired a brand new station wagon. It was parked outside of the exchange tent, so a sergeant jumped into it, crossed the runway under fire, to get to an underground ammunition bunker (likely the same Karst bunker described in the Command history.) They rammed the doors so that they could get in and he and some other marines loaded the station wagon with ammunition and then he took off again across the runway under fire to reach the officer of the day post and unload the ammunition. And that is the only reason we had any ammunition.[185]

During the attack, marines used whatever weapons they had on hand, which was not much to defend the base. As soon as the first wave was over, marines who had already attempted to defend the base quickly fortified and attempted to conceal their positions with whatever materials they had and at the same time trying to salvage what they could of burning equipment and aircraft. Marines used Springfield Rifles, 30-caliber machine guns (taken from the armory) and damaged aircraft to set up new anti-aircraft positions; essentially any weapons at their disposal.

Private William O. Turner and Master Sergeant Emil S. Peters, removed the machine gun from the rear cockpit of a spare SBD-2 (7-86) parked behind the YMSB-232 tents. They used the machine gun from the rear cockpit of the plane as Turner loaded the gun by standing on the wing to fire at the attacking aircraft in the second wave. Both men were wounded; however, they managed to shoot down one of the Japanese aircraft. Unfortunately, Turner died from his wounds several days later at the Ewa Plantation Hospital.[186]

In addition to setting up firing positions, marines also drove trucks and other vehicles onto the runway to block it from possible airborne troops.[187] In the midst of the attack, the base fire truck appeared on the scene but was attacked immediately by enemy aircraft. After having his tires shot out, the driver abandoned the truck. When asked why he rushed into the runway, the driver said, "Hell, Lieutenant, I saw a fire, and I'm supposed to put 'em out."[188] Based on the location of planes, bullet marks near the edges of runways would be associated with aircraft; in the middle of the runways would probably be associated with trucks or other vehicles. Many of the pavement markings on the concrete warming up pad correspond to the locations of parked Ewa Field aircraft.

Not all marines were located at the base on the morning of December 7, 1941. Captain Richard Mangrum, a Marine aviator stationed at Ewa, was at his home at Ewa Beach, three miles southeast of the field when he saw Japanese aircraft. He commented that the Japanese strafed

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[182] National Park Service, *Survivor* Information from Questionnaire Sent to Known *Survivors* & Families

[183] http://www.kitsapsun.com/videos/detail/pearl-harbor-survivor-maynard-hoffmann/#axzz2vbbwg9uf ; http://pearlharborsurvivors.homestead.com/HoffmanMaynard.html

[184] http://www.kitsapsun.com/videos/detail/pearl-harbor-survivor-maynard-hoffman/#axzz2vbbw9uf

[185] http://www.kitsapsun.com/videos/detail/pearl-harbor-survivor-maynard-hoffmann/#axzz2vbbwg9uf ; http://pearlharborsurvivors.homestead.com/HoffmanMaynard.html

[186] Larkin, *Report of Action on December 7, 1941*, 1.

[187] Larkin, *Report of Action on December 7, 1941*, 1.

[188] McWilliams, *Sunday in Hell: Pearl Harbor, Minute by Minute*, 2011, 216.

the area and a small bomb exploded in the vicinity.[189] Based on the armament described and route of the aircraft, Mangrum was likely observing Japanese level bombers headed to Pearl Harbor, and not the aircraft that would attack Ewa. Another Ewa Beach resident and Ewa Marine, Master Technical Sergeant Charles Barker, witnessed strafing along the beach and a bomb dropped near their home.[190]

Base commander, Lt. Col. Claude Larkin, USMC, was at his home in Honolulu when the attack started. Larkin hopped in his 1930 Plymouth and drove to the base. The planes were strafing vehicles on the roads and Larkin was forced to abandon his car and take cover in a ditch about one-mile from base before resuming his drive to the base. Larkin's car was strafed again as he approached the base. Shortly afterward, Larkin was wounded; his injuries included a wound to a finger and his lower left leg.[191]

Lieutenant Yoshio Shiga, leader of the 1st wave fighter unit from the aircraft carrier Kaga stated:

> "At Barbers Point [Ewa Mooring Mast Field] AA counterattack fires were not so fierce: I strafed those parking planes with 7.7 mm guns with pretty ease. I noticed a gallant soldier on the ground attempting to fire us with his pistol, to whom I paid a good respect."[192]

Second Wave, 0835

While the Ewa marines were trying to strengthen their defenses, the second wave occurred approximately 10 to 15 minutes after the first wave (see Figure 34). The tactics and aircraft of the second wave differed greatly from the first wave. It appears that Japanese aircraft had already conducted a dive bomb attack and Ewa Field was their secondary target. There were reported attacks by dive bombers that had missed their targets at Pearl Harbor during the second wave due to the heavy smoke blocking their primary targets according to historian John De Virgilio.[193]

One example is the USS Pyro a munitions ship moored at West Loch's Whiskey Wharf, east of the Ewa Plantation. The ordinance ship was bombed and strafed by a dive bomber whose bomb just missed the ship and pierced the deck of Whiskey Wharf and exploded underneath, causing damage to the ship. The ship was also strafed on three other occasions by planes heading west towards Ewa Field with one circling and strafing the ship a second time from stem to stern (PH Survivor's Report). Captain J.S. Dowell reported that at West Loch "at 0850, enemy planes were observed leaving Pearl Harbor evidently en route to Ewa Mooring Mast, passing close to West Loch. Planes observed were approximately 60 to 70 in number."[194] That would indicate the planes were heading east to west towards Ewa. It appears the primary mission of the second wave was to bomb Wheeler Field; their secondary mission was to strafe and attack targets of opportunity at Ewa Field and adjacent plantations. Like the first wave, the Japanese were interested in destroying American aircraft. However, since the first wave had destroyed all of the aircraft at Ewa, the Japanese proceeded to and strafe any personnel, vehicles, or buildings[195] (Figures 35, 36, and 37).

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189 Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1945*, (1944), 45.
190 McKillop, "U.S. MARINE CORPS AVIATION IN HAWAII,"
191 McKillop, "U.S. Marine Corps Aviation In Hawaii,"
192 Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1945*, (1944), 45.
193 De Virgilio, "Seven Seconds to Infamy," U.S. Naval Institute Proceedings, December, 1997.
194 United States. *Pearl Harbor Attack. Hearings Before the Joint Committee on the Investigation of the Pearl Harbor Attack, Congress of the United States, First Sessions : Pursuant to S. Con. Res. 27 (79th Congress) : a Concurrent Resolution Authorizing an Investigation of the Attack on Pearl Harbor on December 7, 1941, and Events and Circumstances Relating Thereto Vol.* 37, 1269.
195 Hollingshead, *The Japanese Attack of 7 December 1941 on The Marine Corps Air Station at Ewa, Oahu, Territory of Hawaii*, (1946), 10; Larkin, *Report of Action on December 7, 1941*, 2.

Unlike the fighters used in the first wave, the 14 Japanese aircraft in the second wave were two-seater dive bombers (Aichi D3A, code named Val). Eight planes belonged to the 3rd Combat Unit under Lt Masaharu Suganami and six from the 4th Combat Unit under Lt Kiyokuma Okajima.[196] Larkin comments that the Japanese would first fire their front guns as they flew from east to west, and "then pull up into a steep wing-over and the free gunner [rear gunner] would open fire on personnel firing at them."[197] (Note: Bracketed information added.) Since there were not that many targets left on the runway, the aircraft were most likely attacking targets north of the runway in the camp section, along the road leading out of the base, as well as the railroad or village[198] (see Figure 37).

Unlike the first wave, any observed craters would likely come from the second wave. Furthermore, records indicate that the only anti-aircraft fire the marines had at Ewa was small arms. Several of the plantations (around the base) indicated that fires had started from anti-aircraft shells; these likely would have originated from locations other than Ewa Field.

Ewa marine, Albert Grassell recounted how Captain Zack Tyler used a Thompson submachine gun in an attempt to bring down Japanese planes. Grassell and Sergeant Fred Hauser set up a .30-caliber machine gun in a lava (karst) approximately 100 yards south of Ewa Field, and remained in their defensive position for three days (Albert Grassell personal communications, 2013).[199] Karst sinkholes, which were all around the base perimeter, made very good, ready-made foxholes. John Hughes also stated he was ordered to set up a machine gun position west of the barracks near the rail spur where he remained for three days. Digging holes with shovels would have been extremely difficult in the solid, rock like coral limestone.

Marines could not defend the base while under the cover of buildings because of the limited visibility. One location that provided visibility and which afforded some protection was the swimming pool (under construction). Many marines used the wooden framework (for the concrete pour) for protection while also having a view of the sky in all directions. One of the few photographs of the battle action shows several marines poised with rifles along the pool's wooden formwork (see Figure 17).

Another marine who distinguished himself during the third strafing attack was Sergeant Carlo A. Micheletto of Marine Utility Squadron (VMJ) 252. During the first Japanese attack that morning, Micheletto proceeded at once to VMJ-252's parking area and went to work, helping in the attempts to extinguish the fires that had broken out amongst the squadron's parked utility planes. He continued in those labors until the last strafing attack began. Putting aside his fire-fighting equipment and grabbing a rifle, he took cover behind a small pile of lumber, and heedless of the heavy machine-gunning, continued to fire at the attacking planes until a burst of enemy fire struck and killed him instantly.[200]

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196 McWilliams, *Sunday in Hell: Pearl Harbor Minute by Minute.*

197 Larkin, *Report of Action on December 7, 1941*, 2.

198 Hollingshead, *The Japanese Attack of 7 December 1941 on The Marine Corps Air Station at Ewa, Oahu, Territory of Hawaii*, (1946), 10; Larkin, *Report of Action on December 7, 1941*, 2.

199 Albert Grassell telephone interview conducted June 11, 2013.

200 Robert Cressman and J. Michael Wenger, *Infamous Day: Marines at Pearl Harbor, 7 December 1941*, History and Museum Division, Headquarters, U. S. Marine Corps: Washington, D. C., 1992.

Third Wave, 1000

Technically, the Japanese Navy only launched two attack waves; however, a third Japanese group attacked Ewa as part of a rearguard action. As Ewa was near one of the post-attack rendezvous points for Japanese planes, it presented a convenient opportunity for pilots departing the island (after completing missions elsewhere).[201] The Third Wave was likely fighter aircraft that had been primarily tasked with protecting the bomber fleet conducting secondary operations. The fighters flew in a column from the east (which would indicate they had been at Pearl Harbor) and turned in a westerly direction towards Barbers Point and out to sea. Again, the Japanese attacked from the treetops and remained at low altitude. However, because of a lack of targets and establishment of crude anti-aircraft defenses over the morning, the third attack was "comparatively light and ineffectual."[202] For the next hour, Japanese aircraft flew over Ewa Field conducting sporadic strafing of the base, while the remaining aircraft gathered at a point about five miles west of Barber Point at 8,000 feet. Larkin commented that he counted about 25 aircraft out there that were probably providing rear security for the force as they returned to the carrier strike force.[203]

While the Japanese killed five individuals in the battlefield, paranoia from the attack caused another to lose his life. Albert A. Grassell reported that shortly after the first Japanese attack on Ewa, the duty officer gave orders to Grassell and his tentmates to arrest a marine suspected of being a German spy. According to Grassell's account, the marine resisted the arrest and fled outside the base perimeter fence, taking a weapon with him. A local 13-year-old Varona Village resident, named Domingo Bolosan, wrote that he saw a vehicle with marines firing a machine gun into a pile of scrap metal near the end of the village. Shortly afterwards Bolosan saw the marines drive away with a man's body mounted on the back of the vehicle.[204] This marine was cleared of spying charges posthumously, and was buried in a military cemetery in California.

Attacks at Ewa Plantation Company and Villages

The attack in the area around Ewa field was not limited to attacks on US military installations. The Ewa Plantation Company and the surrounding workers' villages were also heavily bombed and strafed during the attack. At 0755, Japanese planes swept low over Ewa Sugar Plantation Villages for their first of two strafing encounters. Upon hearing the incoming planes, many community residents assumed it was the marines practicing maneuvers. Residents quickly learned of the attack when the bullets started flying. Mr. Frank Guy told his wife that he wished the marines would not fly so low when a 20-millimeter bullet entered their house. An incendiary bullet struck the Mendaris house next door to the Guy family, catching it on fire.[205] The Mendaris House was only one of numerous fires (caused by incendiary bullets) that the plantation fire department and residents extinguished during the attacks. In total, there were 12 small fires in homes that caused damage but small fires went unreported.[206] Many of the Ewa buildings including the Mill and Power House, plantation streets were strafed and 30 homes reported damage by bullets or shrapnel, while bombs were dropped at the airfield.[207]

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[201] Aiken 216.
[202] Hollingshead, The Japanese Attack of 7 December 1941 on The Marine Corps Air Station at Ewa, Oahu, Territory of Hawaii, (1946), 11.
[203] Hollingshead, The Japanese Attack of 7 December 1941 on The Marine Corps Air Station at Ewa, Oahu, Territory of Hawaii, (1946), 11; Larkin, *Report of Action on December 7, 1941*, 3.
[204] Albert Grassell, The Ewa Marines, *Naval History*,(Spring 1991) and http://gonebutnotforgotten.homestead.com/Lutschan.html by Jack Henkels.
[205] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1945*, (1944), 44.
[206] *War History of Ewa Plantation Company covering the period December 7, 1941 to September 1942*, 1.
[207] Gwenfread E. Allen, *Hawaii's War Years*, 1941-1945 (1999).

Ewa Village attack eye-witness Isamu Murakami jointly created with Ewa historian John Bond a photo map of the air attack in 2010 as seen by Ewa residents which overlayed a Japanese air photo taken on the morning of December 7, 1941 with a Google Earth image as a georeference with the modern Ewa landscape. Interestingly, they found that the modern landscape had not changed much from the 1941 image. Mr. Murakami was also able to locate other Ewa correspondents (whom were later interviewed) to show where they were standing on the morning of December 7, 1941. In several cases this was at the Ewa Hongwanji (Buddhist) Mission where these then mostly pre-teens were gathering to attend Sunday school at 8 AM. The other viewing areas were home rooftops and the bank of the Kalo'i Ditch which ran through the Ewa Plantation villages.

The Japanese Nakajima Kate torpedo planes were clearly observed that morning at the Ewa Hongwanji by a young Shoso Yasui who stated in an interview that he saw them flying by the mission building headed East to Pearl Harbor. This matches marine accounts of the first torpedo unit passing by at Ewa Field before the attack actually started. The subsequent direction of the initial air attack was seen as coming from the northeast because Mitsubishi Zero fighters came in very low from the northwest in single file formation and then after making a strafing pass pulled up and banked around for a second pass, making this maneuver clearly visible from the Ewa Plantation Villages. Later attacking Aichi Type 99Val dive bombers were seen coming from the east after attacking Pearl Harbor and so the general attack pattern was viewed from the villages as planes headed in a west/southwest direction towards the airfield.

Isamu Murakami, then twelve years old and located in Ewa Village wrote, "When the attack occurred, we all thought that it was another maneuver that took place very frequently at that time. There were spectacular night maneuvers with search lights all over the plantation cane fields beaming on a target pulled by an airplane and the artillery bursts trying to hit the target. And after an announced time, Fort Barrett would shoot their 16 in guns that shook and roared through the Ewa villages." "The bank of the waste ditch [Ka'loi Ditch] was a very good vantage point where all the people had a good view of the attack. The planes were right over their heads flying very low over the cane field and you can clearly see the rear gunners waving their hands. However, once the planes were over the base, it made a loud roar and made a steep climb and the rear gunner fired their machine guns." "What surprised me most were the Japanese planes. During that time I thought that all the planes in Japan were biplanes made up of bamboo and paper. We had no knowledge that they had planes like these. But then, we heard the explosions and black smokes from the Pearl Harbor area and the sound of machine gun fire from Barbers Point [Ewa Field], and LOOK! the rising sun on the airplane wings. Oops! I ran home."[208] (Note: Bracketed information added.)

Seventeen-year-old Victor Pantohan heard the sound of planes from the first wave and climbed on the roof of his family's home in the Lower Village of Ewa Plantation Company so he could wave to the pilots. It was common practice for boys to climb on rooftops and wave to the American pilots during their practice maneuvers. Victor saw planes coming from the northeast headed towards his village. Victor saw a red ball on the side of the planes, which were flying at a very low altitude. Young Mr. Pantohan realized these were not American planes, got off the roof, and climbed on his bicycle. He pedaled towards the plantation offices to tell people what he saw but as he neared the offices, Victor saw live fire (strafing) and quickly turned around and went home[209] (Photograph 19).

Many of the plantation residents were either at home or took cover in village buildings during the attacks. While these buildings provided a measure of cover and concealment, many buildings and

[208] Isamu Murakami, 2010, e-mail description of December 7, 1941 attack sent to John Bond. On file at Save Ewa Field.
[209] Victor Pantohan, personal communication June 2013.

structures were strafed by Japanese aircraft or subjected to anti-aircraft fire from ships in Pearl Harbor. The Ewa Plantation company records indicate, that in some instances, bullets pierced building exteriors and struck pipes and internal structural members of mill buildings.[210]

The road from the base to Ewa Village, the railroad, as well as targets in the village were strafed.[211] Based on the location of the village it would appear that these attacks probably occurred during the second wave when Japanese planes were reported circling Ewa Field and would have had a field of fire that included plantation targets. The effective range of the 7.7 mm and 20 mm machine guns the Japanese were using during the attack was 1000 yards or less. The maximum circular range outside the Ewa Field perimeter during when the Japanese aircraft were attacking was 1000 yards or an attack area of 2500 yards from the Ewa Mooring Mast Control Tower located at the center of the air base. After the initial attacks there was probably more traffic on the road to and from the base; while it was not written in the IJN general orders, it would have been understood that transportation arteries, (roads and railroad) would have been secondary targets.

In addition to attacks on the village, after action reports indicate that the Japanese assault resulted in two cane fires on Ewa Plantation lands. They included:

+ 2.14-acre burn at Field 57.1
+ 16.14-acre fire at Field 83[212]

Furthermore, plantation records show that for the next eight months, workers uncovered unexploded munitions at the plantation including a mix of US anti-aircraft fire and Japanese bombs. Table 5 provides a list of the locations of the munitions recovered at Ewa Plantation demonstrating the attack on Ewa Plantation and Villages as well as Ewa Field.

Table 5
Location of Munitions found at Ewa Plantation.[213]

Date Found	Location	Munitions
March 20, 1942	Field 32	5-inch Dud
March 21, 1942	Field 82.2	Unknown dud
March 23, 1942	Field 77.1	5-inch Dud
March 25, 1942	Field 14.1	Unknown dud
March 30, 1942	Field 15.2	52 rounds of HE Ammunition
March 31, 1942	Field 35.1	3-inch Dud
June 14, 1942	Field 57.1	5-inch Dud
June 23, 1942	Field 50	300-pound bomb
June 29, 1942	Field 79.1	3-inch Dud
July 9, 1942	Field 50	3-inch Dud
August 6, 1942	Cane Cleaner	5-inch Dud

The Ewa Plantation Company hospital treated 53 civilian and three military personnel with injuries related to the Japanese attack. These patients were mostly villagers but also included a US pilot that was shot down in the Ewa Beach area. Seven individuals suffered injuries severe enough to require hospitalization including three from the plantation, two from Ewa Beach, two marines from Ewa Mooring Mast Field, and one other.[214] Three of these individuals died from

[210] Ewa Plantation, *War History of Ewa Plantation Company covering the period December 7, 1941 to September 1942,* 2.
[211] McWilliams, *Sunday in Hell: Pearl Harbor Minute by Minute.*
[212] Ewa Plantation, *War History of Ewa Plantation Company covering the period December 7, 1941 to September 1942, 9.*
[213] Ewa Plantation, *War History of Ewa Plantation Company Covering the period December 7, 1941 to September 1942, 9.*
[214] Ewa Plantation, *War History of Ewa Plantation Company covering the period December 7, 1941 to September 1942,* 2.

their wounds including one each from the plantation, Ewa Beach, as well as an Ewa marine (Figure 39).

Table 6 provides information on the seven individuals that were admitted to the Ewa Plantation Company hospital. (One other individual was also hospitalized at an unspecified location.) Of the nine casualties suffered at Ewa Plantation Villages, only two were serious. Mrs. Rui Tamura, wife of an Ewa employee, had her left arm amputated following the attack. Miss Yaeko Oda, a six-year-old girl, was struck in the head (by an unknown fragment); she was transferred to another hospital and died of her injuries in February 1942.[215]

Table 6
Patients Admitted to Ewa Plantation Hospital on 7 December 1941.[216]

Name	Nature of Wound	Admitted	Released
Y. Oda	Fractured skull	December 7, 1941	Transferred to another hospital (passed away February 1942)
Mrs. J. Garcia	Mid-thigh amputation	December 7, 1941	December 25, 1941
F. Tacderan	Intracranial injury	December 7, 1941	Passed away December 13, 1941
S. Uyene	Puncture wound-stomach	December 7, 1941	December 23, 1941
Pvt. W. Turner	Punctured viscera	December 7, 1941	Passed away December 12, 1941
R. Tamura	Arm amputation	December 7, 1941	December 25, 1941
W. Kundsen	Fractured patella	December 7, 1941	December 11, 1941

Aerial Combat (Dogfights)

Although not often remembered, some American aircraft did challenge the Japanese aerial assault of December 7, 1941. The US had 402 aircraft on Oahu; 188 were destroyed and another 159 were damaged. The American aerial response came from naval aviators returning from the U.S.S. Enterprise as well as eight Army Air Corps pilots, including several that flew combat missions over Ewa. At Ewa a concentration of Japanese aircraft could be seen from a distance and as the Army pilots approached they observed a circling traffic pattern at that location. The preferred strafing approach was during the downwind leg of the pattern for forward guns but the rear gunner could likely strafe at any time during the circular pattern so was the preferred approach for some aircraft. While American forces did not threaten the Japanese mission, they did succeed in shooting down several enemy aircraft providing rallying points for the American military.

Scout Squadron from Enterprise

A group of 18 aircraft from the USS Enterprise would arrive near or over Ewa Field during the battle. Several of these aircraft seeing and experiencing flack and AA fire on their way to Ford Island picked Ewa Field as the alternative carrier landing field but were quickly flagged-off by the marines when they first attempted to land because the field was still under attack. At 0615 on December 7, 1941, H.L. Young, the Commander of the Enterprise Air Group accompanied by Ensign P.L. Teaff and with Lieutenant Commander Bromfield Nichol as passenger, took off in airplane 6-S-2 from the U.S.S. Enterprise located due west of Oahu. His mission was to search sector 058-095 and then continue on to Ford Island.[217]

At 0720, Young sighted a tanker belonging to the Richfield Oil Company to his starboard side. Continuing on, Young sighted the U.S.S. Thresher and U.S.S. Litchfield at about 0740. The tanker off Oahu would later reported seeing one of the USS Enterprise planes crash down into the

[215] Ewa Plantation, *War History of Ewa Plantation Company Covering the period December 7, 1941 to September 1942,* 2.
[216] Letter from Garton E. Wall, Ewa Plantation Hospital, July 1946.
[217] Young, *Report of Action with Japanese Air Force at Oahu, December 7, 1941. After Action Report.* Enterprise Air Group.

ocean but for unknown reason did not follow Maritime Code to attempt to render assistance. Young passed Keana Point at approximately 0810, and Barbers Point at 0820 at which time he spotted a squadron of planes circling Ewa Field in a column formation. Young assumed these to be US Army pursuit planes, and decreased his altitude to 800 feet, continuing on to Ford Island where he noticed considerable "AA" fire and was immediately attacked by a Japanese plane from the rear. Having no time to launch a counterattack, Young put his plane in a zigzag nosedive pattern toward the ground in an attempt to elude his attacker. Not having enough fuel to return to the U.S.S. Enterprise, Young landed through heavy AA fire at Ford Island Field at approximately 0835.[218]

Shortly after reporting to the Commander-in-Chief, Pacific Fleet, Young witnessed approximately 18 Japanese Mitsubishi "Karigane" Mk. II planes engaged in a dive bombing attack on the Navy Yard using 500 pound bombs. Following this attack, Young was ordered to report to Commander Patrol Two on Ford Island where he was able to learn the number of planes from the Enterprise Group that had landed safely. Five of the incoming USS Enterprise planes were shot down by Japanese aircraft, later it was tallied that five Japanese aircraft had also been shot down in the Ewa area with some crashing in the near shore area. Of the 13 remaining of USS Enterprise Scouting Squadron Six that landed safely, Young sent out nine to investigate reports of hostile surface ships, south of Barbers Point. Young positioned himself in the Control Tower at Ford Island Field in an attempt to communicate between the planes and the Enterprise; however, due to low power Young was unable to communicate with either.[219]

Young stated that the lack of information concerning the beginning of Japanese hostilities and the inability of ground and ship crews to recognize friendly planes were the two main reasons why personnel and airplanes from the Enterprise Air Group were lost. Even Young himself was under attack from US forces until his wheels hit the ground on Ford Island.[220]

Young draws particular attention and request for commendation to Lieutenant C.E. Dickenson from Scouting Squadron Six at the end of his report. Young states that Dickenson was forced to bail out of his plane on December 7, 1941 following considerable fire from Japanese and friendly ground forces causing his plane to catch fire. Dickenson then made his way to Ford Island Field where he immediately obtained another plane and participated in a search flight.[221]

Welch and Taylor and Ewa Field

Most of the American defensive fortifications were established around Ewa Field, between the first and second waves, using whatever cover they could find. The exact locations of most of these defensive positions are not specified in the record. Men stationed at the Communications and Operations Office fired at attacking Japanese planes with .30-caliber rifles and believe they were able to down one Japanese plane that crashed off Ewa Field (near Barbers Point)[222]. John Hughes said he was able to first shoot at incoming Japanese planes from in front of his barracks but with a Springfield rifle he was only able to shoot three rounds per plane before they were out of range.

Although no Marine aircraft took off from Ewa Field, Seven USS Enterprise planes from Scouting Squadron Six successfully landed at Ewa Field and several were rearmed by the marines before the aircraft took-off in attempts to locate the enemy. Two American Army Air Corps fighters from Haleiwa Auxiliary Airfield north of Wheeler Air Field were dispatched to defend Ewa. Second Lieutenants George S. Welch and Kenneth M. Taylor, piloting P-40 aircraft arrived at Ewa during

[218] Young, *Report of Action with Japanese Air Force at Oahu, December 7, 1941. After Action Report*. Enterprise Air Group.
[219] Young, *Report of Action with Japanese Air Force at Oahu, December 7, 1941. After Action Report*. Enterprise Air Group.
[220] Young, *Report of Action with Japanese Air Force at Oahu, December 7, 1941. After Action Report*. Enterprise Air Group.
[221] Young, *Report of Action with Japanese Air Force at Oahu, December 7, 1941. After Action Report*. Enterprise Air Group.
[222] Record of Events Sunday 7 December 1941, Appendix N.

the second wave when Japanese aircraft were circling the Ewa target strafing at will. Both shot down two Japanese Val dive-bomber aircraft each before returning to Wheeler Field to rearm. Kenneth Taylor's account of the aerial events over Ewa Field is provided below:

> As George [2nd Lt. George S. Welch] and I approached the Marine Field [Ewa at Barbers Point], we saw fifteen or twenty dive bombers with their wheels down, circling in what looked like a traffic pattern. Our first thought was that the marines were taking off to help us. But as we came closer, we knew that these were Nips who had just dumped their eggs and were strafing the field. So immediately we wheeled around to the rear of the string, and both of us started to shoot the hell out of them - we both came down on them side-by-side, and we couldn't tell who shot down the first ship. On the first pass, we pulled up into a chandelle and as I came out of it I saw one of the dive bombers running for the sea-he was trying to get away. So I let him have a short burst - I don't think I let him have more than fifteen rounds - and as he flamed he went into the most perfect slow roll I've ever seen. All I could see of him was his wheels sticking out of the smoke, and fire pouring out of the ship. Seconds later he hit the surf, right there on the beach. After my first pass, I saw three of the Japs flaming earthward. While I was chasing the lone bomber, George's 'thirties' caught one of the enemy ships from the rear and blew it into bits. Then, just as we had drilled three of them out of the sky, one of the Japs picked up George, and the rear gunner began to pour a steady stream of incendiaries into Welch's cockpit. By this time there was so much smoke that George figured he was on fire and pulled up into the clouds. I lost track of him after that, but I learned later that for a moment he had considered bailing out, and thought better of it - the Japs would probably strafe him. He gave the ship the rudder and found it was still working; so he started looking around, and noticed a ship heading north, toward the sea. He figured it was me and tried to catch up, but as he began to overtake the speeding ship, he saw it was another Jap bomber. He closed in right behind the [Japanese] and shot him down, and the [Japanese] plunked right by the edge of the sea. After I had shot down my first ship, I climbed for altitude and saw that by this time the Japs had scattered in all directions. Just then I spotted another one trying to flee. I pulled up behind him fast, and came so close that I could have thrown a rock at him. With my first burst I killed his rear gunner, and then began to pour it into the Jap. Black smoke began to stream out of him and he started to lose altitude fast. By this time, my fuel and ammunition were running low; I didn't want to get too far out to sea, so I headed for Wheeler Field, and I didn't see this fellow crash. I guess George must have had the same difficulty, because strangely enough, we both landed about the same time.[223]

Taylor's wingman, George Welch described the combat this way:

> Later we noticed 20 or 30 airplanes in a traffic pattern at Ewa, the Marine landing field. We found they were Japanese dive bombers strafing the field. Lieutenant Taylor and I each shot two of those down. I was leading and peeled off first. Lieutenant Taylor was about 200 yards to the rear and side, following me. Their rear gunner was apparently shooting at the ground -- because they didn't see us coming. The first one I shot down, the rear gunner didn't even turn around to face me. I got up close enough to see what he was doing. I got him in a five-second burst - he burned up right away.
>
> I left him and got the next plane in a circle which was about one hundred yards ahead of him. His rear gunner was shooting at me. One bullet put a hole through my cooling radiator, and I got one in my prop and one in the nose. It took about three bursts of five seconds each to get him. He crashed on the beach. In the meantime, the rest of the dive bombers

[223] Taylor. "Sad Sunday (Ken Taylor's Story)" in Col. Robert L. Scott, *Damned to Glory.* New York: Scribners. 1944 quoted in Mason Architects, Ewa Plantation Company, Industrial Center HABS- No. HI-384.

had disappeared. We didn't know where - so Lieutenant Taylor and I went back to Wheeler Field and landed.[224]

Anti-aircraft Fire

Because of the speed of the Japanese attack, Ewa field marines did not have an opportunity to engage the attackers with light 30 cal. machine gun anti-aircraft fire. Accounts of the battle indicate that the Ewa field marines set up temporary anti-aircraft positions where they could find cover and concealment including the unfinished swimming pool and other hastily created posts. Several marines dragged a damaged SBD behind the VMSB tents and used its machine guns during the second and third waves. After the first wave, Lt. Col Larkin ordered all men with rifles and all available 30-caliber machine guns to set up additional anti-aircraft sites around the airfield. John Hughes, a marine stationed at Ewa Field, also reported setting up a machine gun position west of the barracks near the rail spur where he remained for three days after the attack, basically not sleeping anticipating another attack.[225] These quickly constructed air defenses were credited with slowing the effectiveness of the second and third waves.[226]

Camp Malakole had some operational 50 Cal. machine guns but had only a small amount of ammunition available, reported as approximately 200 rounds. However, the best armed AA bases near Ewa Field were the Army at Fort Weaver with some operational 50 Cal and the Navy range at Puuloa, near Ewa Beach. Fort Barrette never got into AA action because they lacked AA ammunition, as was mostly the case at Camp Malakole. The Navy gunnery range at Puuloa, which was right next to Fort Weaver on the east side of the Ewa Beach area near the entrance to Pearl Harbor had ammunition and manned three batteries of 50 Cal Browning M2 water cooled AA machine guns during the Japanese air attack near the Ewa shoreline and Pearl Harbor entrance channel.[227]

10:00 AM to Midnight

After the initial shock of the attack, American forces at military installations throughout Oahu were preparing for additional strikes. Defensive measures included setting up machine guns along Ewa Beach and preparing for a possible land invasion. The Americans also sent out reconnaissance aircraft in an attempt to locate the Japanese fleet as well as shield the carriers on their way back to Pearl Harbor.

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American aircraft losses were extreme – 188 planes were destroyed and 159 were badly damaged during the attack, with only 43 still operational. Conversely, the Japanese only lost 29 planes during the attack (15 dive bombers and high-level bombers, five torpedo planes, and nine fighters). Additionally, four midget submarines, one was sunk inside the harbor, three scuttled by their crews including one at West Loch, one I-class submarine was sunk while another midget sub wrecked on a reef near Bellows Air Field resulting in the first capture of a Japanese prisoner of war. Although there was celebration aboard Japanese carriers following the initial attack, Japanese commanders decided to forego another strike due to potential risks to their fleet from operational American aircraft.[228] Figure 40 depicts the location of documented battle action across Ewa Plain including crash sites, cane field fires, and recovered munitions.

Ewa Plain

[224] James Lansdale, "George Welch interview." Webpage j-aircraft.com
[225] John Hughes interview with John Bond, n.d. On file at Save Ewa Field.
[226] Hollingshead, *The Japanese Attack of 7 December 1941 on The Marine Corps Air Station at Ewa, Oahu, Territory of Hawaii*, (1946), 9.
[227] Cressman and Wenger, *Infamous Day: Marines at Pearl Harbor*. Marines in World War II Commemorative Series, 1992.
[228] Dull, The Battle History of the Imperial Japanese Navy (1941-1945), 18.

After the initial attack, military and civilian personnel along Ewa Plain were in shock and feared for future attacks and invasion. Military bases that were established to protect the island lay in waste. Battleships of the Pacific Fleet were either destroyed or damaged, and the Hawaiian population witnessed no real counter attack by the military. However, in this time of crisis, civilian and military personnel banded together to repair bases and their homes and to implement the pre-planned civil defense strategy to protect the islands.

Aftermath of the Attacks at Ewa Field and Ewa Plantation

After the attack, the whole military establishment and civilian population on the islands, was in chaos. Hospital tents (Ewa Field Camp Area) that housed the sickbay and dispensary had been "set on fire by incendiary ammunition," and "a large quantity of equipment and medical supplies" were "damaged by enemy gunfire." Medics worked in the open (or under any cover), and the most seriously wounded men were evacuated to the Ewa Plantation Hospital (see discussion below) or other medical facilities on the island.[229]

In the hours after the attack, Wheeler Field Control erroneously reported three more waves of Japanese planes inbound; however, no further attacks ever materialized. All through the night air raid warnings were issued for the entire island and all available personnel were on alert. Because the Ewa field runway received only minor damage that was repaired quickly, aircraft from other bases landed at Ewa Field. A B-23 bomber from Hickham landed after dark as marines used flare pots, the Aldis lamp's red and green signal, and radios (on receive only) to serve as a make-shift airport.[230] The next day four US Army P-40s and one P-36 landed at Ewa Field to refuel. At 1000, five fighters were scrambled to investigate unknown planes near Haleiwa. The rest of the day, marines continued to prepare sand bag bunkers and fighting positions.[231] On December 8, 1941, the Army transferred a fighter squadron of 12 aircraft from Wheeler to Ewa because the runways of Ewa were relatively undamaged.[232]

Post-attack reports at Ewa Field indicated that considerable damage was suffered by material, installations machinery, tents and buildings. While damage to government motor vehicles was slight, privately-owned automobiles suffered heavily. Damage to aircraft was extremely heavy owing to the use of explosive incendiary bullets fired from extremely low altitudes; nine out of 11 wildcat fighters, 18 out of 32 scout bombers, three utility planes, one trainer, and two transports of eight utility planes were lost on the ground.[233]

While they lost almost all of their aircraft, Ewa marines experienced the "smallest percentage of casualties suffered by any field or station in the area of the attack."[234] Four enlisted men and two civilians were killed during the attack (Table 7). In addition, 13 marines, including Lt. Col. Larkin and Captain Mil Haines, the Assistance Group Engineering Officer, and the base photographer were wounded (Figure 41).

Table 7
Civilian and Military Deaths at Ewa Plain[235]

Name	Rank	Service	Comment
LAWRENCE, Edward Stephen	PFC	USMC	Scouting-Bombing Squadron 232

[229] Administrative History Section. Administrative Division. Bureau of Medicine and Surgery. *The United States Navy Medical Department at War, 1941-1945.* vol.1, parts 1-2 (Washington: The Bureau, 1946): 1-31.
[230] McWilliams, *Sunday in Hell: Pearl Harbor Minute by Minute.*
[231] Record of Events Sunday 7 December 1941, Appendix N.
[232] McWilliams, *Sunday in Hell: Pearl Harbor Minute by Minute.*
[233] *Investigations of the Pearl Harbor Attack,* Vol. 12, 358. Prange, *At Dawn We Slept* (1981), 525.
[234] Jordan, History of the Marine Corps Air Station Ewa, Oahu, T.H., 1941-1944 (1944), 17.
[235] "Pearl Harbor Casualties," Electronic document, www.pearlharbor.org/history/casualties/pearl-harbor-casualties.

LUTSCHAN, William Edward, Jr.	SGT	USMC	Marine Aircraft Group 21, HQ and Service Squadron 21
MICHELETTO, Carlo Anthony	SGT	USMC	Utility Squadron 252
ODA, Yaeko Lillian,	Civilian		
TACDERAN, Francisco,	Civilian		
TURNER, William George	PVT	USMC	Scouting- Bombing Squadron 231

After the attack, nearby Ewa Plantation offered supplies to assist the Marine Corps recovery and to shore up defenses for any future attacks. At the request of the Marine Corps, Ewa Plantation sent three Northwest Cranes and two D-6 Caterpillar tractors to the Ewa airfield to assist in the removal of aerial bombs from magazines (to load them on bomb carts). The next day another crane and tractor were sent to assist with work on the base including the removal of damaged aircraft. Throughout the rest of December, workers from the Ewa Plantation assisted the marines including the loading of bombs on planes and training in the use of machine guns.[236] Plantation salvage crews also helped remove destroyed aircraft at Ewa Field and fill in bomb craters (under close watch of marines). Also, the CPNAB was ordered to quickly patch damage on the runways where asphalt patches were required.[237] Runway patches on the asphalt are visible on the early 1942 aerial photos. A couple patches are still visible on the concrete warming-up pad.

[Ewa Plantation staff provided:]

- 831 manhours of labors;
- 133 hours of use of Northwest Crane operations;
- 143 hours of D-6 tractor operation; and
- 90 hours of automotive equipment operation.

Ewa Plantation also supplied over 49600 KwH of electrical energy to the base until March 1942 when the Hawaiian Electric Company took over electrical production for the base.[238]

The Plantation water supply system was a great aid to the armed forces during this time of emergency which included furnishing water to Barber's Point Naval Air Station and Ewa Marine Air Station. The scarcity of water on the arid Ewa Plain presented a serious problem in normal times; if the Navy would have been required to develop new sources of potable water, valuable construction work time would have been lost. From December 7, 1941 through September 1942, Ewa Plantation Company supplied the Navy a total of 77,260,000 gallons of water.[239]

Aftermath of the Battle – December 1941 In Ewa Plain

After the attack, the US military prepared for future attacks from Japan including the possible invasion of the Hawaiian islands. The Marine Corps base at Ewa would become "the hub of Marine Corps aviation in the Pacific war. And, in the early months of the war, marines from Ewa formed the very spearhead of America's air effort against Japan."[240] Unlike other airfields in Hawaii, Ewa's aviation facilities received relatively little damage because strafing was the primary method the Japanese used to effectively destroy parked aircraft, so the Navy now under Nimitz as CinCPac ordered a major change to Ewa Field status

[236] Ewa Plantation, *War History of Ewa Plantation Company covering the period December 7, 1941 to September 1942,* 9.
[237] Woodbury, *Builders for Battle: How the Pacific Naval Air Bases were Constructed, etc.* (1946). New York.
[238] Ewa Plantation, *War History of Ewa Plantation Company covering the period December 7, 1941 to September 1942, 9.*
[239] United States. *Pearl Harbor Attack. Hearings Before the Joint Committee on the Investigation of the Pearl Harbor Attack, Congress of the United States, First Sessions : Pursuant to S. Con. Res. 27 (79th Congress) : a Concurrent Resolution Authorizing an Investigation of the Attack on Pearl Harbor on December 7, 1941, and Events and Circumstances Relating Thereto. Volume* 18, 3371.
[240] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1945,* (1944), 58.

from being a temporary base to leasing additional acreage around the existing base expanding the field to be one of the important airfields in the islands. On December 19, 1941, construction efforts under CPNAB were reallocated under a substantial Change-Order shifting their efforts from Barber's Point to Ewa Field for improvements and expansion to occur there first. The 3,000 foot northeast-southwest runway was lengthened to 5,000 feet, and a 3,200-foot north-south runway and a 3,185-foot east-west runway were also constructed.[241] The planned expansion for World War II left the existing Ewa Field facility intact but expanded with a series of new camps to the east, southeast, south, southwest and west basically surrounding the older 3000' by 3000' base area with new housing, aviation facilities and expanded runways and warm up areas basically leaving almost all the original base facilities intact. Admirals' Nimitz and Towers war plan was to expand upon what the marines already had and not tear down to rebuild which might hinder the momentum of war effort.

After the Japanese attacked Pearl Harbor on December 7, 1941, the military ramped up the pace of defense-related construction projects in the Hawaiian Islands and airfields were of high priority. Again, the Navy turned to the CPNAB to construct additional runways, 75 dispersed airplane revetments, and additional temporary buildings for 3,000 men; however, the amount of construction by Naval Construction Battalions (CBs) was also extensive.[242] A CPNAB report described the construction after the attack:

> Immediately following the "blitz" [CPNAB term for December 7, 1941 attack] it is reported that many buildings were erected without plans, on the verbal orders of the Officer in Charge. At this station the chief criterion was emergency construction of the cheapest and quickest sort. The original plan appears to have been to develop the Ewa field for temporary operation, and then to abandon it after completion of Barbers Point. However, once the war had started, to have scrapped the field would have been wasteful; it was decided to develop it further, as a Marine Corps Air Station Wartime criteria, particularly as to dispersal of plane parking, were followed more fully here than at Barbers Point, or at any of the other Hawaiian airfields. A glance at the site plan shows the extent of bunkers and half dome revetments; also personnel facilities were scattered, with dispersal and proximity to parked planes in mind.[243]

Ewa, an isolated landing field before the war, became a bona fide military airfield during World War II and included major construction projects consisting of an administration building, mess hall, barracks, guard house, garages, warehouses, storage buildings, dental clinics, chapels, officer and enlisted clubs, and associated infrastructure (roads, utilities) (Figure 42). The new construction occurred on the lands acquired in 1942 allowed the base to expand to the south, east and west but the base was blocked for expansion to the north because that land was owned by Ewa Plantation.

After the end of World War II, activities at Ewa were quickly demobilized however the base continued to support clean-up actions on islands in the Pacific and actions in China to support the Nationalist Chinese Government. The global Military Air Transport Services Squadron continued from MCAS Ewa until 1949. In March 1949, all naval air activities in Hawaii, including that at Marine Corps Air Station Ewa, were consolidated at Barbers Point. The Navy decommissioned and closed NAS Kaneohe Bay, and all property (except buildings) was transferred to NAS Barbers Point. In the early 1950s, the Marine Corps saw the Mōkapu Peninsula as a perfect home for an air-to-ground combat unit. On January 15, 1952, MCAS Kaneohe Bay was commissioned, to encompass all of what had been NAS Kaneohe Bay and the Army's former Fort Hase. The next year it became home to the First Marine Expeditionary Brigade, and it continues to be an important part of the Marine Corps presence on the island.[244]

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[241] Jordan, *History of Marine Corps Air Station Ewa, Oahu, 1941-1945*, (1944), 59.
[242] Star Bulletin quoted in Ann K. Yoklavich, Historic American Buildings Survey Naval Air Station Barbers Point, Marine Corps Air Station Ewa HABS No. HI-279, p. 6.
[243] Contractors Pacific Naval Air Bases n.d.: A-978 quoted in Ann K. Yoklavich, Historic American Buildings Survey Naval Air Station Barbers Point, Marine Corps Air Station Ewa HABS No. HI-279, p. 8.
[244] USMC Base Hawaii, "Historic Tour and Guide."

MCAS Ewa facilities were used by NAS Barbers Point for interim military housing and recreational activities until ca, 1960. At that time the various camp areas were sold through a government excess and surplus building program to bidding local contractors. Many facilities at this time were carefully dismantled for relocation and or for value of wood and metal construction materials and sold through local commercial vendors, an active business on Oahu at that time. Selected sites at former MCAS Ewa were used for Headquarters facilities during the Cold War. This new construction was localized to several small building sites leaving much of the Ewa Field and outlying MCAS Ewa sites untouched.

Non-Military Development in Ewa Plain

During World War II, the other major land manager on the Ewa Plain remained the Ewa Plantation. Because of the need for sugar, the Plantation continued to thrive during the war. While the plantation lost many of its men to the war effort, it operated with minor changes to its landscape, other than the emplacement of temporary defensive positions. An examination of the Ewa Plantation HABS report shows that during the war, the only major changes to the Ewa Plantation were the addition of several buildings in the industrial center. Most of the major changes in buildings and transportation networks would occur after the war.[245]

After World War II, Ewa Plantation continued in business. In 1946 James N. Orrick served as the manager and would continue until his death in 1962. In 1962, Castle & Cooke, Inc., original agents for the plantation, purchased majority control of Ewa Plantation Company (EPC) stock. The new owners began to modernize the equipment at the sugar factory. In 1968, the plantation's name changed to Ewa Sugar Company, Inc.; less than ten years later, however, declining profits in Hawaii's sugar industry took their toll. Oahu Sugar Company (OSCO) acquired the entire Ewa operation. OSCO leased EPC's former lands from Campbell Estate until the mid-1990s when they stopped operating the land for sugar production. Sugar processing operations at the Ewa mill had ceased in 1976, and the mill was demolished by 1985.[246]

Postscript

Since the 1960s, there have been several efforts to preserve the history of Ewa Field and its role in the attack on Pearl Harbor and World War II. The Navy installed its first marker about the attack on Ewa Field at the end of the main runway in 1960 but the site was not officially recognized like many of the other bases attacked during the Japanese raid - Hickam Field, Wheeler Army Airfield, Marine Corps Air Station Kaneohe Bay and Ford Island were designated National Historic Landmarks; however, Ewa Field remained overlooked. Local non-profit groups, numerous individuals, and the Hawaiian legislature (HCR 49) have emerged to champion the preservation of Ewa Field as a national battlefield (Appendix H).

The Navy has been active in documenting the significant history at the base. Seven HABS projects have been completed at Ewa Field. They include:

+ HABS HI - 279 - NAS Barbers Point and MCAS Ewa
+ HABS HI - 279 - A Ewa Field Revetments
+ HABS HI - 279 - B Ewa Field Quonset Huts
+ HABS HI - 279 - C Ewa Field Bldg 1525 ARMCO Hut
+ HABS HI - 279 - D Ewa Field Bldg 87 Air Raid Shelter
+ HABS HI - 279 - E Ewa Field Quonset Huts Type 2
+ HABS HI - 279 - F Ewa Field Hangar 1146

[245] Mason Architects, Ewa Plantation Company, Industrial Center HABS- No. HI-384, p. 4.
[246] Mason Architects, Ewa Plantation Company, Industrial Center HABS-No. HI-384, p. 12-13.

Additionally in 2008, Historic Hawaii Foundation named Ewa Field one of the nine most endangered Historic Sites in Hawaii.[247]

[247] "9 Most Endangered Historic Sites in Hawaii," Electronic document, http://ewaplainsprograms.weebly.com/uploads/1/5/0/6/15066970/9mostendangered-ewa.pdf

9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form.)

"9 Most Endangered Historic Sites in Hawaii," Electronic document, http://ewaplainsprograms.weebly.com/uploads/1/5/0/6/15066970/9mostendangered-ewa.pdf

Administrative History Section. Administrative Division. Bureau of Medicine and Surgery. *The United States Navy Medical Department at War, 1941-1945*. vol.1, parts 1-2. Washington: The Bureau, 1946.

Admiral Isoroku Yamamoto, Japanese Navy, (1884-1943), http://www.history.navy.mil/photos/prs-for/japan/japrs-xz/i-yamto.htm

AECOM and Mason Architects. *Battlefield Evaluation of Ewa Field, Inventory and Historic Contexts*. Charlottesville VA and Honolulu HI. 2011.

Allen et al. A Study of Native Hawaiian Traditional Cultural Places, Hickam Air Force Base, Hālawa and Moanalua Ahupua'a, 'Ewa and Kona Districts, O'ahu, Hawai'iHonolulu: International Archaeological Research Institute, Inc. 2005.

Andrus *Guidelines for Identifying, Evaluating, and Registering America's Historic Battlefields*, National Register Bulletin 40, National Park Service, 1999.

Anthony, Joseph Garner. *Hawaii Under Army Rule.* Honolulu: University of Hawaii Press, 1975.

Barbers Point Light, electronic document, http://www.uscg.mil/history/weblighthouses/LHHI.asp.

Barber's Point NAS. Electronic document, http://hawaii.gov/hawaiiaviation/hawaii-airfields-airports/oahu-pre-world-war-ii/barbers-point.

City and County of Honolulu Planning Department, Ewa Development Plan, August 1997

Coletta, Paolo Enrico. *United States Navy and Marine Corps Bases, Domestic*. Westport, Conn: Greenwood Press, 1985.

Collier, Basil, *The Second World War: a Military History*, New York: William Morrow & Co, 1967.

Commander, Enterprise Air Group, Report of Action with Japanese Air Force at Oahu, T.K., December 7, 1941. Dated December 15, 1941.

Condon, John P., *U.S. Marine Corps Aviation*. Washington, D.C.: Deputy Chief of Naval Operations (Air Warfare), 1987.

Contractors Pacific Naval Air Bases (CPNAB). Technical Report and Project History Contracts NOy-3550 and NOy-4773. Chapter XXVII Ewa. Microfilm of report of WW II construction of bases at Pearl Harbor and elsewhere in the Pacific available at PACDIV Library, Pearl Harbor, call # VA 69.5/02. N.D. (ca. 1946). On File at National Archives and Records Administration, San Francisco repository.

Contractors Pacific Naval Air Bases, Ewa Mooring Mast, Area "O", Field Drawing BF SK 301, dated 11-7-42.

Bibliography (Continued)

Cressman, Robert J., and J. Michael Wenger. *Infamous Day: Marines at Pearl Harbor, 7 December 1941.* Marines in World War II Commemorative Series. Marine Corps Historical Center, 1992.

Cressman, Robert J., and Wenger, J. Michael. *Steady Nerves and Stout Hearts. The Enterprise (CV-6) Air Group and Pearl Harbor 7 December 1941.* Pictorial Histories Publishing Company, Missoula, Montana 1989.

Czarnecki, Joseph, Richard Worth, Matthias C. Noch, Mark E. Horan and Tony DiGiulian. Order of Battle Pearl Harbor 7 December 1941, Electronic document, http://www.navweaps.com/index_oob/OOB_WWII_Pacific/OOB_WWII_Pearl_Harbor.htm

Department of the Navy, Base Realignment and Closure, Program Management Office. *Final Environmental Assessment Disposal and Reuse of Surplus Property at Naval Air Station Barbers Point, O'ahu, Hawaii.* 2011. http://oeqc.doh.hawaii.gov/Shared%20Documents/EA_and_EIS_Online_Library/NEPA%20and%20Other%20Documents/2011-09-08-NEPA-FEA-Disposal-and-Reuse-of-Surplus-Property-at-Barbers-Point-Naval-Air-Station.pdf

"Dirigible to Fly to Hawaii," *New York Times*, January 18, 1935

Dull, Paul S. *A Battle History of the Imperial Japanese Navy, 1941-1945.* Annapolis: Naval Institute Press, 1978.

Ewa Plantation, *War History of Ewa Plantation Company covering the period December 7, 1941 to September 1942.*

Evans, David C., and Mark R. Peattie. *Kaigun: Strategy, Tactics, and Technology in the Imperial Japanese Navy, 1887-1941.* Annapolis, Md: Naval Institute Press, 1997.

Federal Preserve America Grant Application, 2007

Foote, Donald., E. Hill, S. Nakamura, and F. Stephens, *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, U.S. Department of Agriculture, Soil Conservation Service, August 1972.

Fourteenth Naval District, Map of Marine Corps Air Station Ewa, Oahu, T.H. showing Conditions on June 30, 1948

Fourteenth Naval District, District Order No.77-42, September 1, 1942.

Fourteenth Naval District, Commandant. *History of the Marine Corps Air Station, Ewa, Oahu, T.H., 1941-1944.* San Francisco: 14th Naval District. 1945.

The Garden Island, 31 May 2003 [*The Garden Island*, 5 June 1928]

Gordon, Mike. "WWII internment camp revisited", *The Honolulu Advertiser, March 8, 2003.*

Grassell, Albert. The Ewa Marines, *Naval History*, (Spring 1991).

Gross, Charles Joseph. *American Military Aviation The Indispensable Arm.* College Station: Texas A & M University Press, 2002.

Bibliography (Continued)

Grossnick, Roy A. *United States Naval Aviation, 1910-1995*. Washington, D.C.: Naval Historical Center, Dept. of the Navy, 1997.

Gudmens, Jeffrey J. *Staff Ride Handbook for the Attack on Pearl Harbor, 7 December 1941 A Study of Defending America*. Fort Leavenworth, Kan: Combat Studies Institute Press, 2005. http://purl.access.gpo.gov/GPO/LPS68399.

Hammau, Hallet, David Shideler, and William Folk, *Appendix D: Archaeological Reconnaissance of the 'Ewa Villages Project Site, Honouliuli, 'Ewa, O'ahu*, September 1990, p. 14. In R.M. Towill Corporation. *Final Environmental Impact Statement for the Ewa Villages Master Plan, Ewa, Oahu, Hawaii.*, February 1991.

Hepburn, Arthur, quoted in Public Works Authorization Act. H.R. Committee on Naval Affairs Hearings, 76th Congress, 1st Session, 26 January 1939.

"Hepburn" electronic document, http://www.history.navy.mil/danfs/h5/hepburn.htm

Hoffmann, Maynard, Major, Recorded interview located on the World Wide Web at http://www.kitsapsun.com/videos/detail/pearl-harbor-survivor-maynard-hoffmann/#axzz2ThSAhYNm.

Hollingshead, Billie. "The Japanese Attack of 7 Dec. 1941 on the Marine Corps Air Station, Ewa, Oahu, Territory of Hawaii" (mimeographed monograph prepared by the Historical Division of the Marine Corps), 1946.

Honolulu Advertiser February 14, 1935.

Honolulu Star Bulletin 1927.

Imamura, Y. *History of the Hongwanji Mission of Hawaii*, 1918. http://evols.library.manoa.hawaii.edu/bitstream/handle/10524/23186/Hongwanji.pdf?sequence=3

Ingram, H.A. *Monograph on the Mooring Mast and Lighter than air station*, 20 March 1931.

"Island Defense Plans Alter Pacific Picture," *New York Times*, 12 February 1939.

Jeffries, John W. "Part One: Mobilization and Its Impact," in *World War II and the American Home Front: A National Historic Landmarks Theme Study.* Washington, D.C., The National Historic Landmarks Program, 2007.

Jordan, Wayne, 1944. *History of the Marine Corps Air Station Ewa, Oahu, T.H., 1941-1944.*

Kingsford-Smith, Charles Edward, and Charles T. P. Ulm. *The Flight of the Southern Cross*. New York: National Travel Club, 1929.

Lansdale, James. "George Welch interview." Electronic document, j-aircraft.com.

Larkin, Col. Claude A. "Report of Action on December 7, 1941." After action report. Appendix L of document History of the Marine Corps Air Station Ewa, Oahu, T.H., 1941-1944. December 30, 1941.

Bibliography (Continued)

Lebra, Joyce. *Japan's Greater East Asia Co-Prosperity Sphere in World War II: Selected Readings and Documents*. Kuala Lumpur: Oxford University Press, 1975.

Letter from Garton E. Wall, Ewa Plantation Hospital, July 1946.

MacArthur, Douglas. *Reports of General MacArthur: The Campaigns of MacArthur in the Pacific*. Washington, D.C.: U.S. Govt. Print. Office, 1966.

McKillop, Jack. "The B-17 Flight," Electronic document, http://homepage.ntlworld.com/andrew.etherington/articles/level1/pearl_harbor_the_b17_flight.htm.

_____. "U.S. Marine Corps Aviation in Hawaii," Electronic document, http://homepage.ntlworld.com/andrew.etherington/articles/level1/pearl_harbor_us_marine_corps_aviation_in_hawaii.htm

McWilliams, Bill. *Sunday in Hell: Pearl Harbor, Minute by Minute*. New York: E-Reads, 2011.

Mason Architects, Ewa Plantation Company, Industrial Center HABS- No. HI-384.

_____. Naval Air Station Barbers Point, Marine Corps Air Station Ewa Aircraft Revetment Type (Facility Nos. 1226 thru 1293, 1297 thru 1301 and 2 un-numbered) HABS No. HI-279-A.

Miller, Edward. *War Plan Orange: The U.S. Strategy to Defeat Japan, 1897–1945*. Annapolis, MD: U.S. Naval Institute Press, 2007.

Military History Section, Headquarters Army Forces Far East, *Pearl Harbor Operations: General Outline of Orders and Plans, Japanese Monograph No. 97*.

Moy, Tonia, *National Register Nomination Form for Ewa Sugar Plantation Villages,* July 1995 [Listed in 1996].

National Park Service, Survivor Information from Questionnaire Sent to Known Survivors & Families.

National Historic Landmarks for Hawaii, http://en.wikipedia.org/wiki/List_of_National_Historic_Landmarks_in_Hawaii

National Register of Historic Places Inventory - Nomination Forms for Oahu Railway and Land Company Right-of-Way, listed 1975 and Oahu Railway and Land Company Right-of-Way and Hawaiian Railway Society, Ewa Railroad Yard.

National Register of Historic Places Inventory for Hawaii, http://en.wikipedia.org/wiki/National_Register_of_Historic_Places_listings_in_Oahu

Nalty, Bernard C. *Winged Shield, Winged Sword: A History of the United States Air Force, Volume I* Washington, D.C.: Air Force History and Museum Program, 1997.

"Navy Board Urges 41 Defense Bases for Entire Nation," *New York Times*, 4 January 1939.

New York Times May 12, 1929.

Pantohan, Victor, personal communication June 2013.

Bibliography (Continued)

"Pearl Harbor Attacks, 7 December 1941 Carrier Locations" Electronic document http://www.history.navy.mil/faqs/faq66-9.htm.

"Pearl Harbor Casualties," Electronic document, www.pearlharbor.org/history/casualties/pearl-harbor-casualties.

Pearl Harbor Raid, 7 December 1941: Japanese Forces in Pearl Harbor Attack, http://www.history.navy.mil/photos/events/wwii-pac/pearlhbr/ph-ja1.htm

Peattie Mark R. *Sunburst: The Rise of the Japanese Naval Air Power, 1909-1941.* Annapolis, Md: Naval Institute Press, 2001.

Prange, Gordon W. 1981. *At Dawn* 1 *We Slept: The Untold Story of Pearl Harbor.* New York: Penguin Group.

_____. Informant Interview Notes for Jinichi Goto, interviewed 17 January 1950.

Public Works Authorization Act. H.R. Committee on Naval Affairs Hearings, 76th Congress, 1st Session, 26 January 1939, p. 94.

R.M. Towill Corporation. *Final Environmental Impact Statement for the Ewa Villages Master Plan, Ewa, Oahu, Hawaii.*, February 1991.

Rottman, Gordon. *U.S. Marine Corps World War II Order of Battle Ground and Air Units in the Pacific War, 1939-1945.* Westport, Conn: Greenwood Press, 2002.

Shettle, M.L. *United States Marine Corps Air Stations of World War II.* Bowersville, Georgia: Schaertel Publishing Company 2001.

"Ships and District Craft Present at Pearl Harbor, 0800 7 December 1941," Electronic document, http://www.history.navy.mil/faqs/faq66-2.htm.

Spiller, Steve. "An Island Worth Defending," presentation to the Redlands Fortnightly Meeting, #1748, electronic document, http://www.redlandsfortnightly.org/papers/spiller07.html

State of Hawaii, Hawaii Aviation: An Archive of Historic Photos and Facts. State of Hawaii, Department of Transportation, Aviation Division, 2005–2011

Taylor, Kenneth. "Sad Sunday (Ken Taylor's Story)" in Col. Robert L. Scott, *Damned to Glory.* New York: Scribners. 1944 quoted in Mason Architects, Ewa Plantation Company, Industrial Center HABS- No. HI-384.

Tierney, Elisabeth L. *A Brief History of Marine Corps Aviation.* Washington, D.C.: Historical Branch, G-3 Division, Headquarters, U.S. Marine Corps, 1962.

Tuggle, H. David, and M. J. Tomonari-Tuggle. 1997 *A Cultural Resource Inventory of Naval Air Station, Barbers Point, Oahu, Hawaii. Part I: Phase I Survey and Inventory Evaluation Summary.* Honolulu: International Archaeological Research Institute, Inc. (IARII) and Belt Collins Hawaii. July.

Bibliography (Continued)

United States. *Pearl Harbor Attack. Hearings Before the Joint Committee on the Investigation of the Pearl Harbor Attack, Congress of the United States, First Sessions : Pursuant to S. Con. Res. 27 (79th Congress) : a Concurrent Resolution Authorizing an Investigation of the Attack on Pearl Harbor on December 7, 1941, and Events and Circumstances Relating Thereto. Volume 23.* Washington: U.S. G.P.O., 1946.

United States. *Pearl Harbor Operations: General Outline of Orders and Plans.* [Tokyo?]: Distributed by Office of the Chief of Military History, Dept. of the Army, 1953.

United States Bureau of Yards and Docks. *Building the Navy's Bases in World War II; History of the Bureau of Yards and Docks and the Civil Engineer Corps, 1940-1946.* Washington: U.S. Government Printing Office, 1947.

U.S. Navy, Pacific Naval Air Bases ... at the Naval Station Pearl Harbor Hawaii and Pacific Islands, *Volume 10, Appendix B, Appendix "A"* pp.979. (NAVFAC Pacific Library Microfilm Drawer VA69.5, 02, Vol. 6.)

U.S. Navy, Fourteenth Naval District, Bureau of Yards and Docks. 1945. *Public Works of the Navy Data Book, Buildings: NAVDOCS P -164, July 1945.* Available at NAVFAC Archives, Port Hueneme, CA.

USMC Base Hawaii, "Historic Tour and Guide."

United States Strategic Bombing Survey. *The Campaigns of the Pacific War.* [Washington]: U.S. Strategic Bombing Survey (Pacific) Naval Analysis Division, 1946

Weinberg, Gerhard L. *A World at Arms: A Global History of World War II.* (Cambridge [England]: Cambridge University Press, 1994.

"Where the US Pacific Fleet is Centered." *The Glasgow Herald*, 8 December 1941. Electronic document, http://news.google.com/newspapers?id=LT9AAAAAIBAJ&sjid=cVkMAAAAIBAJ&pg=4211%2C4128593

Woodbury, David O., Lili Réthi, and Louis H. Ruyl. *Builders for Battle, How the Pacific Naval Air Bases Were Constructed.* New York: E.P. Dutton and Company Inc, 1946.

Yasui, Shoso, Yoshinubu Oshiro, and Kazuto Tomayasu, iinformant interviews recorded August 2010, recording on file at John Bond, Save Ewa Field.

Yoklavich, Ann K. Historic American Buildings Survey Naval Air Station Barbers Point, Marine Corps Air Station Ewa HABS No. HI-279.

Young, H. L. 1941. *Enterprise Air Group, Report for Pearl Harbor Attack.* After action report. Pearl Harbor, HI: Commander Enterprise Air Group. December 15.

Photographs, Maps, Design Plans

Assorted material from the National Archives and Records Administration (NARA), Record Group 71, Architectural and Engineering Plans, especially 1404-3-89 (6-30-1941 plan), 1445-3-9 (6-30-1948 plan), 1445-30-30 to 32 (conversion of BOQs), 1445-30-33 (3-1945 plan), 1445-32-1 (October 30, 1943 base plan blueprint), 1445-45-1 to 7 (October 16, 1941 Hangar re-erection plans).

Assorted material from the National Archives and Records Administration (NARA), Record Group 80, Entry G, Box 1352 (assorted aerial photographs and other historic photographs of Ewa Field).

Fourteenth Naval District, Photograph Collection (assorted photographs of Ewa Field).

Isamu Murakami Gallery, PicasaWeb, https://picasaweb.google.com/106372957805167415257/MYHOMETOWNEWA#

John Bond, Save Ewa Field, Photograph Collection.

NAVFAC Hawaii, Photograph Collection.

National Park Service, World War II Valor in the Pacific National Monument, Pearl Harbor Naval Complex Photo Collection. Digitized Photographs Provided to GAI Consultants, Inc.

United States Geological Survey, Ewa Quadrangle and Barbers Point Quadrangle, 1927.

Previous documentation on file (NPS):

____ preliminary determination of individual listing (36 CFR 67) has been requested
____ previously listed in the National Register
____previously determined eligible by the National Register
____designated a National Historic Landmark
____ recorded by Historic American Buildings Survey #_____
____recorded by Historic American Engineering Record # _____
____ recorded by Historic American Landscape Survey # _____

Primary location of additional data:

_X_ State Historic Preservation Office
____ Other State agency
_X_ Federal agency
____ Local government
_X_ University
____ Other
Name of repository: _____

Historic Resources Survey Number (if assigned): _____

10. Geographical Data

Acreage of Property 180.0

Use either the UTM system or latitude/longitude coordinates

Latitude/Longitude Coordinates
Datum if other than WGS84:_____
(enter coordinates to 6 decimal places)

1. Latitude: Longitude:
2. Latitude: Longitude:
3. Latitude: Longitude:
4. Latitude: Longitude:

Or

UTM References
Datum (indicated on USGS map):

[ ] NAD 1927 or [X] **NAD 1983**

1. Zone: 4 North	Easting:	598595	Northing:	2359075
2. Zone: 4 North	Easting:	599367	Northing:	2359140
3. Zone: 4 North	Easting:	599447	Northing:	2358823
4. Zone: 4 North	Easting :	599568	Northing:	2358753
5. Zone: 4 North	Easting :	599464	Northing:	2358550
6. Zone: 4 North	Easting :	599585	Northing:	2358443
7. Zone: 4 North	Easting :	599189	Northing:	2358311
8. Zone: 4 North	Easting :	599186	Northing:	2358218
9. Zone: 4 North	Easting :	598624	Northing:	2358193
10.Zone: 4 North	Easting :	598777	Northing:	2358409
11.Zone: 4 North	Easting :	598593	Northing:	2358515
12.Zone: 4 North	Easting :	598611	Northing:	2358597

Verbal Boundary Description (Describe the boundaries of the property.)

The northern boundary follows Roosevelt Avenue, which becomes Geiger Road, in a general southeastern direction to the southeast corner of the battlefield, adjacent and west of the golf course. From there, it turns west to the southwest corner of the 1941 limits of Ewa Field before turning again in a general north direction, curving around the FAA beacon fence line, ending at the northwest corner of the battlefield.

The boundary is also detailed in the multiple UTM references encompassing the overall battlefield.

Boundary Justification (Explain why the boundaries were selected.)

The proposed National Register boundary encompasses the core area of battle action that retains integrity. This includes the 1941 boundary of Ewa Mooring Mast Field (less disturbed locations at the periphery of the base). Upon further, more intensive investigations, the proposed boundary should be reevaluated to include potentially associated archaeological remains and portions of Ewa Plantation Villages.

11. Form Prepared By

Name/title: Lori Frye, M.A., RPA, Senior Project Archaeologist and Benjamin Resnick, M.A., RPA, Senior Director
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City or town: Homestead, State: Pennsylvania, Zip code: 15120
E-mail: l.frye@gaiconsultants.com; b.resnick@gaiconsultants.com
Telephone: 412-476-2000
Date: December 31, 2013

Additional Documentation

Submit the following items with the completed form:

- **Maps:** A **USGS map** or equivalent (7.5 or 15 minute series) indicating the property's location.
- **Sketch map** for historic districts and properties having large acreage or numerous resources. Key all photographs to this map.
- **Additional items:** (Check with the SHPO, TPO, or FPO for any additional items.)
- **Photographs**

  Submit clear and descriptive photographs. The size of each image must be 1600x1200 pixels (minimum), 3000x2000 preferred, at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map. Each photograph must be numbered and that number must correspond to the photograph number on the photo log. For simplicity, the name of the photographer, photo date, etc. may be listed once on the photograph log and doesn't need to be labeled on every photograph.

Photo Log

Name of Property: Ewa Plain Battlefield

City or Vicinity: Honolulu

County: Honolulu State: Hawaii

Photographer: Lori A. Frye, M.A., RPA

Date Photographed: June, 2013

Description of Photograph(s) and number, include description of view indicating direction of camera:

Photo 1 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0001.tif)
Overview, Ewa Plain, camera facing southeast

Photo 2 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0002.tif)
Cluster Spalling from Aircraft Strafing, December 7, 1941, camera facing southwest

Photo 3 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0003.tif)
Linear Spalling from Aircraft Strafing, December 7, 1941, camera facing southeast

Photo 4 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0004.tif)
Hangar Foundation, camera facing southeast

Photo 5 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0005.tif)
Vicinity, Enlisted Barracks, camera facing north

Photo 6 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0006.tif)
Overview of BOQ C Foundation, camera facing east

Photo 7 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0007.tif)
Foundation, Officer's Latrine, camera facing north

Photo 8 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0008.tif)
Foundation, Boiler Room, Tank Cradles Visible in Background, camera facing north

Photo 9 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0009.tif)
Detail, Swimming Pool, camera facing north

Photo 10 of 19 (HI_Honolulu County_Ewa Plain Battlfield_0010.tof)
Cement Deck, Swimming Pool Vicinity, camera facing southeast

Photo 11 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0011.tif)
Detail, OR&L Railroad Tie, camera facing west

Photo 12 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0012.tif)
Vicinity of Underground Fuel Tanks, camera facing southwest south

Photo 13 of 19 (HI_Honolulu County_Ewa Plain Battlfield_0013.tif)
Detail, Vault, Underground Fuel Tank, camera facing west

Photo 14 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0014.tif)
Vicinity of Flagpole, camera facing west

Photo 15 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0015.tif)

Storage Building Foundation, camera facing southeast

Photo 16 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0016.tif)

Open Field, Northwest Quadrant, Ewa Field Camp Area, camera facing northwest

Photo 17 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0017.tif)

Philippine Sea Road in Foreground. Roosevelt Avenue to Left of Photograph. Cold War-era Building to Right. , camera facing east

Photo 18 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0018.tif)

Solar Array, South of Runways, camera facing north

Photo 19 of 19 (HI_Honolulu County_Ewa Plain Battlefield_0019.tif)

Victor Pantohan (left) and brother, June 2013, camera facing northwest

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C.460 et seq.).
Estimated Burden Statement: Public reporting burden for this form is estimated to average 100 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Office of Planning and Performance Management. U.S. Dept. of the Interior, 1849 C. Street, NW, Washington, DC

Appendix B. Japanese Order of Battle, December 7, 1941.[248]

Imperial Japanese Navy Order of Battle, December 7, 1941
Naval General Staff—Admiral Nagano Osami
Combined Fleet Admiral Yamamoto Isoroku
First Air Fleet Vice Admiral Nagumo Chuichi
First Carrier Division Vice Admiral Nagumo Chuichi
CV Akagi—Captain Hasegawa Kiichi Air Officer—Commander Masuda Shogo VTB Leader—Commander Fuchida Mitsuo 1st Squadron (5xB5N2 "Kate")—CDR Fuchida 2nd Squadron (5xB5N2 "Kate") 3rd Squadron (5xB5N2 "Kate") VT Leader—LCDR Murata 1st Squadron (3xB5N2 "Kate")—LCDR Murata Shigeharu 2nd Squadron (3xB5N2 "Kate") 3rd Squadron (3xB5N2 "Kate") 4th Squadron (3xB5N2 "Kate") VB Leader—LT Chihaya 21st Squadron (3xD3A1 "Val")—LT Chihaya 22nd Squadron (3xD3A1 "Val") 23rd Squadron (3xD3A1 "Val") 25th Squadron (3xD3A1 "Val") 26th Squadron (3xD3A1 "Val") 27th Squadron (3xD3A1 "Val") VF Leader—LCDR Itaya 1st FCU Wave 1 (9xA6M2 "Zeke")—LCDR Itaya Shigeru 1st FCU Wave 2 (9xA6M2 "Zeke")—LT Shindo CAP (9xA6M2 "Zeke")
CV Kaga—Captain Okada Jisaku Air Officer—Commander Sata Naohito VTB Leader--LCDR Hashiguchi 1st Sqdn (5xB5N2 "Kate")—LCDR Hashiguchi 2nd Squadron (5xB5N2 "Kate") 3rd Squadron (5xB5N2 "Kate") VT Leader—LT Kitajima 1st Squadron (3xB5N2 "Kate")—LT Kitajima 2nd Squadron (3xB5N2 "Kate") 3rd Squadron (3xB5N2 "Kate") 4th Squadron (3xB5N2 "Kate") VB Leader—LT Makino 21st Squadron (3xD3A1 "Val")—LT Makino 22nd Squadron (3xD3A1 "Val") 23rd Squadron (3xD3A1 "Val")

[248] Joseph Czarnecki, Richard Worth, Matthias C. Noch, Mark E. Horan and Tony DiGiulian . Order of Battle Pearl Harbor 7 December 1941, http://www.navweaps.com/index_oob/OOB_WWII_Pacific/OOB_WWII_Pearl_Harbor.htm

24th Squadron (3xD3A1 "Val") 25th Squadron (3xD3A1 "Val") 26th Squadron (3xD3A1 "Val") 27th Squadron (3xD3A1 "Val") 28th Squadron (3xD3A1 "Val") 29th Squadron (3XD3A1 "Val") VF Leader—LT Shiga 2nd FCU Wave 1 (9xA6M2 "Zeke")—LT Shiga 2nd FCU Wave 2 (9xA6M2 "Zeke")—LT Nikaido CAP (9xA6M2 "Zeke")
Destroyer Division 7 (Midway Attack Unit) DD Ushio (Fubuki Class) DD Sazanami (Fubuki Class)
Second Carrier Division Rear Admiral Yamaguchi Tamon
CV Soryu—Captain Yanagimoto Ryusaku Air Officer—Commander Kusumoto Ikuto VTB Leader—LT Abe 1st Squadron (5xB5N2 "Kate")—LT Abe 2nd Squadron (5xB5N2 "Kate") VT Leader—LT Nagai 1st Squadron (2xB5N2 "Kate")—LT Nagai 2nd Squadron (2xB5N2 "Kate") 3rd Squadron (2xB5N2 "Kate") 4th Squadron (2xB5N2 "Kate") VB Leader—LCDR Egusa 21st Squadron (3xD3A1 "Val")—LCDR Egusa Takeshige 22nd Squadron (3xD3A1 "Val") 23rd Squadron (3xD3A1 "Val") 24th Squadron (3xD3A1 "Val") 25th Squadron (3xD3A1 "Val") 26th Squadron (3xD3A1 "Val") VF-Leader—LT Suganami 3rd FCU Wave 1 (9xA6M2 "Zeke")—LT Suganami 3rd FCU Wave 2 (9xA6M2 "Zeke")—LT Iida CAP (9xA6M2 "Zeke")
CV Hiryu—Captain Kaku Tomeo Air Officer—Commander Amagai Takahisa VTB Leader—LCDR Kosumi 1st Squadron (5xB5N2 "Kate")—LCDR Kosumi 2nd Squadron (5xB5N2 "Kate") VT Leader—LT Matsumura 1st Squadron (2xB5N2 "Kate")—LT Matsumura 2nd Squadron (2xB5N2 "Kate") 3rd Squadron (2xB5N2 "Kate") 4th Squadron (2xB5N2 "Kate") VB Leader—LT Kobayashi 21st Squadron (3xD3A1 "Val")—LT Kobayashi 22nd Squadron (3xD3A1 "Val") 23rd Squadron (3xD3A1 "Val")

24th Squadron (3xD3A1 "Val") 25th Squadron (3xD3A1 "Val") 26th Squadron (3xD3A1 "Val") VF Leader—LT Okajima 4th FCU Wave 1 (6xA6M2 "Zeke")—LT Okajima 4th FCU Wave 2 (9xA6M2 "Zeke")—LT Nono CAP (9xA6M2 "Zeke")
Fifth Carrier Division Rear Admiral Hara Chuichi
CV Shokaku (Shokaku Class)—Captain Jojima Takatsugu Air Officer—Commander Wada Tetsujiro VTB Leader—LCDR Shimazaki 1st Sqdn (9xB5N2 "Kate")—LCDR Shimazaki Shigekazu 2nd Squadron (9xB5N2 "Kate") 3rd Squadron (9xB5N2 "Kate") VB Leader—LCDR Takahashi 1st Sqdn (9xD3A1 "Val")—LCDR Takahashi Kakuichi 2nd Squadron (9xD3A1 "Val") 3rd Squadron (9xD3A1 "Val") VF Leader—LT Kaneko 5th FCU Wave 1 (6xA6M2 "Zeke")—LT Kaneko CAP (9xA6M2 "Zeke")
CV Zuikaku (Shokaku Class)—Captain Yokokawa Ichibei Air Officer—Commander Shimoda Hisao VTB Leader—LT Ichihara 1st Squadron (9xB5N2 "Kate")—LT Ichihara 2nd Squadron (9xB5N2 "Kate") 3rd Squadron (9xB5N2 "Kate") VB Leader—LCDR Sakamoto 1st Sqdn (9xD3A1 "Val")—LCDR Sakamoto Akira 2nd Squadron (9xD3A1 "Val") 3rd Squadron (9xD3A1 "Val") VF Leader—LT Sato 6th FCU Wave 1 (6xA6M2 "Zeke")—LT Sato CAP (9xA6M2 "Zeke")
DD Akigumo (Yugumo Class)
Battleship Division 3 Vice Admiral Mikawa Gunichi
BB Hiei BB Kirishima
Cruiser Division 8
CA Tone CA Chikuma
Destroyer Squadron 1 Rear Admiral Omori Sentaro
CL Abukuma (Nagara Class)
Destroyer Division 17 DD Urakaze (Kagero Class) DD Isokaze (Kagero Class)

DD Tanikaze (Kagero Class) DD Hamakaze (Kagero Class)
Destroyer Division 18 (Detached from DesRon 2) DD Kagero (Kagero Class) DD Shiranuhi (Kagero Class) DD Arare (Asashio Class) DD Kasumi (Asashio Class)
Midway Destruction Unit Captain Ohishi Kaname DD Akebono (Fubuki Class) DD Ushio (Fubuki Class)
Submarine Division 2 Captain Imaizumi Kijiro SS I-19 (I-15 Class/Type B1) SS I-21 (I-15 Class/Type B1) SS I-23 (I-15 Class/Type B1)
1st Supply Train AO Kyokuto Maru (Merchant conversion) AO Kenyo Maru (Merchant conversion) AO Kokuyo Maru (Merchant conversion) AO Shinkiku Maru (Merchant conversion) AO Akebono Maru (Merchant conversion)
2nd Supply Train AO Toho Maru (Merchant conversion) AO Toei Maru (Merchant conversion) AO Nippon Maru (Merchant conversion)
Sixth (Submarine) Fleet Vice Admiral Shimizu Mitsumi
1st Submarine Squadron Rear Admiral Sato Tsutomu SS I-9 (I-9 Class/Type A1) SS I-15 (I-15 Class/Type B1) SS I-17 (I-15 Class/Type B1) SS I-25 (I-15 Class/Type B1)
2nd Submarine Squadron Rear Admiral Yamazaki Shigeaki SS I-7 (I-7 Class/Type J3) SS I-1 (I-1 Class/Type J1) SS I-2 (I-1 Class/Type J1) SS I-3 (I-1 Class/Type J1) SS I-4 (I-1 Class/Type J1) SS I-5 (I-5 Class/Type J1M) SS I-6 (I-6 Class/Type J2)
3rd Submarine Squadron Rear Admiral Miwa Shigeyoski SS I-8 (I-7 Class/Type J3) SS I-68 (I-68 Class/Type KD6A) SS I-69 (I-68 Class/Type KD6A) SS I-70 (I-68 Class/Type KD6A)

SS I-71 (I-68 Class/Type KD6A) SS I-72 (I-68 Class/Type KD6A) SS I-73 (I-68 Class/Type KD6A) SS I-74 (I-74 Class/Type KD6B) SS I-75 (I-74 Class/Type KD6B)
Special Attack Unit Captain Sasaki Hanku (Mother Submarines Commander) Lt. Naoji Iwasa (Mini-submarines Commander)
SS I-22 (F) (I-16 Class/Type C1) MSS I-22A (A type) SS I-16 (I-16 Class/Type C1) Lt. Cmdr. Hiroshi Hanabusa MSS (mini-submarine) I-16 A (A type)—Ensign Sakamaki Kazuo (USA's first POW) SS I-18 (I-16 Class/Type C1) MSS I-18A (A type) SS I-20 (I-16 Class/Type C1) MMS I-20A (A type) SS I-24 (I-16 Class/Type C1) MSS I-24A (A type)
Submarine Reconnaissance Unit Commander Kashihara Yasuchika SS I-10 (I-9 Class/Type A1) SS I-26 (I-26 Class/Type B1) Cmdr Minoru Yokota

Appendix C. United States Military Airfields of the World War II Pacific.				
Area	Island Group	Name of Installation (Island or Region Where Located)	Date of American Military Utilization, Commission, or Construction	Date of American Military Abandonment or Deactivation
Central & Southern Pacific US Possessions	Hawaii	Barking Sands Airfield, Kaua'i	1940	Presently US military (Pacific Missile Range Facility Barking Sands)
		Burns Airfield, Kaua'i	1930	1947
		Bellows Field, Oahu	1917	Presently US military (Bellows Air Force Station)
		Ewa Field	1925 (US Navy)	1952
		Haleiwa Airfield, Oahu	1940	1946
		Hickam Field, Oahu	1935	Presently US military (Hickam Air Force Base)
		Kahuku Air Base, Oahu	1941	circa 1947
		Kaneohe Airfield, Oahu	1918	Presently US military (Marine Corps Air Station Kaneohe Bay)
		Luke Field, Oahu	1918	1962
		Mokuleia Airfield, Oahu	1922	Presently US military (Dillingham Airfield)
		Putnam Airfield, Oahu	1922	1945
		Wheeler Army Air Base, Oahu	1922	Presently US military (Wheeler Army Airfield)
		Lyman Airfield, Hawaii	1941	1947
		Morse Airfield, Hawaii	1940	1946
		Suiter Airfield, Hawaii	1944	1947
		Hana Airfield, Maui	1941	1947
		Puunene Airfield, Maui	1940	1945
		Lanai City Airfield, Lāna'i	1941	1947
		Kalaupapa Airfield, Moloka'i	1941	1947
		Molokai Airfield, Moloka'i	1941	1947
	French Frigate Shoals	Naval Air Facility French Frigate Shoals, French Frigate Shoals	March 1943	1946
	Johnston Island	Johnston Airfield, Johnston Island	1936	2005
	Line Islands	Lowe Field, Palmyra Island	1941	1947
	Midway Atoll	Eastern Island Airfield, Eastern Island	18 August 1941	1993

	Wake Island	NAS Wake Island, Wake Island	August 1941	1947
South Pacific Area	American Samoa	Tafuna Airfield, Samoa	1942	1945
	Fiji	Nandi Airfield, Viti Levu Island	1942	1945
		Lautoka Airfield, Viti Levu Island	1942	1945
		Nausori Airfield, Viti Levu Island	1942	1945
	New Caledonia Island	Magenta Airfield, New Caledonia	1942	1945
		Tontouta Airfield, New Caledonia	1942	1945
		Koumac Airfield, New Caledonia	Pre-war	1945
		Plaine Des Gaiacs Airfield, New Caledonia	1942	1945
	New Hebrides Islands	Lunganville Airfield, Espiritu Santo	1943	1945
		Pallikulo Field, Espiritu Santo	1943	1945
		Pekoa Field, Espiritu Santo	1943	1945
		Turtle Bay Airfield, Espiritu Santo	1943	1945
		Bauerfield Airfield, Efate Island	1943	1945
		Quoin Hill Airstrip, Efate Island	1943	1945
		Havannah Harbor Fighter Strip, Efate Island	1943	1945
	Society Islands	Navy Air Station Bora Bora, Bora Bora	1943	1946
		Army Airfield, Bora Bora	1943	1946
	Solomon Islands	Henderson Field, Guadalcanal	1942	1945
		Kukum Field, Guadalcanal	1 January 1943	1945
		Carney Field, Guadalcanal	19 December 1942	1945
		Lunga Field, Guadalcanal	9 February 1942	1945
		Koli Field, Guadalcanal	October 1943	1945
		Fighter 3, Guadalcanal	1943	1945
		Naval Air Base Guadalcanal, Guadalcanal	15 February 1943	12 June 1946
		Banika Airfield, Banika Island	March 1943	1945
		Renard Field, Banika Island	June 1943	1945
		Segi Point, New Georgia Island	July 1943	1945
		Munda Airfield, New Georgia Island	August 1943	March 1945
		Ondonga Airfield, Ondonga Island	23 October 1943	March 1945
		Barakoma Airfield, Vella Lavella Island	September 1943	1945
		Naval Advance Base, Vella Lavella Island	8 October 1943	15 June 1944
		Pavavu Airfield, Pavavu Island	1944	1945
	Solomon Islands (continued)	Stirling Airfield, Stirling Island	24 December 1943	1945
	Tonga Islands	Army Airfield, Tongatabu Island	May 1942	1943
	Wallis and	Hihifo Airfield, Wallis Island	October 1942	1945

	Futuna	Fighter Strip, Wallis Island	1942	1945
Southwest Pacific Area	Indonesia	Mokmer Airfield, Biak	July 1944	19 January 1946
		Borokoe Airfield, Biak	July 1944	19 January 1946
		Sorido Airfield, Biak	August 1944	19 January 1946
		Kamiri Airfield, Noemfoor Island	July 1944	1945
		Namber Airfield, Noemfoor Island	31 August 1944	1945
		Yebrurro Airfield, Noemfoor Island	July 1944	1945
		Owi Airfield, Irian Jaya	21 June 1944	19 January 1946
		Sanspor Airfield, Irian Jaya	November 1944	1945
		Hollandia Airfield, Irian Jaya	6 June 1944	1 July 1945
		Middleburg Airfield, Irian Jaya	1944	1945
		Wakde Airfield, Irian Jaya	May 1944	19 January 1946
		Sentani Airfield, Irian Jaya	1944	1945
		Cyclops Airfield, Irian Jaya	1944	1945
		Tami Airfield, Irian Jaya	April 1944	1945
		Wama Airfield, Morotai	September 1944	1945
		Pitu Airfield, Morotai	March 1945	1945
	Papua New Guinea	Navy Advance Base, Thursday Island	May 1943	July 1944
		Kila Kila, Papua New Guinea	October 1943	1945
		Ward Drome, Papua New Guinea	1943	1945
		Jackson Drome, Papua New Guinea	September 1941	1945
		Berry Drome, Papua New Guinea	15 May 1943	1945
		Schwimmer Drome, Papua New Guinea	1942	1945
		Durand Drome, Papua New Guinea	August 1942	1945
		Rogers Drome, Papua New Guinea	June 1942	1945
		Mount Hagen Airfield, Papua New Guinea	1942	1945
		Daru Airfield, Papua New Guinea	1942	1945
		Tadji, Papua New Guinea	24 April 1944	1945
		Telefomin Airfield, Papua New Guinea	1944	1945
		Horanda Drome, Papua New Guinea	1943	1945
		Girua Airfield, Papua New Guinea	1943	1945
		Embi Airfield, Papua New Guinea	1943	1945
		Talasea Airfield, Papua New Guinea	March 1944	1945
		Lae Airfield, Papua New Guinea	February 1944	1945
		Gusap Airfield, Papua New Guinea	May 1944	1945
		Tsili Tsili Airfield, Papua New Guinea	1943	1945
		Finschafen Airfield, Papua New Guinea	December 1943	1945
		Naval Advance Base, Aitape, Papua New Guinea	April 1944	November 1945
		Nadzab Airbase Complex, Papua New Guinea	September 1943	1945
		Ocean Airfield, Bougainville	29 March 1944	1945
		Lagoon Airfield, Bougainville	February 1944	1945

		Torokina Airfield, Bougainville	10 December 1943	1945
		Piva Bomber Field, Bouganville	30 December 1943	March 1945
		Piva Fighter Field, Bouganville	21 January 1944	March 1945
		Gurney Airfield, Milne Bay	August 1942	1945
		Turnbull Airfield, Milne Bay	September 1942	1945
		Kiriwina Airfield, Milne Bay	12 October 1943	1945
		Vivigani Airfield, Goodenough Island	December 1943	1945
		Narewa Airfield, Woodlark Island	October 1943	1945
		Momote Airfield, Los Negros Island	March 1944	1945
		Mokerang Airfield, Los Negros Island	1944	1945
		Emirau Airfield, Emirau	28 April 1944	1945
	Australia	Bankstown Airfield, Bankstown	1942	1945
		Ballarat Airfield, Victoria	1942	1945
		Mount Gambier Airfield, South Australia	1942	1945
		Fenton Airfield, Northern Territory	1942	1944
		Daly Waters Airfield, Northern Territory	1942	1945
		Mareeba Airfield, Queensland	1942	1943
		Reid River Airfield, Queensland	1942	1943
		Antil Plains Airfield, Queensland	1942	1945
		Charter Towers Airfield, Queensland	1942	1943
		Cloncurry Airfield, Queensland	1942	1945
		NAS Palm Island, Queensland	1943	1943
	The Philippines	Guiuan Airfield, Samar Island	14 January 1945	1945
		Mandurriao Airfield, Panay Island	December 1944	1945
		Santa Barbara Airfield, Panay Island	1941	1945
		Zamboanga Airfield, Mindanao	18 March 1945	1945
		San Roque Airfield, Mindanao	March 1945	1945
		Del Monte Airfield, Mindanao	1941	1941
		Malaybalay Airfield, Mindanao	May 1945	1945
		Malabang Airfield, Mindanao	Pre-1941	1945
		Clark Field, Luzon	1917	1991
		Zablan Airfield, Luzon	Pre-1941	1945
		Mangaldan Airfield, Luzon	January 1945	1945
		Nielson Airfield, Luzon	Pre-1941	1947
		Lipa Airfield, Luzon	Pre-1941	Presently US military (Fernando AFB)
		Tanauan Airfield, Luzon	December 1941	1942
		Del Carmen Airfield	Pre-1941	1945
		San Marcelino Field	Pre-1941	1945
		Iba Field	Pre-1941	1942

		Orani Airfield, Luzon	1941	1942
		Bataan Airfield, Luzon	1941	1942
		Pilar Airfield, Luzon	1941	1942
		Legaspi Airfield, Luzon	Pre-1941	1945
		Cacaben Airfield	1942	1942
Central Pacific Area	Caroline Islands	Falalop Airfield, Ulithi	1 December 1941	1945
		Sorlen Airfield, Yap	January 1945	1945
	Ellice Islands	Nanumea Airfield, Tuvalu	October 1943	1945
		Fanufuti Airfield, Tuvalu	1942	1945
		Motulalo Airfield, Tuvalu	November 1943	1945
		Baker Island Airfield, Baker Island	1 September 1943	1945
		Kamakaiwi Airfield, Howland Island	mid-1930s	1941
	Gilbert Islands	Bonriki Airfield, Gilbert Islands	November 1943	1945
		Tarawa Field, Gilbert Islands	November 1943	1945
		Abemama Airfield, Gilbert Islands	November 1943	1945
		Canton Airfield, Canton Island	November 1941	1945
	Mariana Islands	North Field, Guam	November 1944	Presently US military (Anderson AFB)
		Northwest Field, Guam	1945	Presently US military (auxiliary to Anderson AFB)
		Depot Field, Guam	1945	1945
		Orote Airfield, Guam	1921	1946
		Isley Field, Saipan	September 1944	1945
		Marpi Point, Saipan	1944	1945
		East Field, Saipan	December 1944	1960s
		Kobler Airfield, Saipan	1944	1945
		Ushi Point Airfield, Tinian	December 1944	1945
		Gurguan Point Airfield, Tinian	1944	1945
	Marshall Islands	Kwajalein Airfield, Kwajalein Atoll	31 January 1944	1945
		Engebi Airfield, Engebi Island	March 1944	1945
		Roi Airfield, Roi Island	December 1944	1945
		Majuro Airfield, Dalop Island	15 April 1944	1945
		Enewetak Airfield, Enewetak Island	February 1944	1945

Source: Bureau of Yards and Docks 1947; Pacific Wrecks 2011; Rottman 2002.

Appendix D: Japanese Attack Plan

First Attack [249]

The first attack was designed to land a crippling blow on the US Navy, as well, as destroy the aviation forces on the island. The main objectives were the destruction of the large capital ships of the American fleet (the battleships and the carriers), as well as destruction of airfields and their airplanes. The destruction of the airfields and the airplanes was so successful during the first wave that the attacks planned during the second wave focused on secondary targets (for a lack of targets at the airfields).

I. Horizontal Bombing Unit (50 Type 97 Carrier Attack Planes)
Target : Battleships
Considerations:
   a. It was presumed that the American battleships could be effectively crippled by 800-kg armor piercing bombs, dropped from an altitude of 3,000 meters or more.
   b. Horizontal bombing is relatively inaccurate. However, it was estimated, considering the degree of training of the bombing units, that four out of five salvos could be placed on stationary battleships if formation of five airplanes were employed from an altitude of 3,000 meters or more. Therefore it was concluded that about four battleships could be effectively crippled with 10 formations of type 97 bombers.
   c. Because of the accuracy of torpedo attacks, it was desired to use as many torpedoes as possible. However both bombing attacks and torpedo attacks were used for the following reasons:
      1. If torpedo nets were laid, the torpedo attacks would be unsuccessful.
      2. Launching torpedoes in shallow water such as that at Pearl Harbor required special technique.
      3. Ordinarily, ships were moored in pairs breast each other. Consequently, bombing attacks were the only effective method against the inside ships.

II. Torpedo Unit (40 Type 97 Carrier Attack Planes)
Target: Battleships and Aircraft Carriers
Considerations:
   a. Short range torpedo runs are very accurate. Therefore the pilots most skillful at shallow water torpedo drops were selected in order to put as many battleships and carriers temporarily out of action due to underwater damage as the conditions mentioned would permit. (Because the carriers were not at their anchorages on the day of the attack, the planes concentrated on the battleships).

III. Dive Bombing Unit (54 Type 99 Carrier Bombers)
Target: Air Bases
No. 15 Attack Unit (27 A/C): Hangars and grounded airplanes at Ford Island.
No. 16 Attack Unit (27 (A/C): Hangars and grounded airplanes at Wheeler Field.
Considerations:
   a. Since the primary objective of the attack on Pearl Harbor was to put the United States Pacific Fleet temporarily out of action, the primary targets were battleships and carriers. However fighter plane bases were to be attacked first because it was necessary to prevent a counterattack by American fighter planes against the horizontal bombing and torpedo units.

[249] United States Strategic Bombing Survey. *The Campaigns of the Pacific War.*, 16-18.

b. It was known that Wheeler Field was a United States Army fighter plane base and that carrier planes from the United States Pacific Fleet were usually kept at Ford Island.

III. Fighter Striking Unit (45 Type Zero Carrier Fighters)
Targets: Airborne planes, grounded planes.
No. 2 Fighter Striking Unit--Ford Island and Hickam.
No. 4 Fighter Striking Unit--Wheeler and Ewa.
No. 6 Fighter Striking Unit--Kaneohe.
Considerations:

a. At the beginning of the attack the fighter striking unit was to maintain a single formation and patrol over Oahu, attacking any airborne enemy fighter planes.
b. If no fighter opposition was met in the air, the unit was to split up as indicated above and attack grounded airplanes on the various airfields on Oahu, thereby preventing a counterattack against the Task Force.

Second Attack.

I. Horizontal Bombing Unit (54 Type 97 Carrier Attack Planes)
Target: Air Bases
No. 6 Attack Unit: Hangars and grounded aircraft at Hickam.
No. 5 Attack Unit: Hangars and grounded aircraft at Kaneohe, Ford Island and Ewa.
Considerations:

a. By putting the American airplanes on Oahu temporarily out of action, counterattack against the Task Force could be prevented.

II. Dive Bombing Unit (81 Type 99 Carrier Bombers)
Target: Aircraft Carriers and Cruisers.
Considerations:

a. Although the 250-kg. bombs which the airplanes were able to carry could not pierce the armor of the battleships, it was estimated that they would be effective against United States cruisers and carriers.
b. It was estimated that there were then four or five American carriers operating in the Hawaiian Area. They were the targets of this dive bombing unit. (Since the aircraft carriers were not at their anchorages on the day of the attack, most of the blows were directed against battleships).

III. Fighter Striking Unit (36 Type Zero Fighters)
Target: Airborne airplanes, grounded airplanes
No. 2 Fighter Striking Unit--Ford Island and Hickam.
No. 4 Fighter Striking Unit--Wheeler and Kaneohe.
Considerations:

a. By destroying enemy aircraft counterattacks against air units and the surface forces would be prevented.
b. According to the schedule, the first Japanese aircraft took off from their carriers, located 200 miles north of Oahu, at 0600 (Hawaiian Time). The second wave of aircraft followed approximately one hour and fifteen minutes later. Both waves made their approach at an altitude of 3,000 meters above a dense cloud layer at 2,000 meters which provided cover from being spotted by ships at sea. The first group arrived at Oahu at 0740, and below is a list of the first targets.[250]

[250] United States Strategic Bombing Survey. *The Campaigns of the Pacific War.*, 16-18.

Targets of the Japanese's First Wave.[251]

Unit	Target	Time
Dive Bombing Unit	Wheeler Field	0755
Torpedo Attack Unit	Battleships	0757
Fighter Striking Unit	Grounded Aircraft	0800
Horizontal Bombing Unit	Battleships	0805

[251] United States Strategic Bombing Survey. *The Campaigns of the Pacific War.*, 16-18.

Appendix E. Japanese Carriers used in the attack on Ewa Field, December 7, 1941

Name	Hiryu	Kaga (as built)	Kaga (as reconstructed)
Builder	Yokosuka Naval Dockyard	Kawasaki Dockyard Company and Yokosuka Naval	-
Laid Down	8-July-36	19-Jul-20	-
Launched	16-Nov-37	17-Nov-21	-
Commissioned	5-Jul-39	31-Mar-28	-
Displacement	17,300 tons (standard); 20,250(normal)	26,000 tons (standard); 33,693 tons (normal)	38,200 tons (standard); 42,541 tons (normal)
Length	745 ft 11 in (OA); 721 ft 9 in (WL); 687 ft 5 in (PP)	782 ft 6 in (OA), 771 ft 0 in (WL), 715 ft 1 in (PP)	812 ft 6 in (OA), 788 ft 5 in (WL), 738 ft 2 in (PP)
Width	73 ft 3 in	97 ft 0 in	106 ft 8 in
Draught	25 ft 9 in	26 ft 0 in	31 ft 1 in
Machinery	four sets geared turbines, eight Kampon boilers; four shafts	Brown-Curtiss geared turbines, 12 Kampon boilers, four shafts	Kampon geared turbines, eight Kampon boilers, four shafts
Performance	153,000shp; 34.5 knots	91,000shp; 28.5 knot	127,400 shp; 28 knots
Bunkerage	4,400 tons fuel oil (approx)	3,600 tons fuel oil; 1,700 tons coal	8,208 tons fuel oil, 600 tons avgas
Range	10,330 nm at 18 knots	8,000nm at 14 knots	10,000 nm at 16 knots
Flight-deck dimensions	711 ft 6 in x 88 ft 6 in	560 ft 0 in by 100 ft 0in, plus 60 ft (approx) and 160 ft (approx) flying-off platforms at hangar-deck levels	815 ft 6 in x 100 ft 0 in

Appendix E. Japanese Carriers used in the attack on Ewa Field, December 7, 1941 (Continued)

Name	Hiryu	Kaga (as built)	Kaga (as reconstructed)
Elevators	three (42 ft 8 in by 52 ft 6 in, 42 ft 8 in by 39 ft 4 in, 38 ft 8 in by 42 ft 8 in	two (37 ft 8 in by 39 ft 5 in, 35 ft 0 in by 52 ft 0 in)	three (37 ft 8 in bu 39 ft 5 in, 35 ft 0 in by 52 ft 0 in, 42 ft 0 in by 31ft 5in)
Arrester Wires	six aft, three forward, all hydraulic	six (electrically controlled)	nine (hydraulically controlled)
Hangar Decks	Two	three (upper, middle, and lower; lower used for disassembled aircraft stowage only)	three (upper, middle, and lower; lower used for disassembled aircraft stowage only)
Hangar Dimensions	upper 562 ft by 60 ft by 15ft (approx), lower 467 ft by 60 ft by 14ft (approx); 61,740 sq ft (approx)	upper 415 ft x 65 ft (approx), middle 470 ft x 75 ft (approx), lower 116 ft x 48 ft (approx); upper and middle hangar area 62,225 sq ft (approx), lower hangar	upper and middle 615 ft by 88 ft (approx), lower 116 ft x 48 ft (approx); upper and middle hangar area 108,240 sq ft (approx), lower hangar 5,568 sq ft (approx)
Aircraft	73	60	91
Armament	12 x 5 in/40-cal DP, 31x25mm AA	10 by 8 in/50-cal LA, 12 by 4.7in/45-cal HA, 2 MGs	10 by 8 in/50-cal LA, 16 by 5 in/40-cal DP, 22 by 25 mm AA
Armor	3.5 in belt (magazines 5.9in), 1in deck (2.2in over the magazines)	6 in belt, 1.5 in deck	6 in belt, 1.5 in deck
Complement	1,100	1,340	2,016

Appendix F. Japanese Aircraft used in the attack on Ewa Field

Make and Model	Official Designation	Subsequent Allied Code Name	Description	Crew	Power Plant	Armament	Bomb Load	Dimensions	Weight	Performance
Mitsubishi A6M2 Model 21	Type 0 carrier fighter	"Zeke"	Single-engine single-seat carrier-borne and land-based fighter	1	1 Nakajima NK1C Sakae 12 14-cylinder air-cooled radial, 940hp at takeoff, driving a 3-bladed propeller	2x7.7mm Type 97 machine guns and 2 x 20mm Type 99 cannon	2x60kg (132lb) bombs, 1x330-liter (72.6-imp-gal) drop tank	39ft 4in (span); 29ft 8in (length); 11ft 6in (height)	3,704lb (empty); 5,313lb (loaded)	332mph at 14,930ft (maximum speed); 207mph (cruising speed); 19,685ft in 7min 27sec (climb); 32,810ft (service ceiling); 1,010nm (1,675nm max) (range)
Nakajima B5N2	Type 97 carrier attack aircraft	"Kate"	Single-engine 3-seat carrier-borne torpedo bomber	3 (pilot, observer/ navigator/ bomb aimer, radio operator/ gunner)	1 Nakajima NK1B Sakae 11 14-cylinder air-cooled radial, 1,000hp at takeoff, driving a 3-bladed propeller	1 flexible rear-firing 7.7mm Type 92 machine gun	1x800kg (1,764lb) torpedo or 800kg (1,764lb) of bombs	50ft 10in (span); 33ft 9in (length); 12ft 1in (height)	5,024lb (empty); 8,378lb (loaded)	235mph at 11,810ft (maximum speed); 161mph at 11,810ft (cruising speed); 9,845 in 7min 40sec (climb); 27,100ft (service ceiling); 528nm (1,075nm max) (range)
Aichi D3A1	Type 99 carrier bomber	"Val"	Single-engine 2-seat carrier-borne and land-based dive bomber	2	1 Mitsubishi Kinsei 43 14-cylinder air-cooled radical, 1,000hp at takeoff, or Mitsubishi Kinsei 44 14-cylinder air-cooled radial, 1,070hp at takeoff, driving a 3-bladed propeller	2 forward-firing 7.7mm Type 97 machine guns and 1 flexible rear-firing 7.7mm Type 92 machine gun	1x250kg (551lb) bomb under the fuselage and 2x60kg (132lb) bombs under the wings	47ft 1in (span); 33ft 5in (length); 12ft 7in (height)	5,309lb (empty); 8,047lb (loaded)	240mph at 9,845ft (maximum speed); 184mph at 9,845ft (cruising speed); 9,845ft in 6min 0sec (climb); 30,050ft (service ceiling); 795nm (range)

Appendix G. American Naval Ships at Pearl Harbor on 7 December 1941.[252]

Ship Type	Status	Name	Hull Number	Note
Battleships (BB)				
		Pennsylvania	(BB-38)	(in Dry Dock No.1)
	#	Arizona	(BB-39)	
		Nevada	(BB-36)	
	#	Oklahoma	(BB-37)	
		Tennessee	(BB-43)	
	#	California	(BB-44)	
		Maryland	(BB-46)	
	#	West Virginia	(BB-48)	
Heavy Cruisers (CA)				
		New Orleans	(CA-32)	
		San Francisco	(CA-38)	
Light Cruisers (CL)				
		Raleigh	(CL-7)	
		Detroit	(CL-8)	
		Phoenix	(CL-46)	
		Honolulu	(CL-48)	
		St. Louis	(CL-49)	
		Helena	(CL-50)	
Destroyers (DD)				
		Allen	(DD-66)	
		Schley	(DD-103)	
		Chew	(DD-106)	
	*	Ward	(DD-139)	(patrolling Channel entrance to Pearl Harbor)
		Dewey	(DD-349)	
		Farragut	(DD-348)	
		Hull	(DD-350)	
		MacDonough	(DD-351)	
		Worden	(DD-352)	
		Dale	(DD-353)	
		Monaghan	(DD-354)	(preparing to get underway to aid Ward)
		Aylwin	(DD-355)	
		Selfridge	(DD-357)	
		Phelps	(DD-360)	
		Cummings	(DD-365)	
		Reid	(DD-369)	
		Case	(DD-370)	
		Conyngham	(DD-371)	
		Cassin	(DD-372)	(in Dry Dock No.1)

[252] *"Ships and District Craft Present at Pearl Harbor, 0800 7 December 1941," Electronic document, http://www.history.navy.mil/faqs/faq66-2.htm.*

		Shaw	(DD-373)	(in floating drydock YFD-2)
		Tucker	(DD-374)	
		Downes	(DD-375)	(in Dry Dock No.1)
		Bagley	(DD-386)	
		Blue	(DD-387)	
		Helm	(DD-388)	(underway, nearing West Loch)
		Mugford	(DD-389)	
		Ralph Talbot	(DD-390)	
		Henley	(DD-391)	
		Patterson	(DD-392)	
		Jarvis	(DD-393)	
Submarines (SS)				
		Narwhal	(SS-167)	
		Dolphin	(SS-169)	
		Cachalot	(SS-170)	
		Tautog	(SS-199)	
Minelayer (CM)				
	#	Oglala	(CM-4)	
Minesweepers (AM)				
		Turkey	(AM-13)	
		Bobolink	(AM-20)	
		Rail	(AM-26)	
		Tern	(AM-31)	
		Grebe	(AM-43)	
		Vireo	(AM-52)	
Coastal Minesweepers (AMc)				
		Cockatoo	(AMc-8)	
		Crossbill	(AMc-9)	
		Condor	(AMc-14)	
		Reedbird	(AMc-30)	
Light Minelayers (DM)				
		Gamble	(DM-15)	
		Ramsay	(DM-16)	
		Montgomery	(DM-17)	
		Breese	(DM-18)	
		Tracy	(DM-19)	
		Preble	(DM-20)	
		Sicard	(DM-21)	
		Pruitt	(DM-22)	
High Speed Minesweepers (DMS)				
		Zane	(DMS-14)	
		Wasmuth	(DMS-15)	
		Trever	(DMS-16)	
		Perry	(DMS-17)	
Gunboat (PG)				
		Sacramento	(PG-19)	
Destroyer Tenders (AD)				
		Dobbin	(AD-3)	
		Whitney	(AD-4)	

Seaplane Tenders (AV)				
		Curtiss	(AV-4)	
		Tangier	(AV-8)	
Seaplane Tenders (Small) (AVP)				
		Avocet	(AVP-4)	
		Swan	(AVP-7)	(on Marine Railway)
Seaplane Tenders (Destroyer) (AVD)				
		Hulbert	(AVD-6)	
		Thornton	(AVD-11)	
Ammunition Ship (AE)				
		Pyro	(AE-1)	(at Naval Ammunition Depot, West Loch)
Oilers (AO)				
		Ramapo	(AO-12)	
		Neosho	(AO-23)	
Repair Ships (AR)				
		Medusa	(AR-1)	
		Vestal	(AR-4)	
Base Repair Ship (ARb)				
		Rigel	(ARb-1)	
Submarine Tender (AS)				
		Pelias	(AS-14)	
Submarine Rescue Ship (ASR)				
		Widgeon	(ASR-1)	
Hospital Ship (AH)				
		Solace	(AH-5)	
Cargo Ship (AK)				
	*	Vega	(AK-17)	(at Honolulu)
General-Stores-Issue Ships (AKS)				
		Castor	(AKS-1)	
	*	Antares	(AKS-3)	at Pearl Harbor entrance
Ocean-going Tugs (AT)				
		Ontario	(AT-13)	
		Sunnadin	(AT-28)	
	*	Keosanqua	(AT-38)	(at Pearl Harbor entrance)
	*	Navajo	(AT-64)	(12 miles outside Pearl Harbor entrance)
Miscellaneous Auxiliaries (AG)				
	#	Utah	(AG-16)	
		Argonne	(AG-31)	
		Sumner	(AG-32)	
Motor Torpedo Boats (PT)				
		PT-20		
		PT-21		
		PT-22		
		PT-23		
		PT-24		
		PT-25		
		PT-26		(on pier, Navy Yard)

		PT-27		(on board Ramapo)
		PT-28		(on pier, Navy Yard)
		PT-29		(on board Ramapo)
		PT-30		(on board Ramapo)
		PT-42		(on board Ramapo)
District Craft				
Harbor Tugs (YT)				
		Sotoyomo	(YT-9)	(in YFD-2 with Shaw)
		YT-119		
		Osceola	(YT-129)	
		YT-130		
		YT-142		
		Hoga	(YT-146)	
		YT-152		
		YT-153		(underway in channel)
Motor Tug (YMT)				
		YMT-5		
Torpedo Testing Barge (YTT)				
		YTT-3		
Net Tenders (YN)				
		Ash	(YN-2)	
		Cinchona	(YN-7)	
		Cockenoe	(YN-47)	Honolulu Harbor
		Marin	(YN-53)	
		Wapello	(YN-56)	
District Patrol Vessel (YP)				
		YP-109		
Floating Drydock (YFD)				
		YFD-2		(with Shaw and Sotoyomo docked)
Salvage Pontoons (YSP)				
		YSP-11		
		YSP-12		
		YSP-13		
		YSP-14		
		YSP-15		
		YSP-16		
		YSP-17		
		YSP-18		
		YSP-19		
		YSP-20		
Floating Workshops (YR)				
		YR-20		
		YR-22		(alongside Cachalot)
Miscellaneous (Unclassified) (IX)				
		Cheng Ho	(IX-52)	
Gate Vessel (YNg)				
		YNg-17		
Garbage Lighters (YG)				

		YG-15		
		YG-17		
		YG-21		
Ferryboat (YFB)				
		Manuwai	(YFB-15)	
		Nihoa	(YFB-17)	
Fuel Oil Barges (YO)				
		YO-30		
		YO-43		
		YO-44		
Seaplane Wrecking Derrick (YSD)				
		YSD-9		
Hulk				
		Ex-Baltimore	(CM-1)	
Covered Lighters (YF)				
		YF-240		
		YF-241		
Open Lighters (YC)				
		YC-429		
		YC-470		
		YC-473		
		YC-477		
		YC-651		
		YC-699		
Pontoon Storage Barges (YPK)				
		YPK-2		
		YPK-3		
Submarine Rescue Chamber (YRC)				
		YRC-5		
Ash Lighter (YA)				
		YA-66		
Water Barge (YW)				
		YW-10		

Appendix H. Hawaii House of Representative's Resolution concerning United States Marine Corps Air Station, Ewa

HCR49 HD1.DOC

HOUSE OF REPRESENTATIVES
TWENTY-FIFTH LEGISLATURE, 2009
STATE OF HAWAII

H.C.R. NO. 49 H.D. 1

HOUSE CONCURRENT RESOLUTION

URGING FULL PRESERVATION OF UNITED STATES MARINE CORPS AIR STATION EWA AS A NATIONAL MONUMENT, MUSEUM, AND RESTORED PARK FOR THE STATE OF HAWAII.

WHEREAS, as international tensions intensified and military conflicts broke out in Europe and Asia prior to America's entry into World War II, Japan resented what it perceived to be United States interference in the affairs of the Far East; and

WHEREAS, Japan decided to destroy the United States Pacific Fleet based in Pearl Harbor and all Army, Navy, and Marine air forces on Oahu to ensure that the United States could not hinder Japan's plans for conquest in Asia and the Pacific; and

WHEREAS, in order to attain this objective, Japan sent a powerful naval force of six aircraft carriers and supporting ships across the Pacific Ocean to attack American forces based on the island of Oahu; and

WHEREAS, in the early stages of that attack, at approximately 7:53 a.m. on the morning of December 7, 1941, Lieutenant Kiyokuma Okajima led nine Mitsubishi Type 0 (Zero) carrier fighters from the aircraft carrier Hiryu toward the Ewa Mooring Mast Field (later re-designated Marine Corps Air Station Ewa) on the island of Oahu, and coming from the north, the fighters flew as low as 20 feet over the unsuspecting Marine Corps airfield, and in subsequent firing passes, destroyed many of the 49 aircraft there, damaging buildings and equipment; and

WHEREAS, within minutes, fighters from the aircraft carriers Akagi, Kaga, and Soryu arrived over the Ewa Mooring Mast Field and caused further destruction at the base; and

WHEREAS, the attack on Ewa Mooring Mast Field was so precise and well-executed that it appeared as though the Japanese fighters had previously selected their particular targets with the purpose of riddling them, and setting fire to the gas tanks so as to render them useless for pursuit and interception; and

WHEREAS, the Ewa Mooring Mast Field lay along the departure route for many Japanese aircraft flying toward their rendezvous point northwest of Kaena Point, those aircraft subjected the field to additional strafing attacks and completed the destruction of 33 aircraft and the damage to 16 others of the 49 present; and

WHEREAS, within minutes, the Marines mounted a gallant defense of their base, while the remainder of the Japanese strike force attacked Pearl Harbor and other airfields on Oahu; and

HCR49 HD1.DOC

WHEREAS, the bravery of the United States Marines at Ewa showed itself in full force that morning, with the men fighting gallantly in the face of a ruthless and determined enemy who carried out their mission of neutralizing any American aircraft that could intercept and counterattack the Japanese invaders; and

WHEREAS, in one example of courage, Private William G. Turner, who died of his wounds and received a posthumous Bronze Star, assisted Master Technical Sergeant Emil S. Peters who jumped into the rear cockpit of a SBD-2 dive bomber, with Peters firing from the cockpit as Turner fed ammunition; and

WHEREAS, the Japanese aircraft also inflicted other casualties among the Marines at the Ewa Mooring Mast Field, killing three men and wounding 13 others; and

WHEREAS, Sergeant Carlo A. Micheletto, Private First Class Edward S. Laurence, and Private William G. Turner, gave their lives in defense of their country, and two civilian residents of Ewa, Yaeko Lillian Oda and Francisco Tacderan, also lost their lives as a result of the attack; and

WHEREAS, Japanese Lieutenant Yoshio Shiga, leader of the first wave fighter unit from the aircraft carrier Kaga, while strafing the parked planes at Ewa Field with his 7.7 mm machine guns, recorded for posterity the account of a lone Marine, who stood amidst the gunfire striking the ground around him and bravely emptied his sidearm at the aircraft attacking overhead, a man in whom Lieutenant Shiga found the "spirit of dogged tenacity that was the very embodiment of bravery and valor" that he did not expect from an American, and commented that this Marine was the bravest soldier he ever encountered; and

WHEREAS, two Army Air Force fighter pilots from Wheeler Field, Second Lieutenants Kenneth M. Taylor and George S. Welch, engaged Japanese dive bombers in the vicinity of the Ewa Mooring Mast Field in one of the most famous dogfights of the war; and

WHEREAS, the Ewa Mooring Mast Field constitutes one of the very first points of the attack against the United States which precipitated our nation's entry into World War II; and

WHEREAS, during 1941, the Marine Corps developed the Ewa Mooring Mast Field which later, as Marine Corps Air Station Ewa, served through World War II; and

WHEREAS, the Marine Corps Air Station Ewa was officially closed on June 18, 1952, and its property assumed by Naval Air Station Barbers Point; and

WHEREAS, the designation and development of Ewa Field as a National Monument, Museum, and Restored Park would preserve this critical American historic site, allowing stories to be told of the associated military conflicts, American sacrifices, and the heroism and determination that became the foundation for victory in the Pacific arena and eventually in World War II itself; and

WHEREAS, a National Monument at the former Marine Corps Air Station Ewa would further preserve documentation of Hawaii's involvement in World War II, serving as a focal point for the observation, remembrance, and expression of American patriotism, honoring those who served within its gates; and

WHEREAS, the preservation of Marine Corps Air Station Ewa as a National Monument would create opportunities for employment, education, and community pride for the people of Hawaii; and

WHEREAS, to designate Ewa Field as a National Monument, Museum, and Restored Park it is necessary to identify an appropriate boundary for

HCR49 HD1.DOC

nomination to the Hawaii State and National Registers of Historic Places by conducting a battlefield survey and historic research, and making an inventory of contributing and noncontributing historic features; now, therefore,

BE IT RESOLVED by the House of Representatives of the Twenty-fifth Legislature of the State of Hawaii, Regular Session of 2009, the Senate concurring, that the President of the United States, the Secretary of Defense, Secretary of the Interior, and United States Navy are respectfully urged to preserve Marine Corps Air Station Ewa, or a portion of it, as a National Monument; and

BE IT FURTHER RESOLVED that the United States Navy and its private, public and non-profit partners are respectfully requested to proceed with the research, battlefield analysis, and other activities necessary to designate an appropriate boundary for nomination of Ewa Field to the Hawaii State and National Registers of Historic Places; and

BE IT FURTHER RESOLVED that the Department of Land and Natural Resources submit a report no later than 20 days before the convening of the 2010 Regular Session on the research, battlefield analysis, and other activities necessary to designate an appropriate boundary for nomination of Ewa Field to the Hawaii State and National Registers of Historic Places; and

BE IT FURTHER RESOLVED that certified copies of this Concurrent Resolution be transmitted to the President of the United States, the Secretary of Defense, and the Secretary of the Interior, Commander of Navy Region Hawaii, and to each member of Hawaii's Congressional delegation.

United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet - Figures

Ewa Plain Battlefield
Name of Property
Honolulu County, Hawaii
County and State
Name of multiple listing (if applicable)

Section numbers 7 & 8 Page 1

Figure 1 of 42 – Project Location

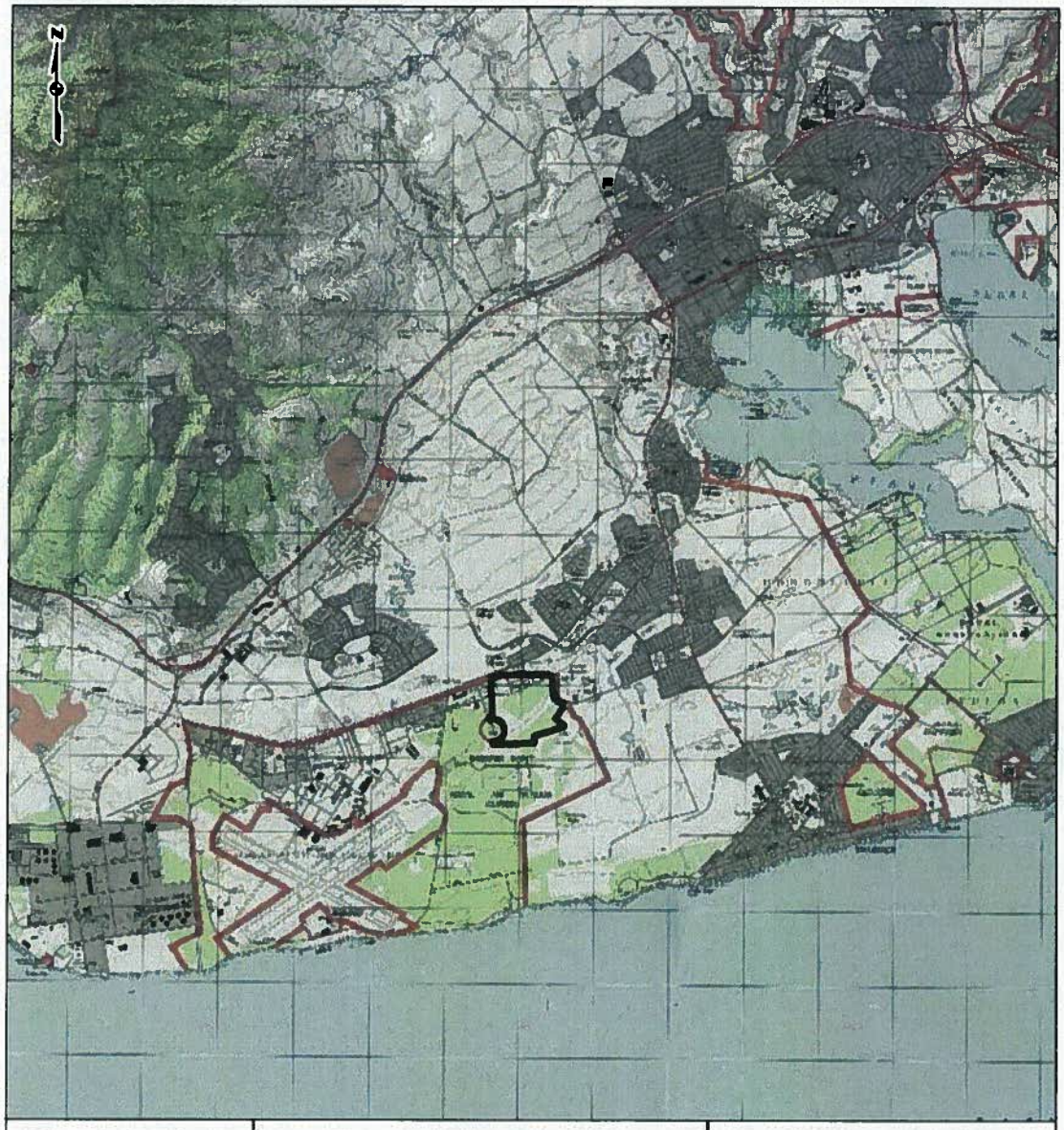
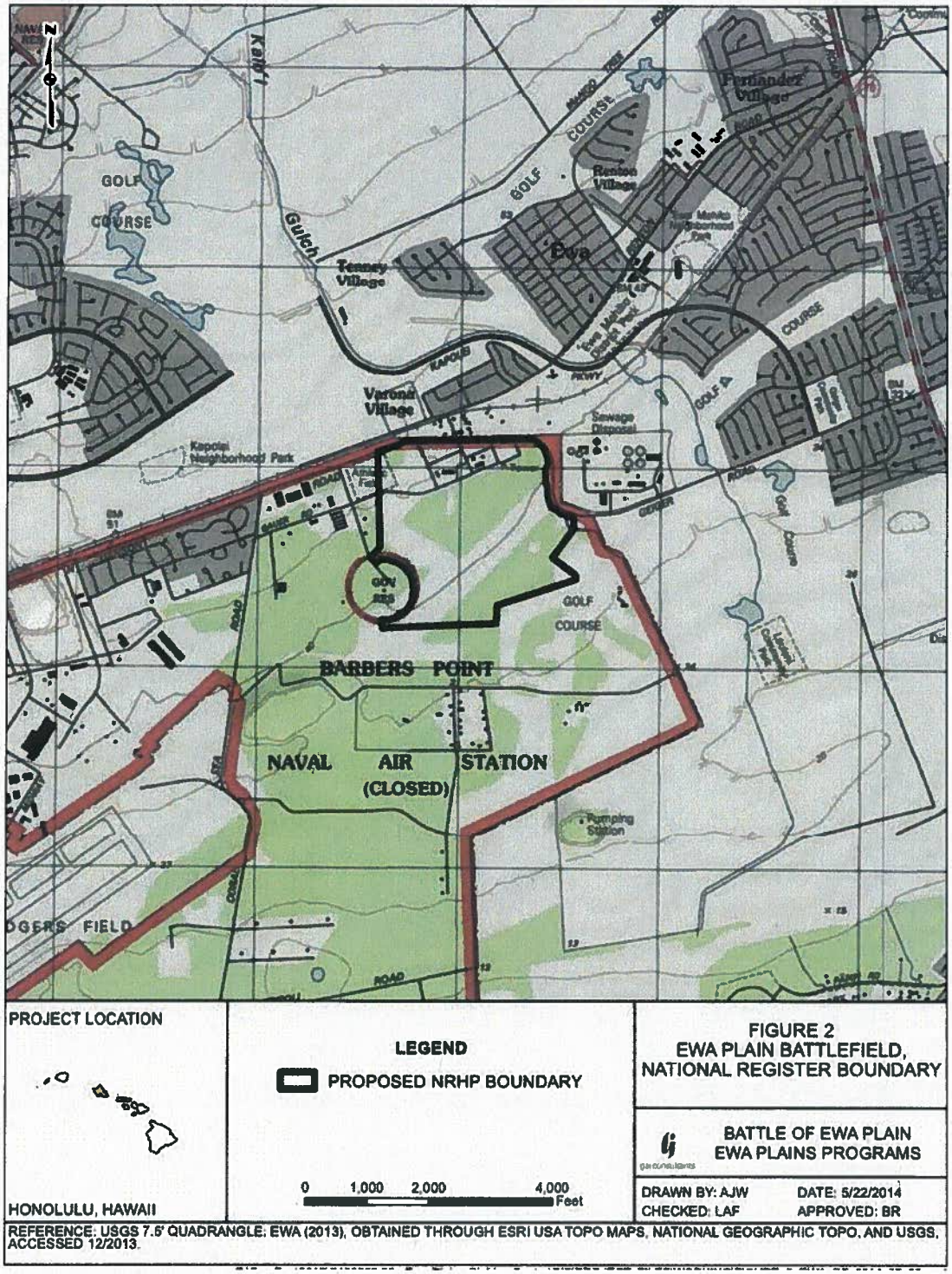


Figure 2 of 42 – Ewa Plain Battlefield, National Register Boundary



United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet - Figures

Ewa Plain Battlefield
Name of Property
Honolulu County, Hawaii
County and State
Name of multiple listing (if applicable)

Section numbers 7 & 8 Page 3

Figure 3 of 42 – Ewa Plain Battlefield

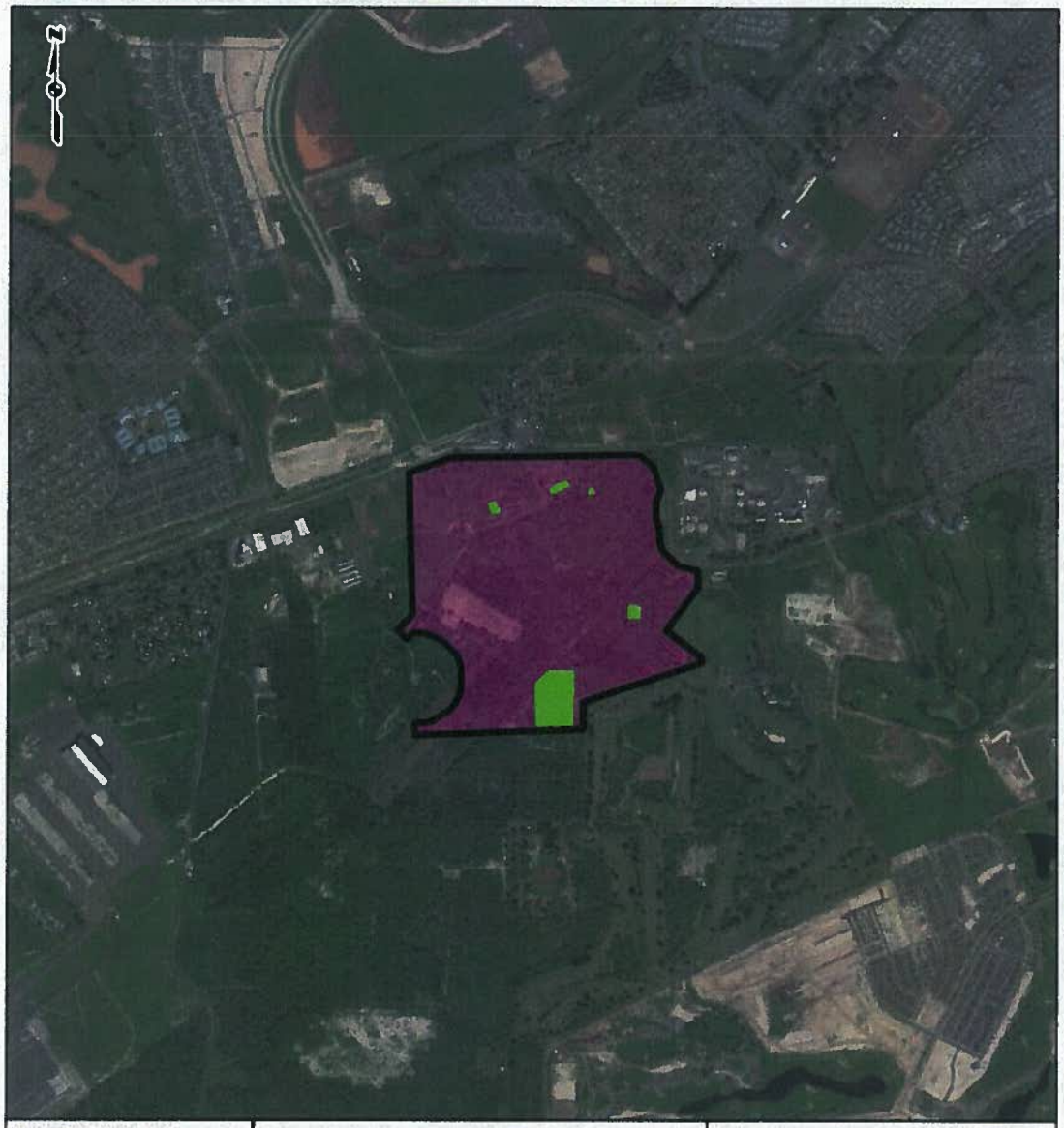


Figure 4 of 42 – Ewa Plain Battlefield Boundaries with Contributing and Non-Contributing Sources

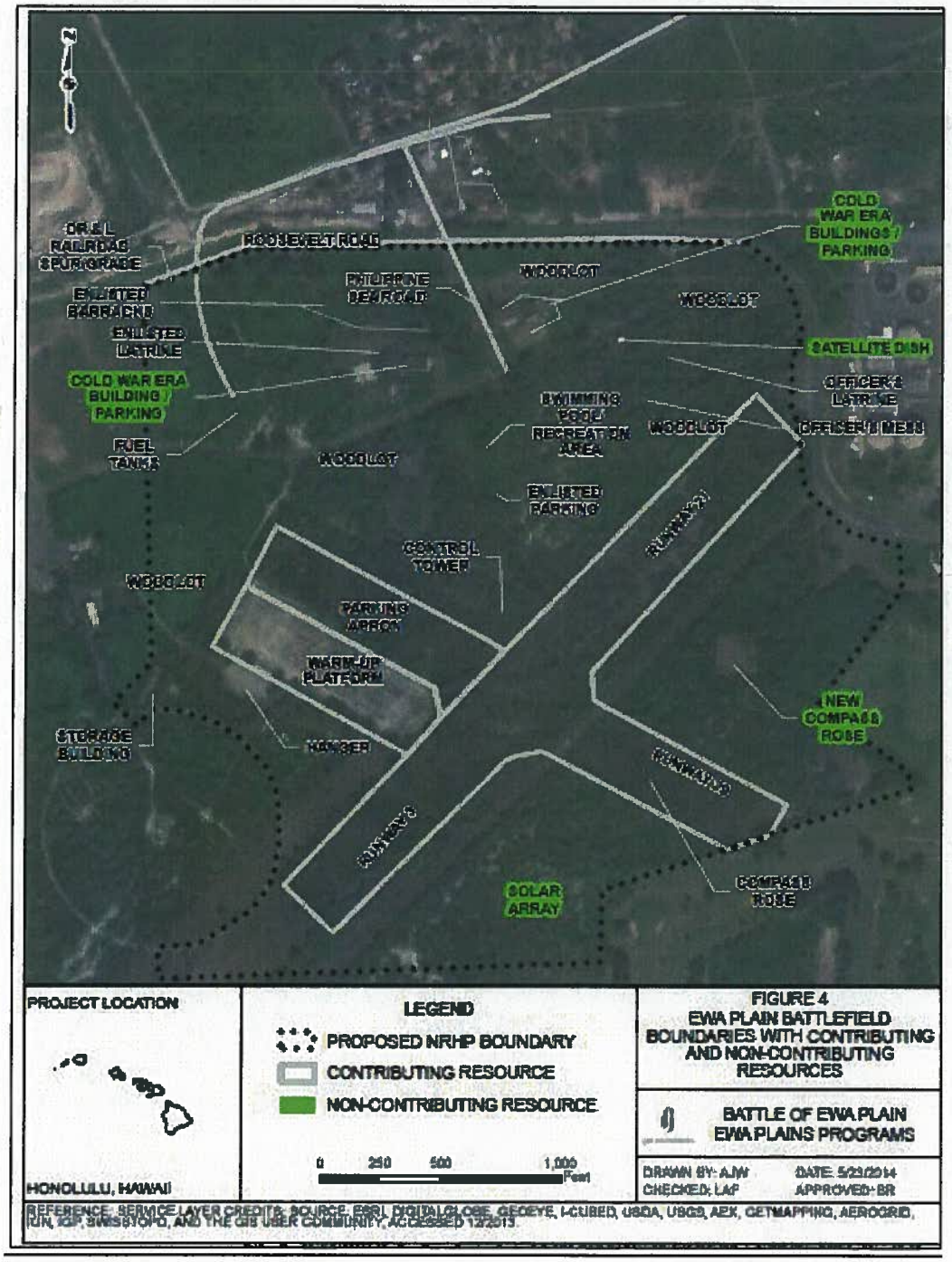


Figure 5 of 42 – Battle Action, Oahu, December 7, 1941
(Source: http://www.ibiblio.org/hyperwar/AAF/7Dec41/7Dec41-4.html)

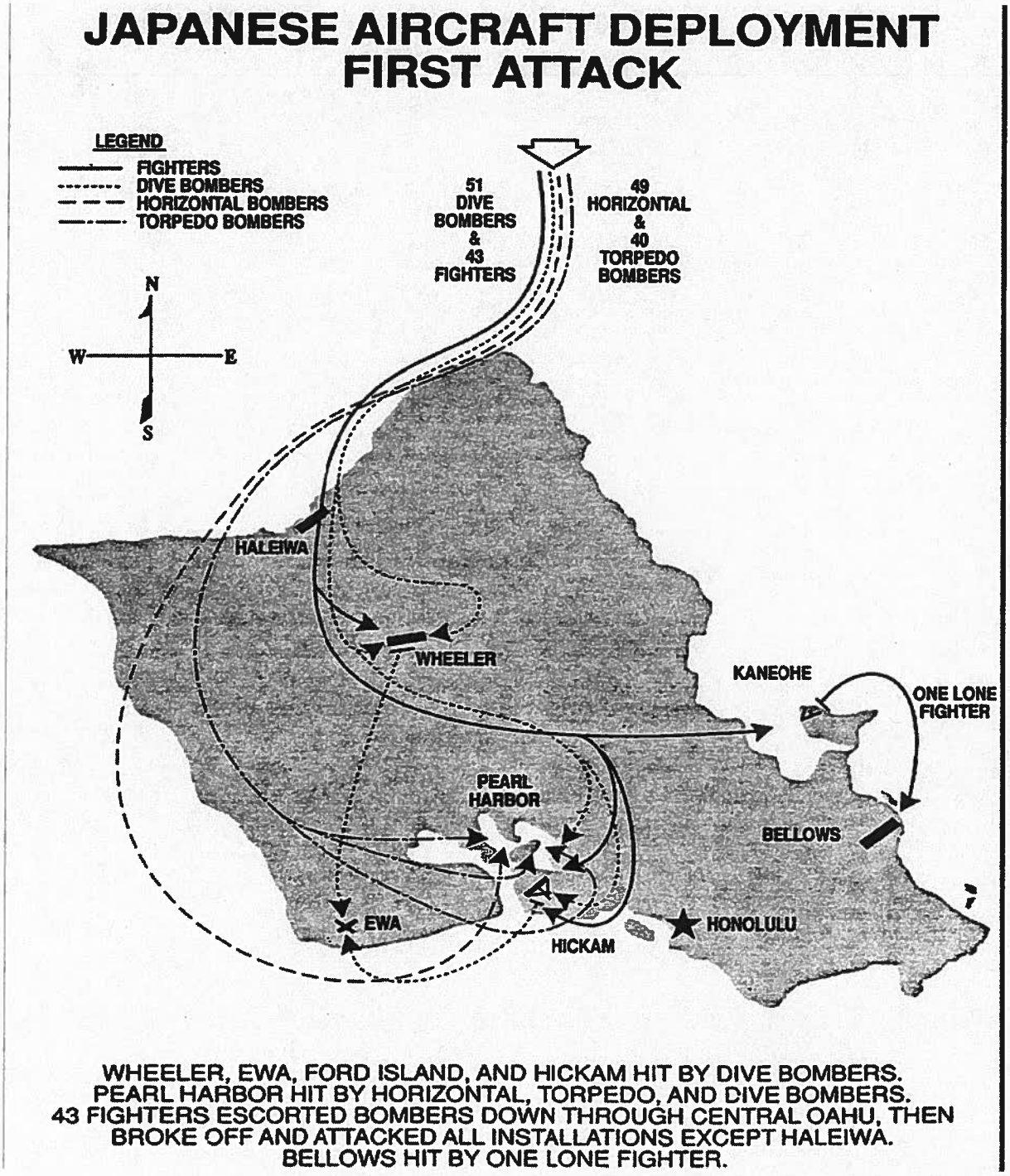


Figure 6 of 42 – Ewa Marines Clearing Sisal Field (Source: Pacific War Institute)

Figure 7 of 42 – Blasting Trees for Ewa Runway (Source: NARA)

Figure 8 of 42 – Mooring Mast and Nearby Buildings, 1925 (Source: National Park Service; USAR-2975)

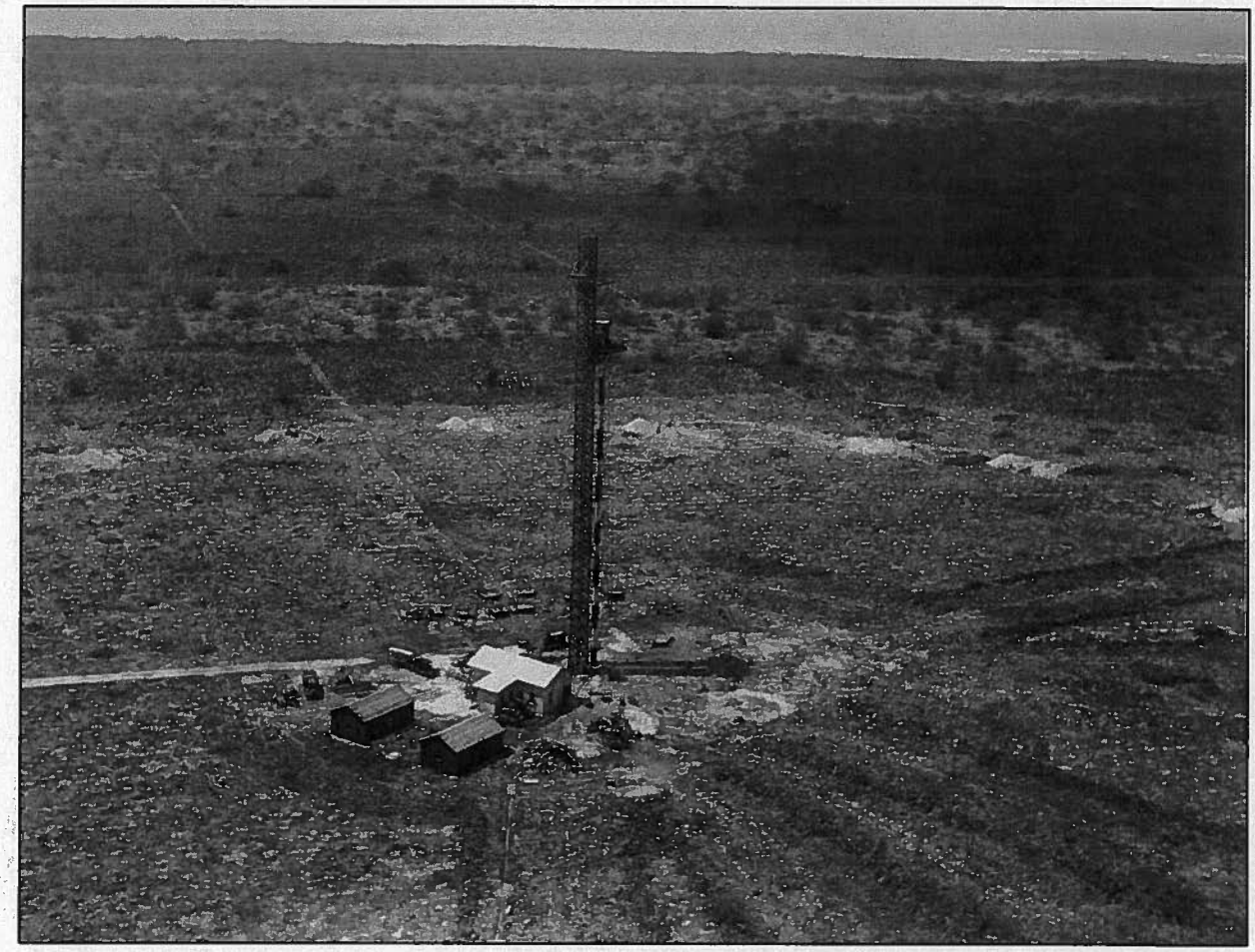


Figure 9 of 42 – Ewa Field, January 29, 1941 (Source: Naval History Heritage Command)

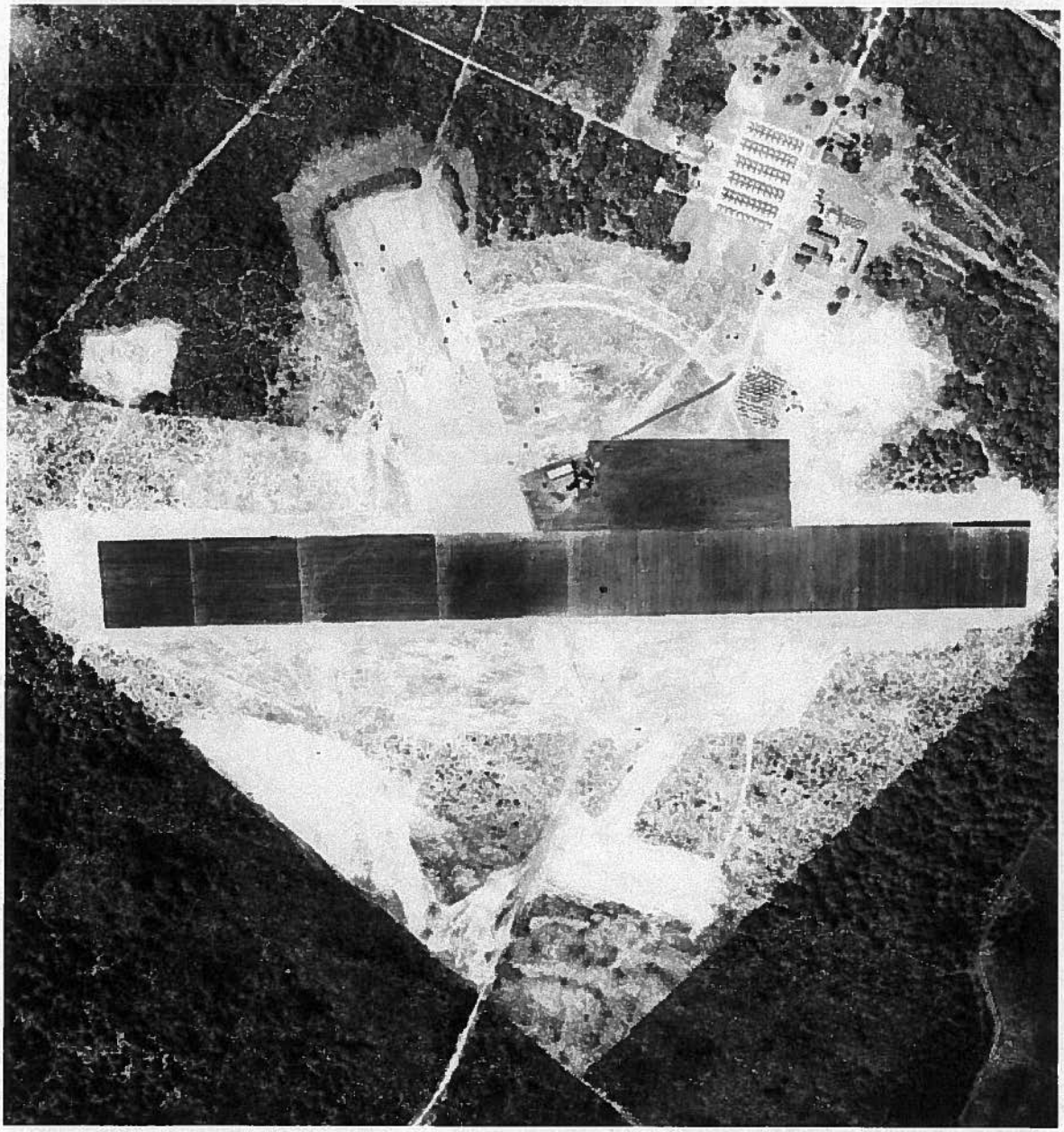


Figure 10 of 42 – Ewa Field, March 14, 1941 (Source: Naval History Heritage Command)

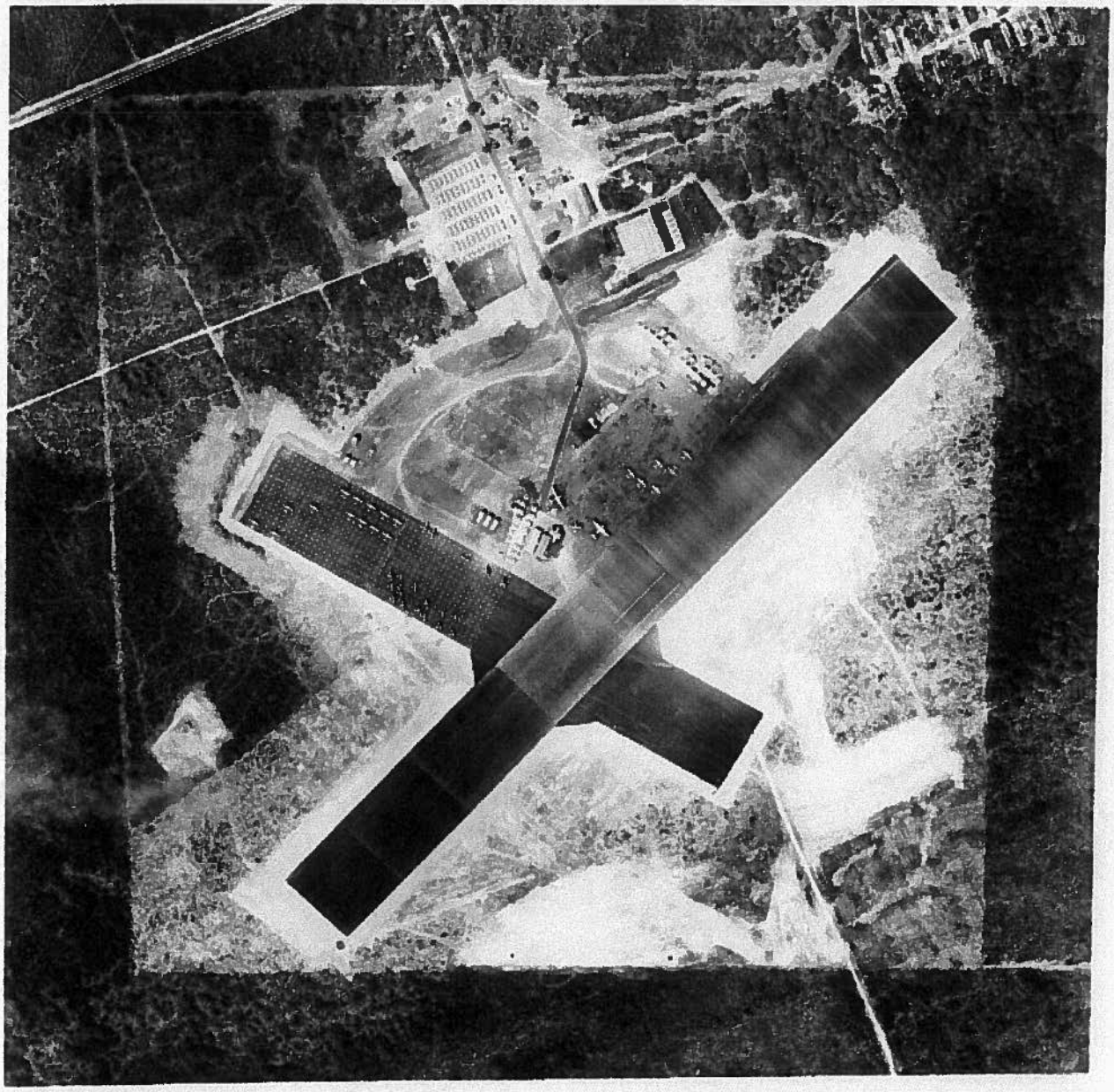


Figure 11 of 42 – Site Plan, Ewa Field, June 30, 1941 (Source: NARA)

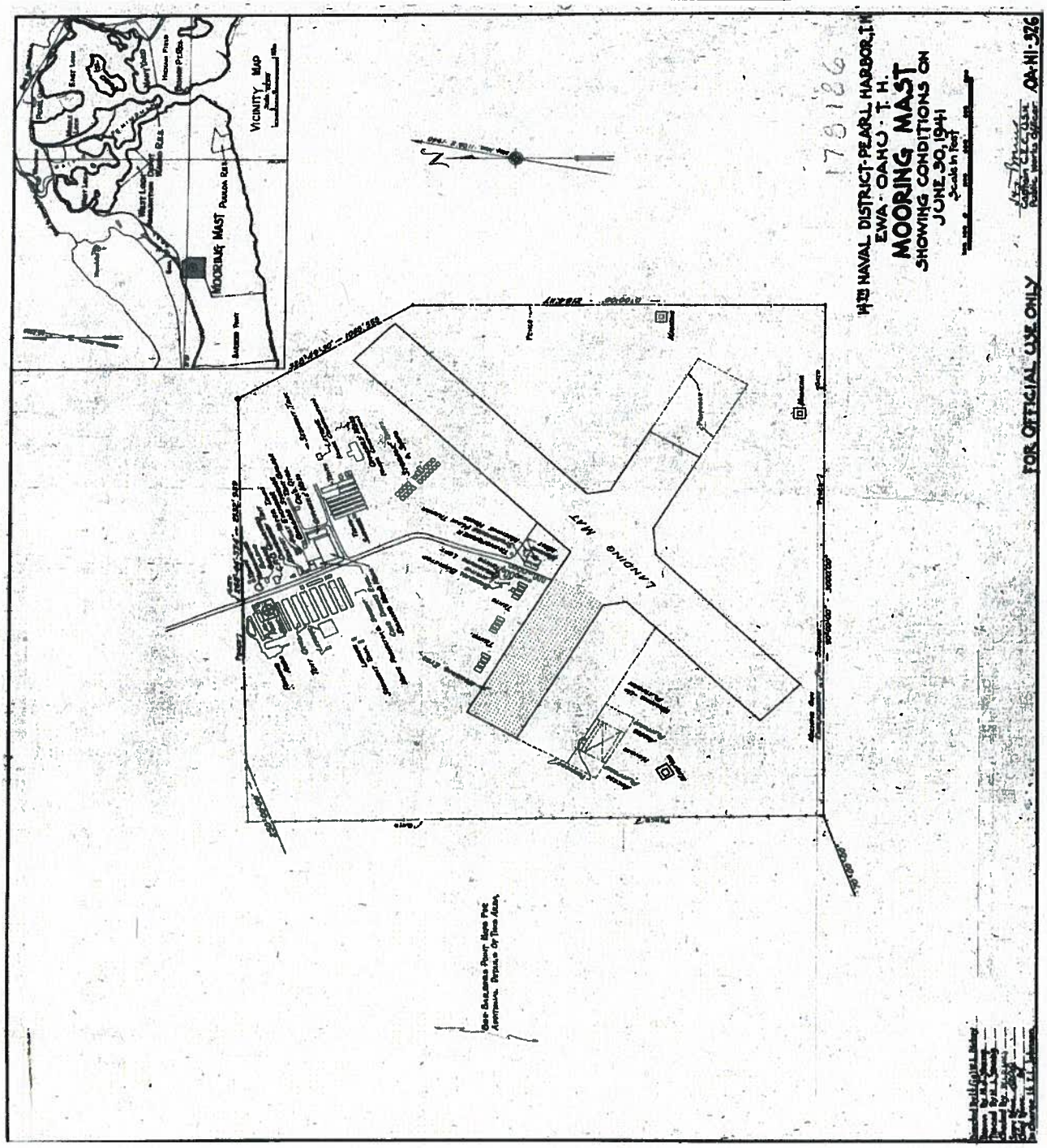


Figure 12 of 42 – Ewa Field, December 2, 1941 (Source: Naval History Heritage Command)

Figure 13 of 42 – Site Plan, Ewa Field, June 30, 1948 (Source: NARA

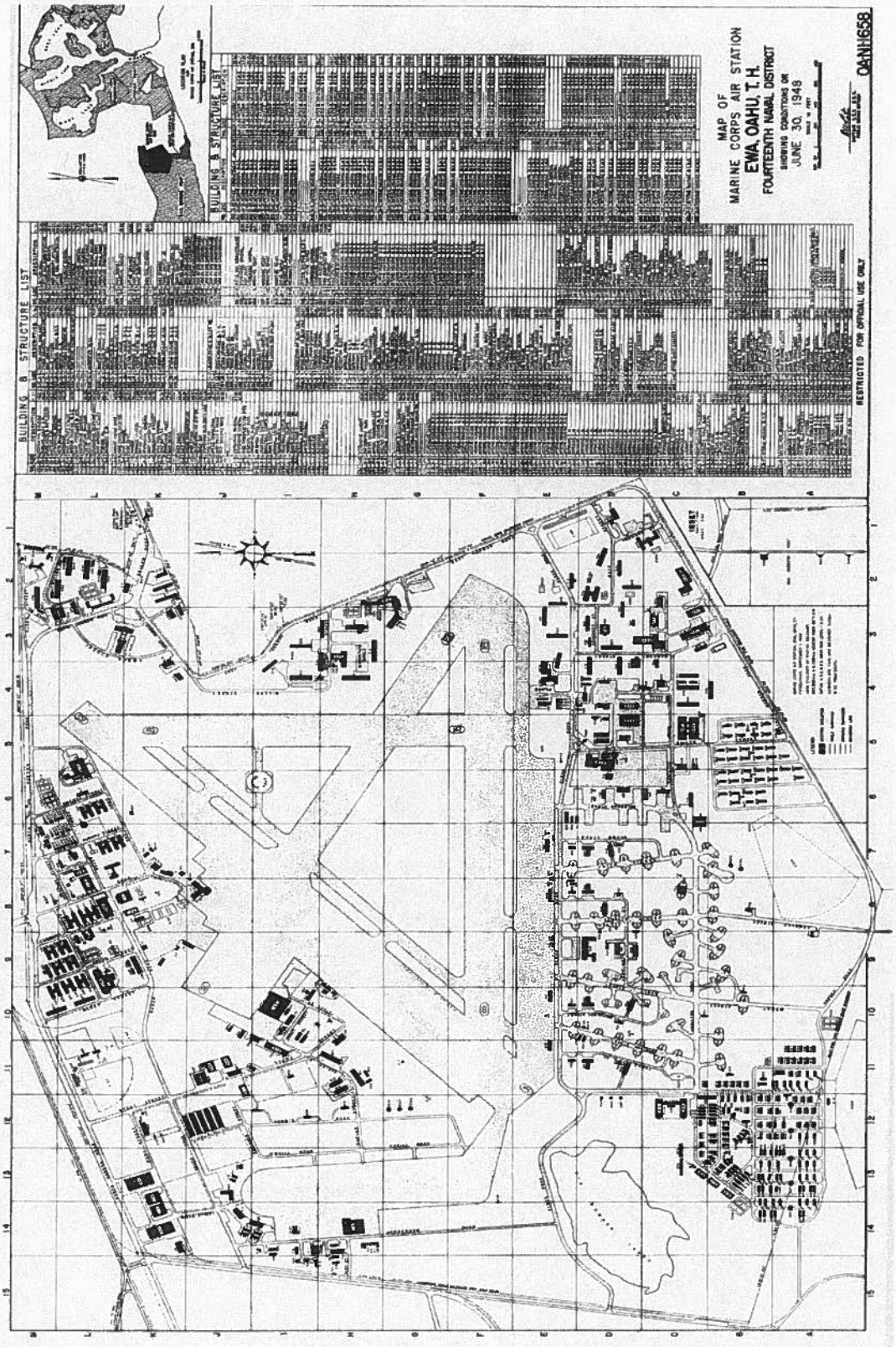


Figure 14 of 42 – Parking Apron/Runway 11, 1941

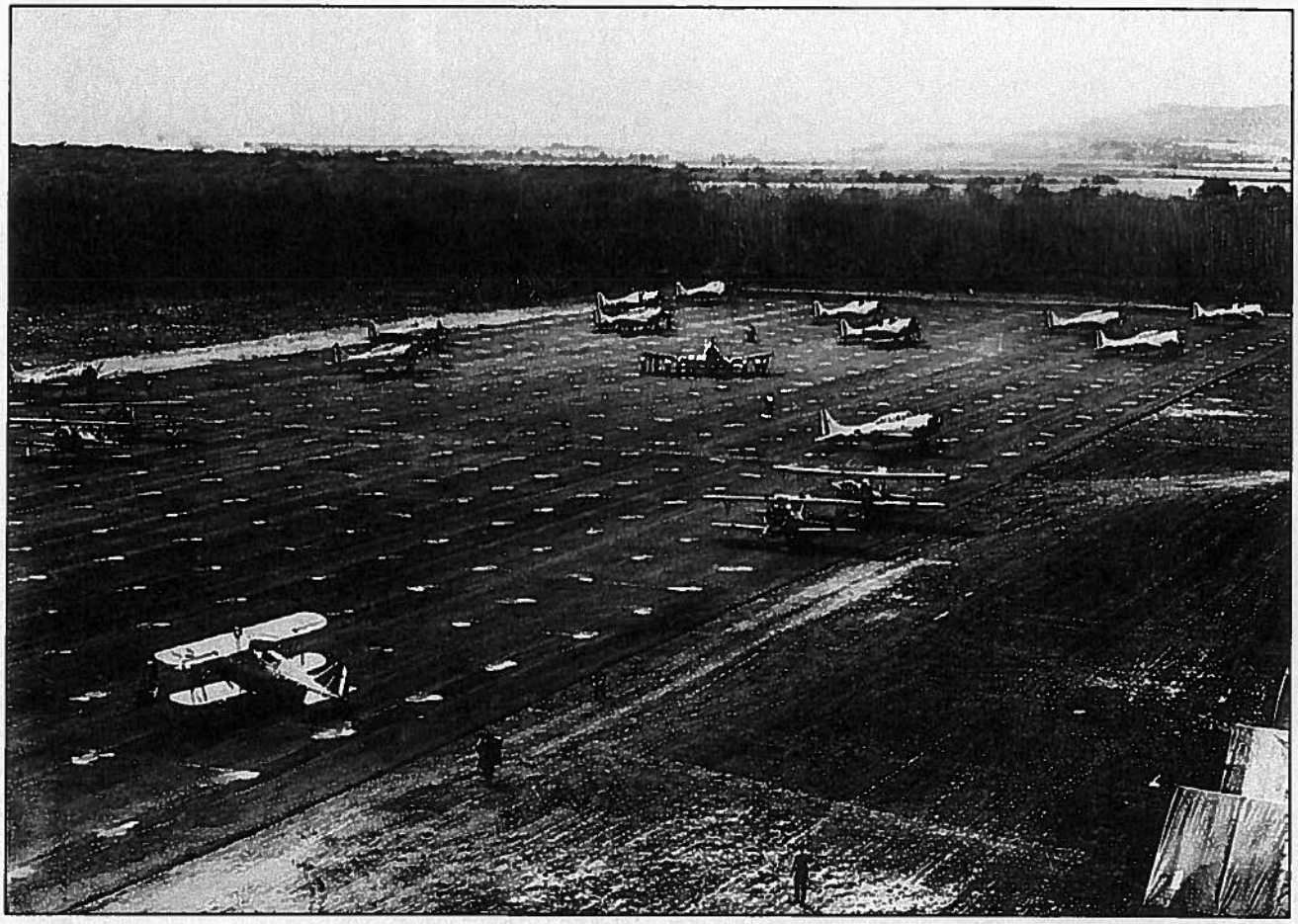


Figure 15 of 42 – Site Plan, Contributing Resources, Aerial Photograph taken December 2, 1941 (Source: Naval History Heritage Command)

Figure 16 of 42 (Sheet 1 0f 2) – Site Plan, Ewa Field Camp Area, 1942 (Sheet 1 of 2), (Source: NAVFAC)

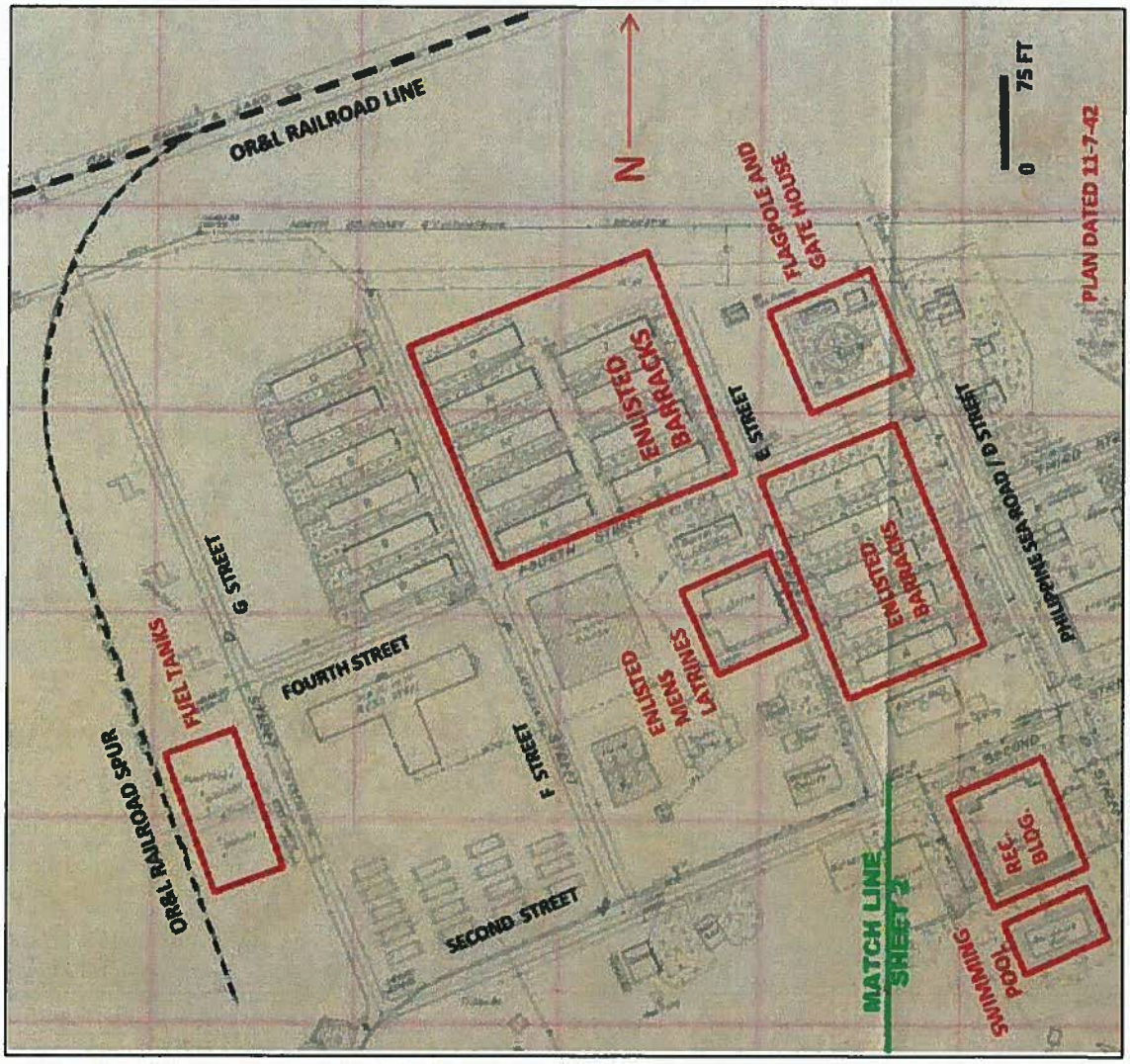


Figure 16 of 42 (Sheet 2 of 2) – Site Plan, Ewa Field Camp Area, 1942 (Sheet 2 of 2), (Source: NAVFAC)

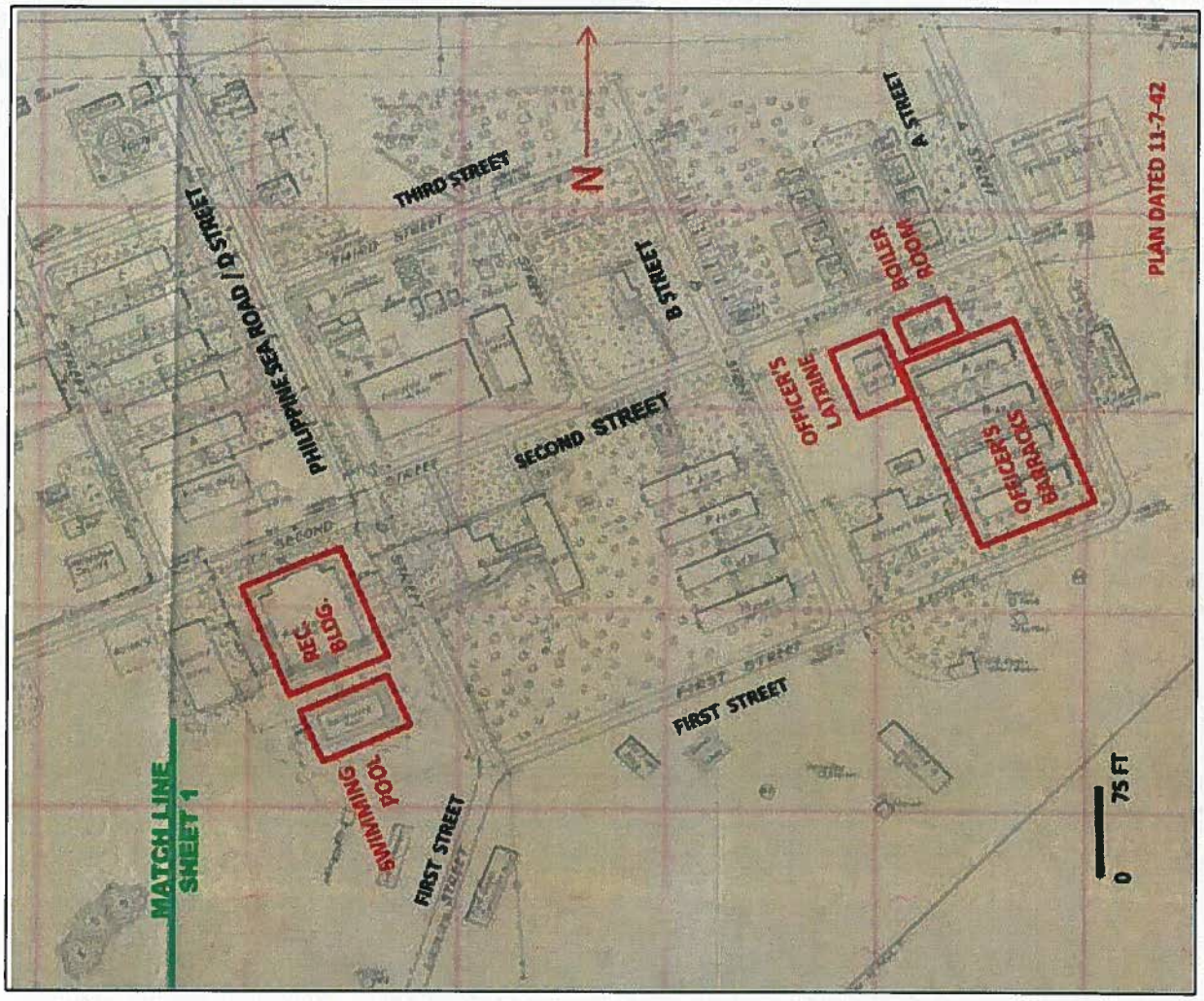


Figure 17 of 42 – Marines Observing IJN Aircraft from Swimming Pool (under construction), (Source: NPS)

USAR-1301 Marines at Ewa Corps Air Station scanning the sky for Japanese aircraft, Dec. 7, 1941.

Figure 18 of 42 – Flagpole Area, August 21, 1941, (Source: NARA)

Figure 19 of 42 – Fields and Woodlots North of Airfield (Source: NAVFAC)

Figure 20 of 42 – Ewa Field Road Network, August 1941 (Source: NARA)

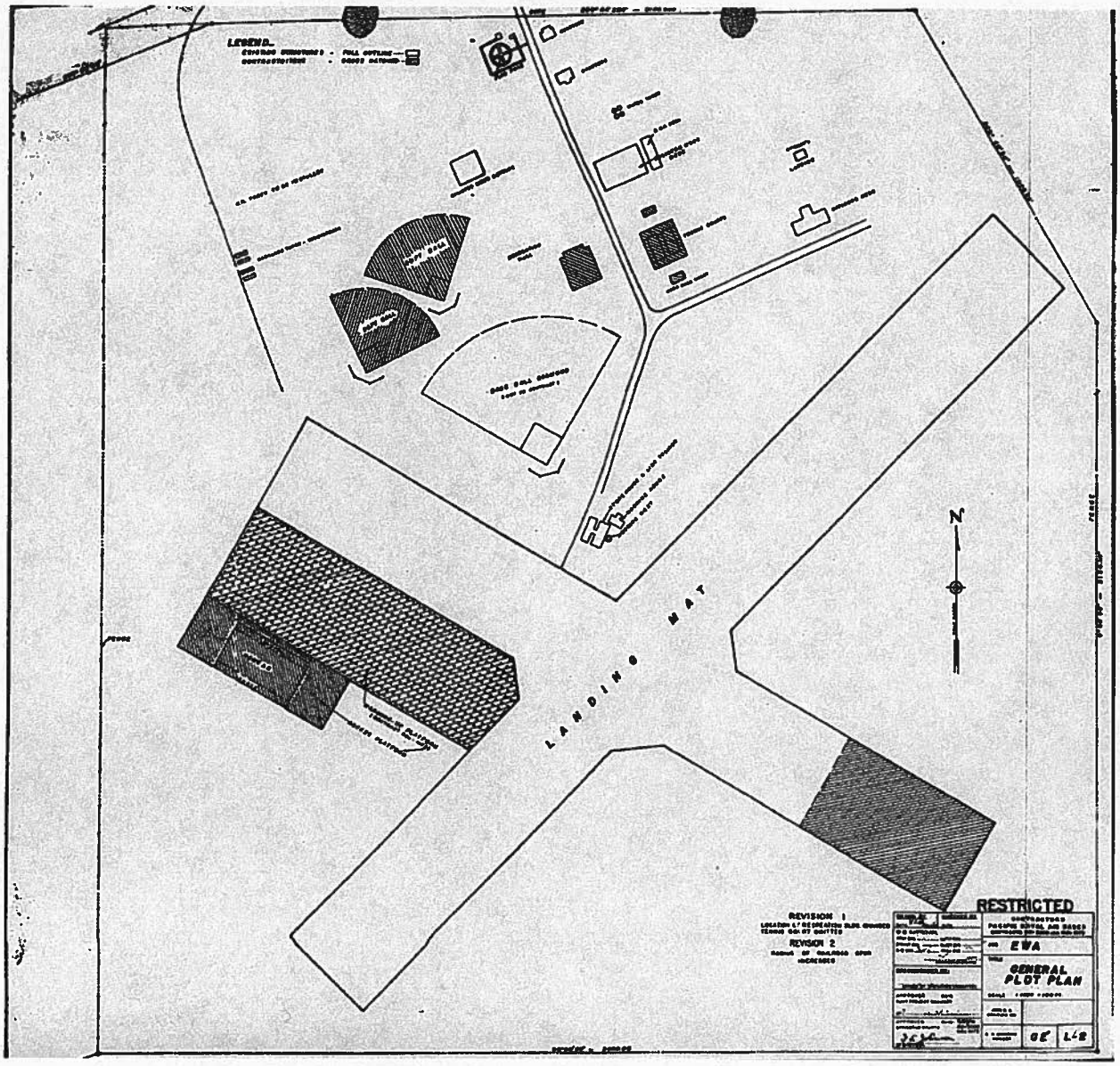


Figure 21 of 42 – Ewa Field and nearby Ewa Villages, 1927

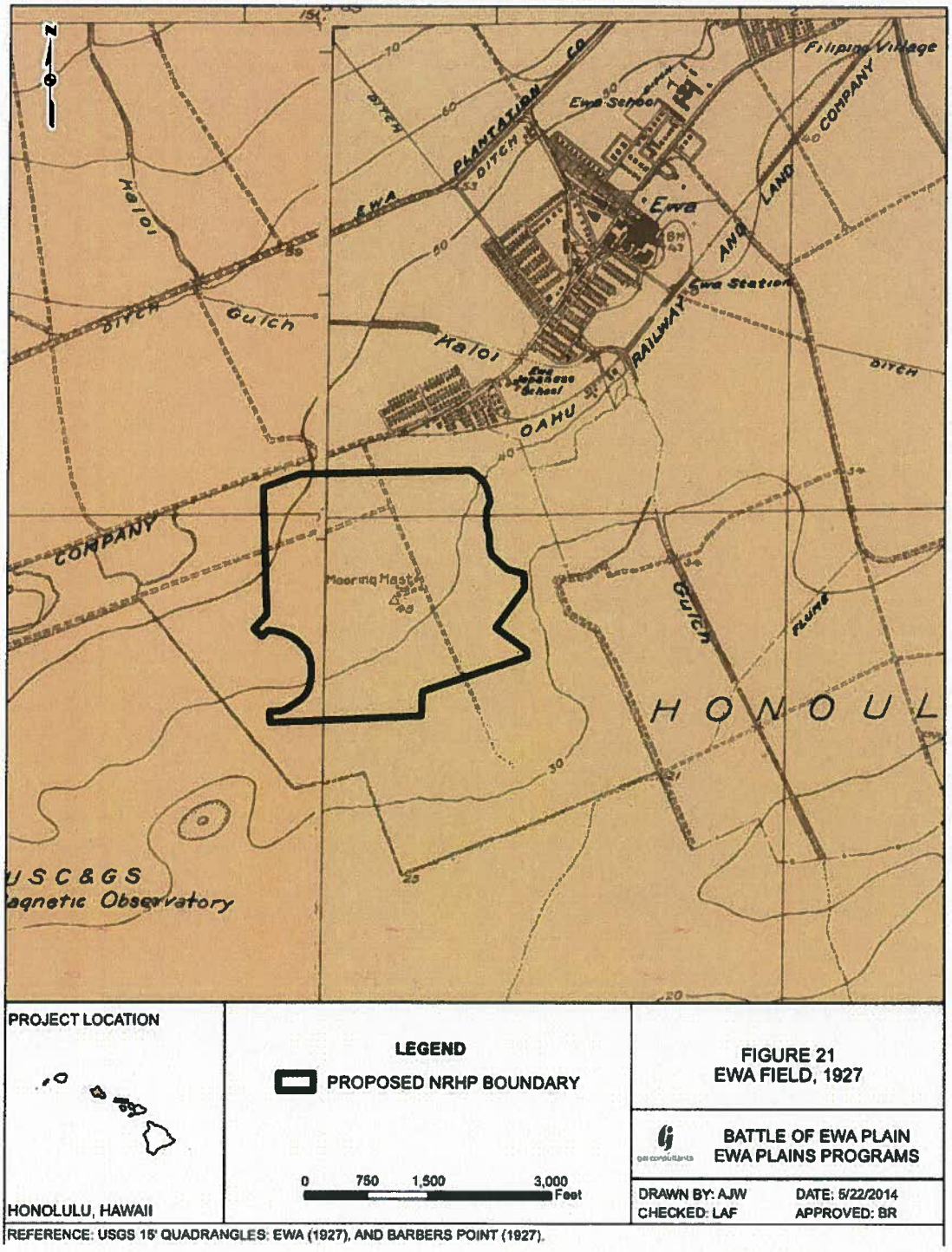


Figure 22 of 42 – Construction of Mooring Mast, circa 1925 (Source: NPS)

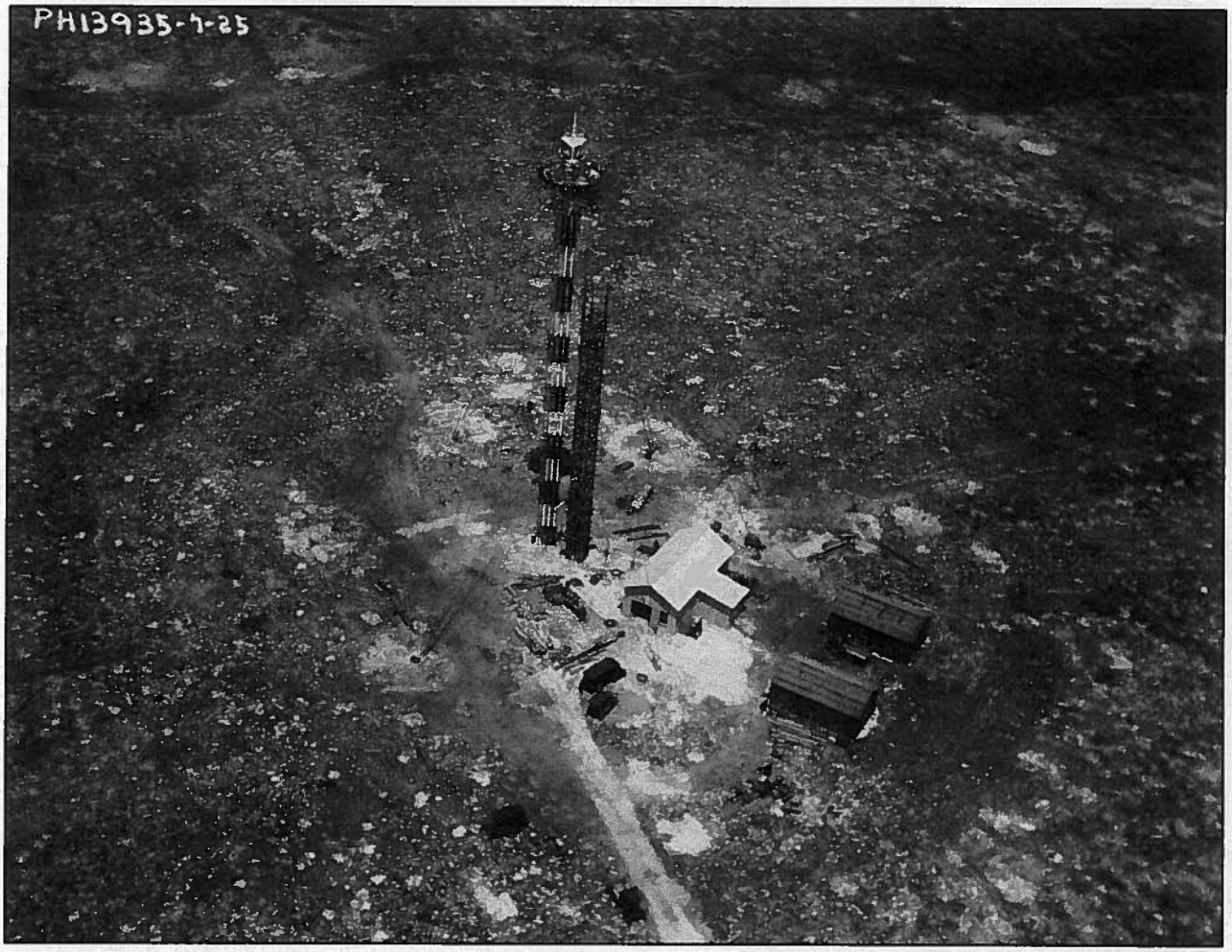


Figure 23 of 42 – Plan, Mooring Mast, circa 1932 (Source: NARA)

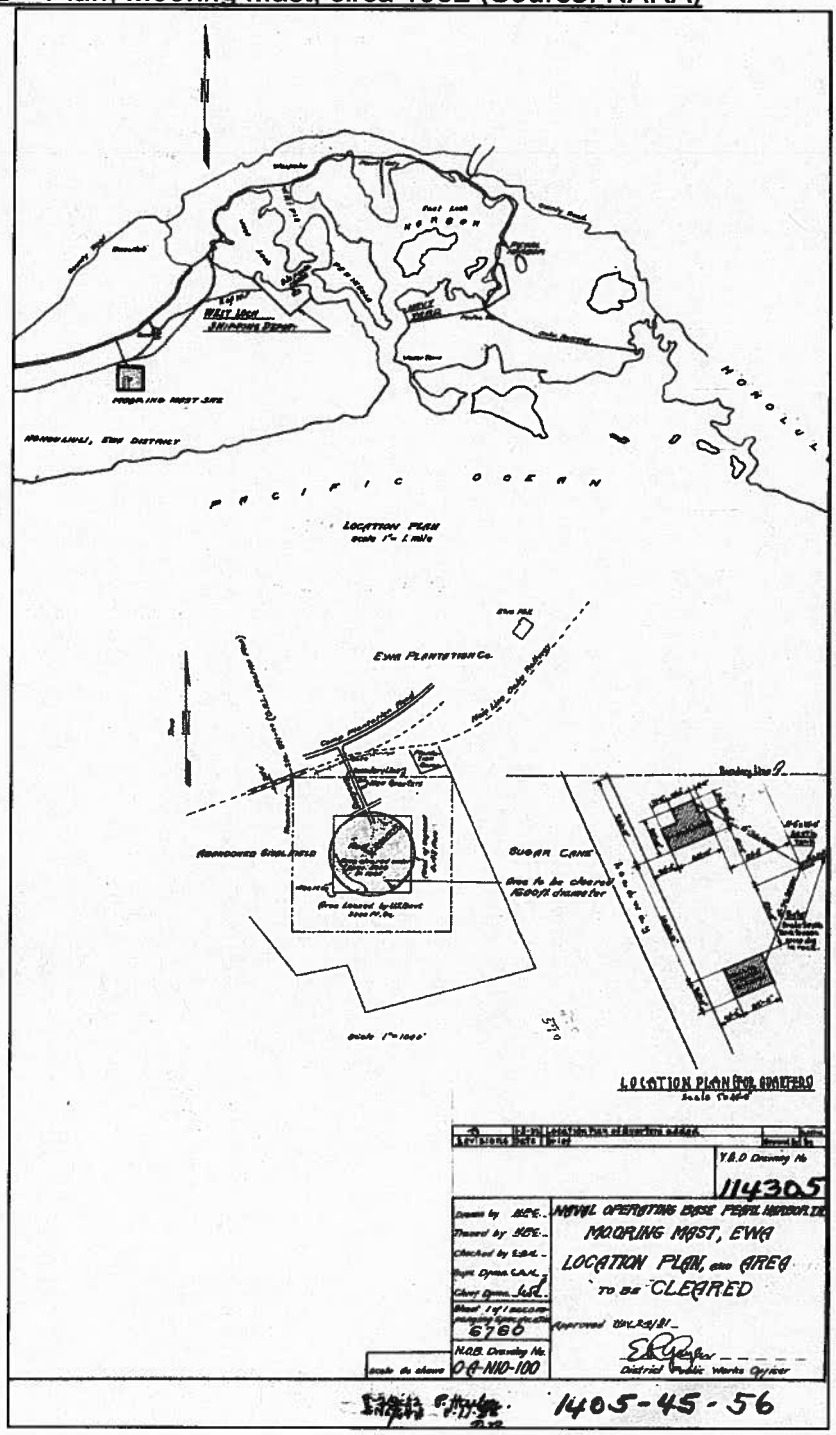


Figure 24 of 42 – Admiral Yamamoto (Source: Naval History Heritage Command)

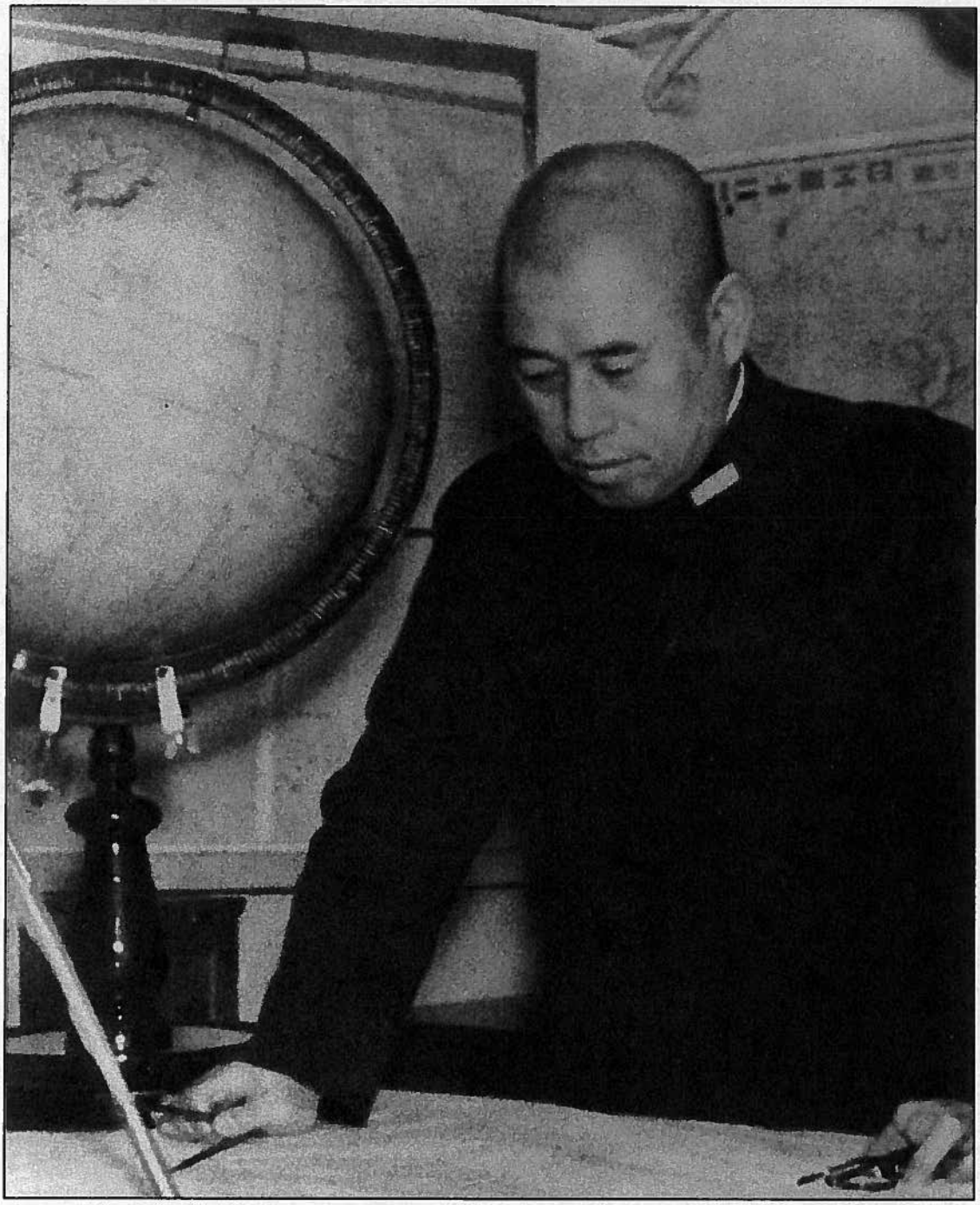


Figure 25 of 42 – Development of Ewa Field Camp Area, early 1941, (Source: NARA)

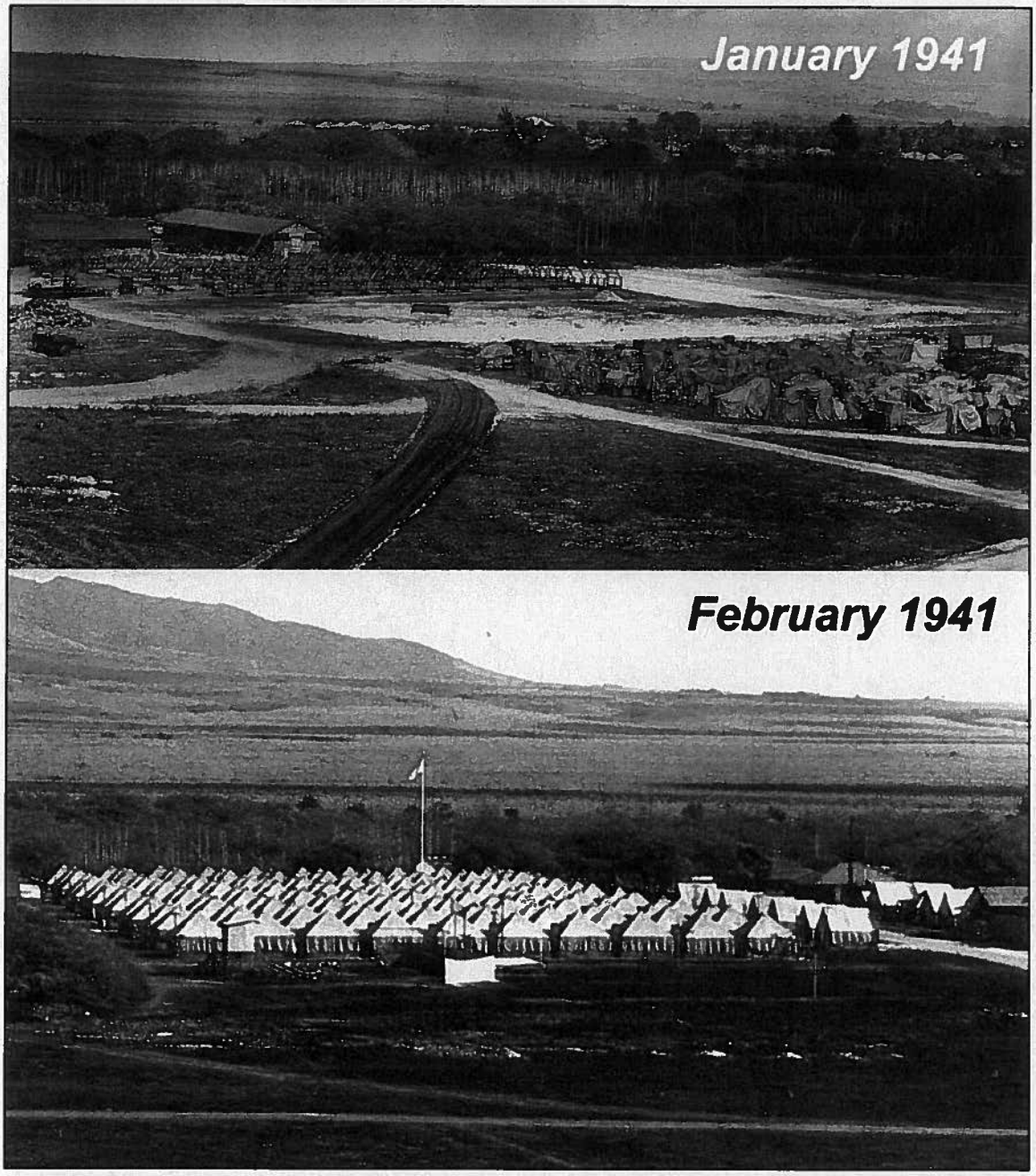


Figure 26 of 42 – Ewa Field, June 19, 1941 (Source: Naval History Heritage Command)

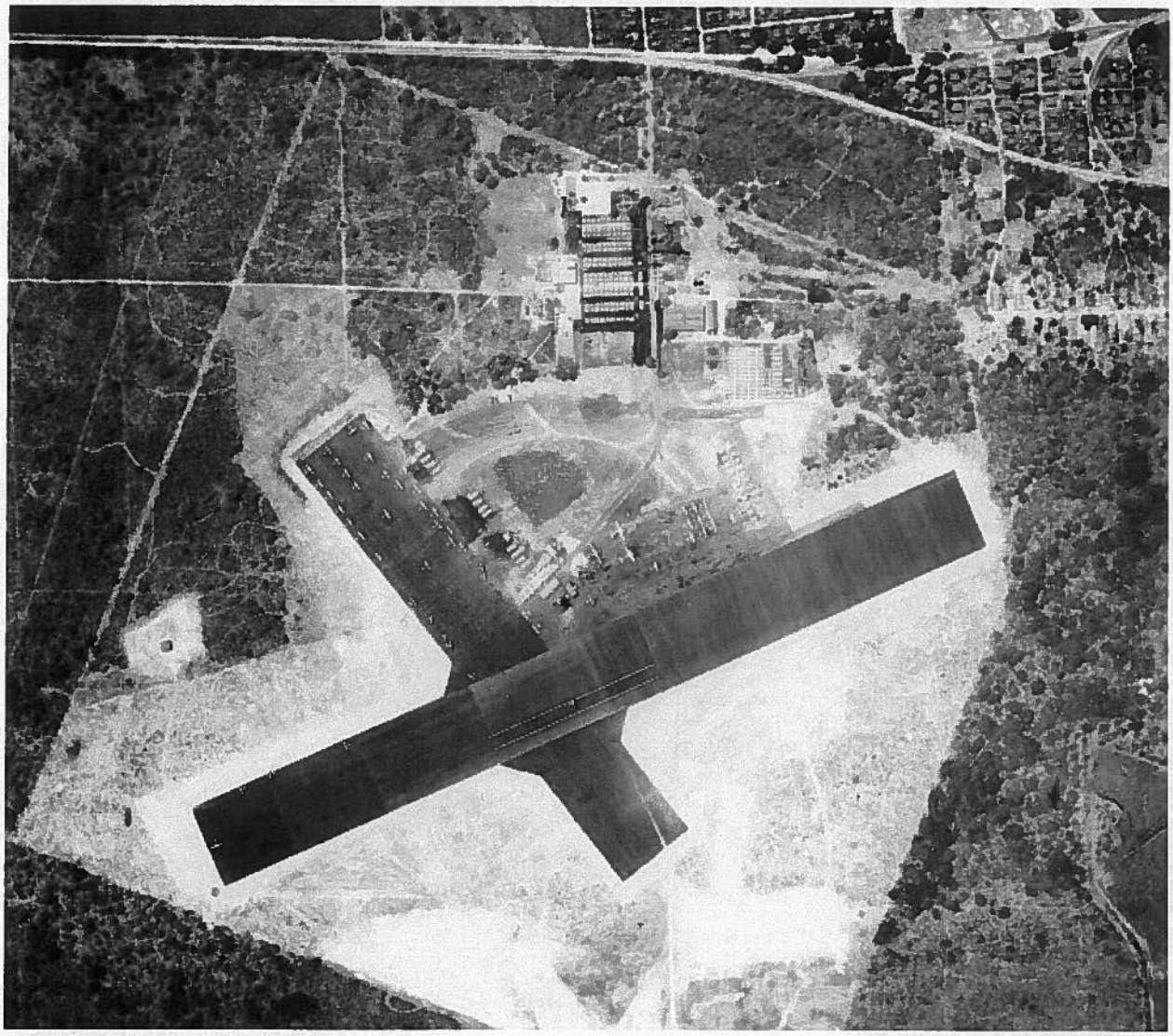


Figure 27 of 42 – IJN Aircraft Prep for Takeoff from Carrier (Source: Gudmens 2005)

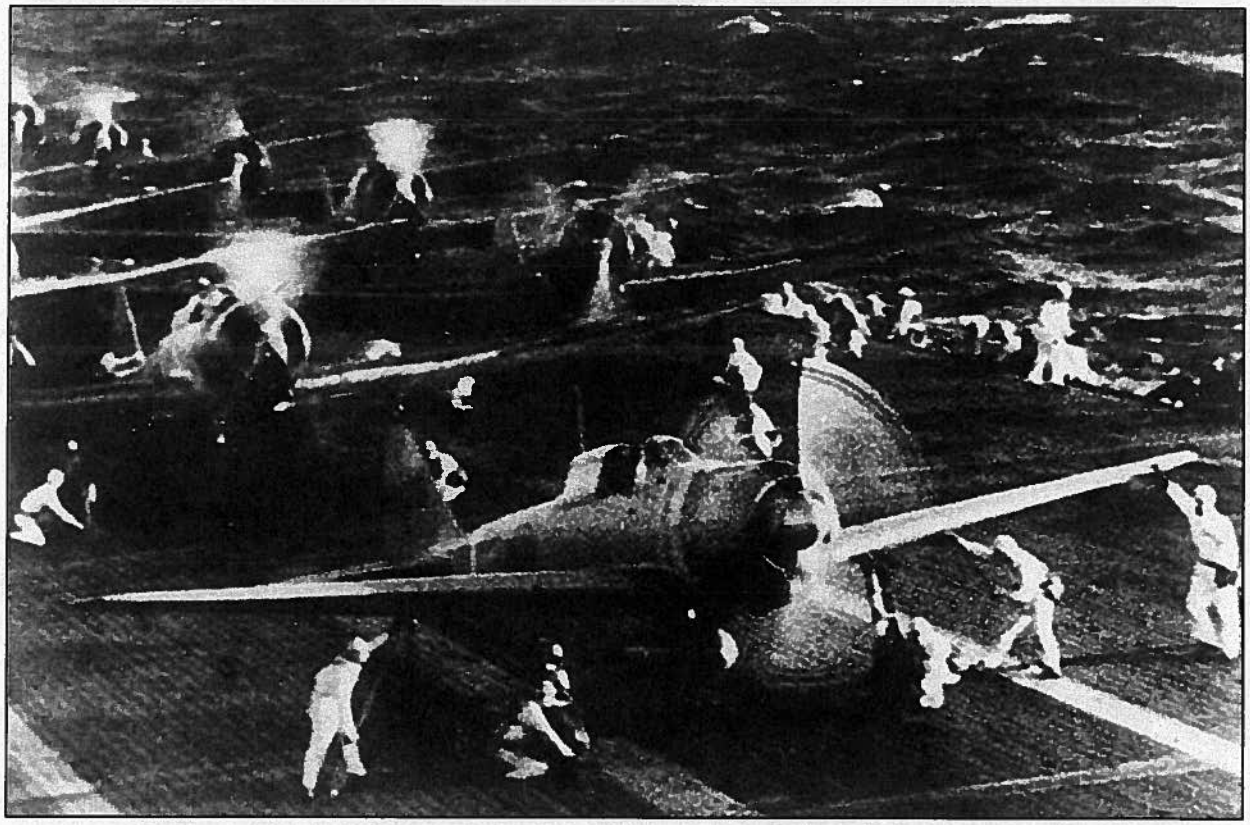


Figure 28 of 42 – IJN Flight Patterns, December 7, 1941 (Aerial Photographs Source: Naval History Heritage Command)

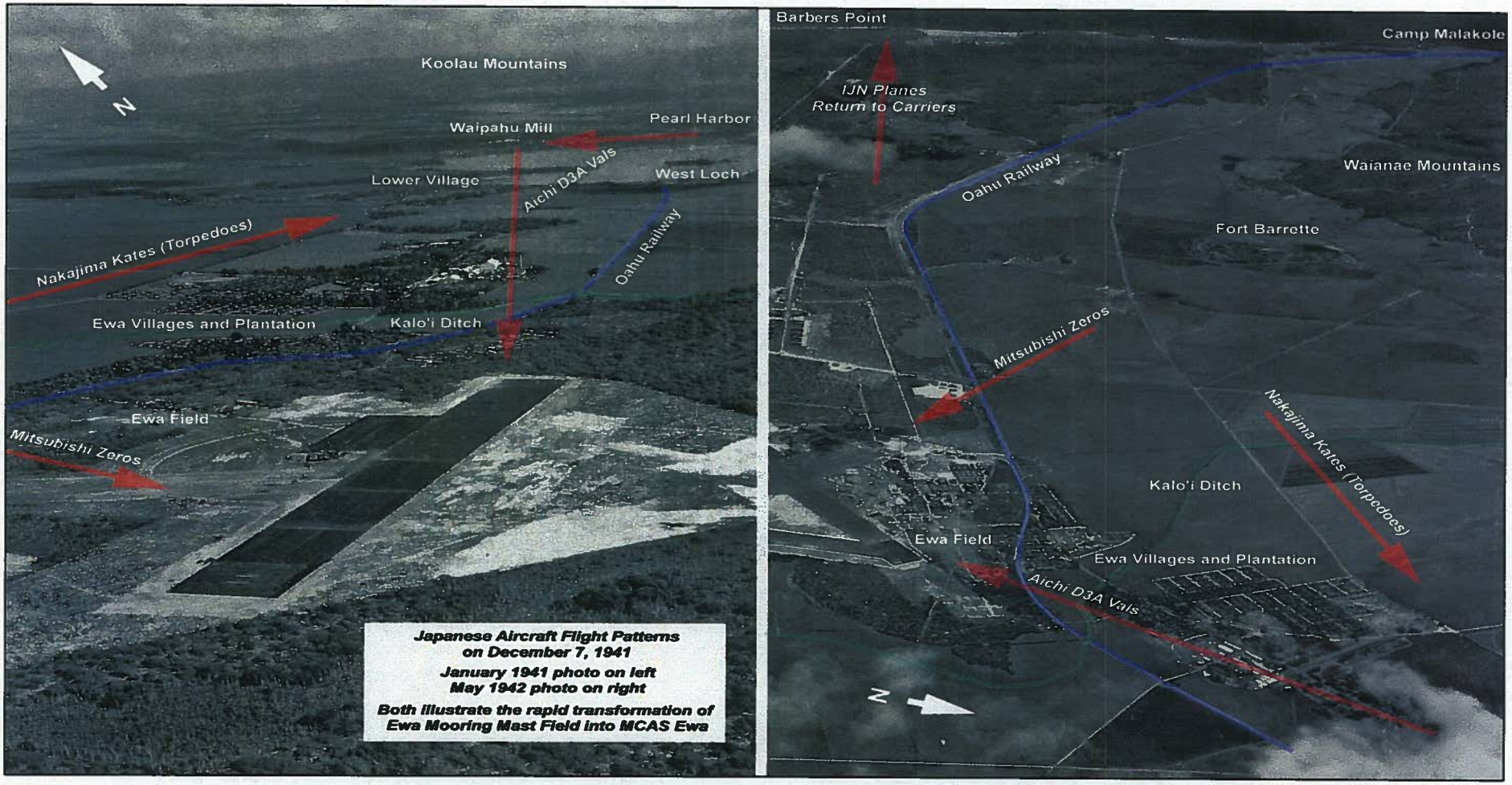
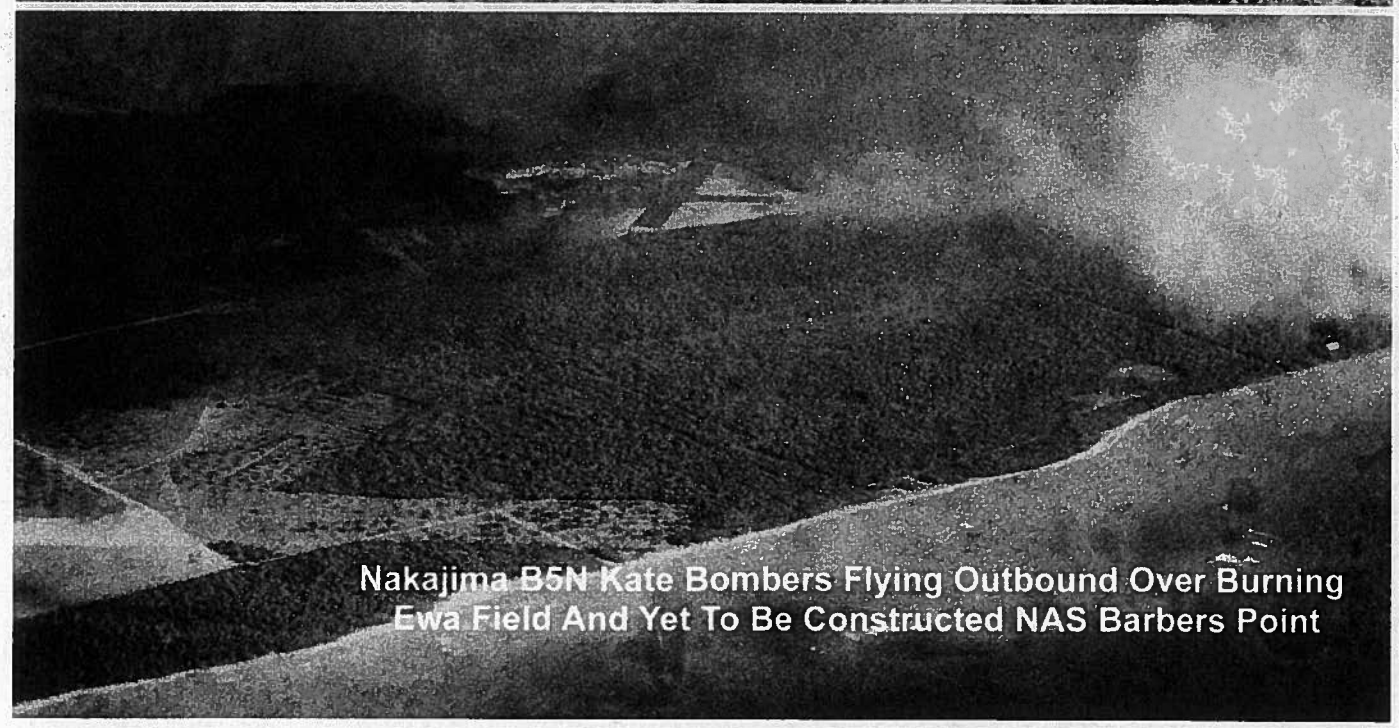


Figure 29 of 42 – Aerial View from IJN Aircraft, December 7, 1941

Nakajima B5N Kate Torpedo Bombers
Flying Inbound To Pearl Harbor Over Lualualei



Nakajima B5N Kate Bombers Flying Outbound Over Burning
Ewa Field And Yet To Be Constructed NAS Barbers Point

Figure 30 of 42 – Ewa Plain from IJN Aircraft, December 7, 1941 (Source: US Navy)

Figure 31 of 42 – Akagi Map Board Depicting Ewa Field (Source: Original Print Al Makiel)

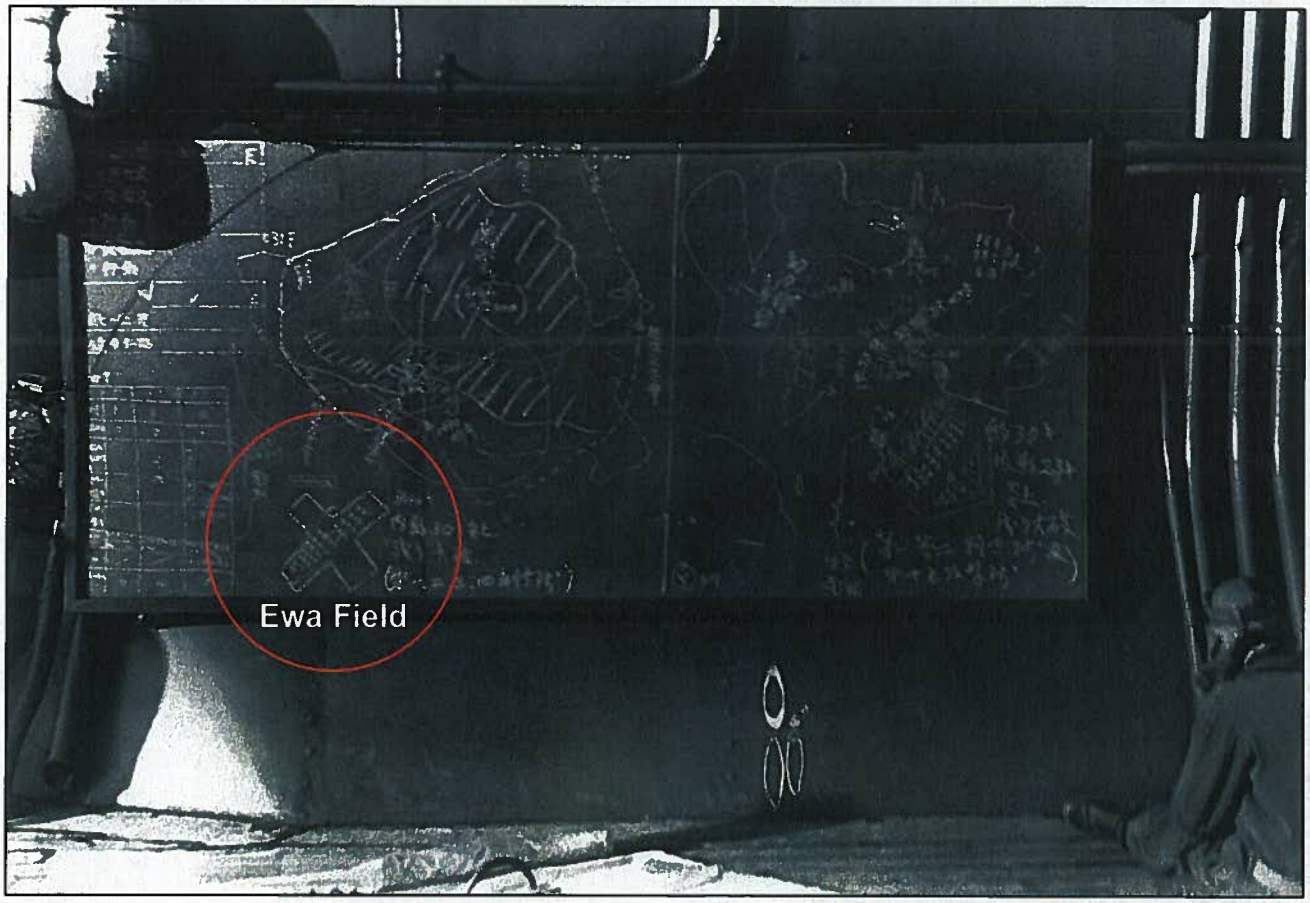


Figure 32 of 42 – Japanese Planes Photographed from a B-17, December 7, 1941
(Source: Lee Embree Photograph Collection)

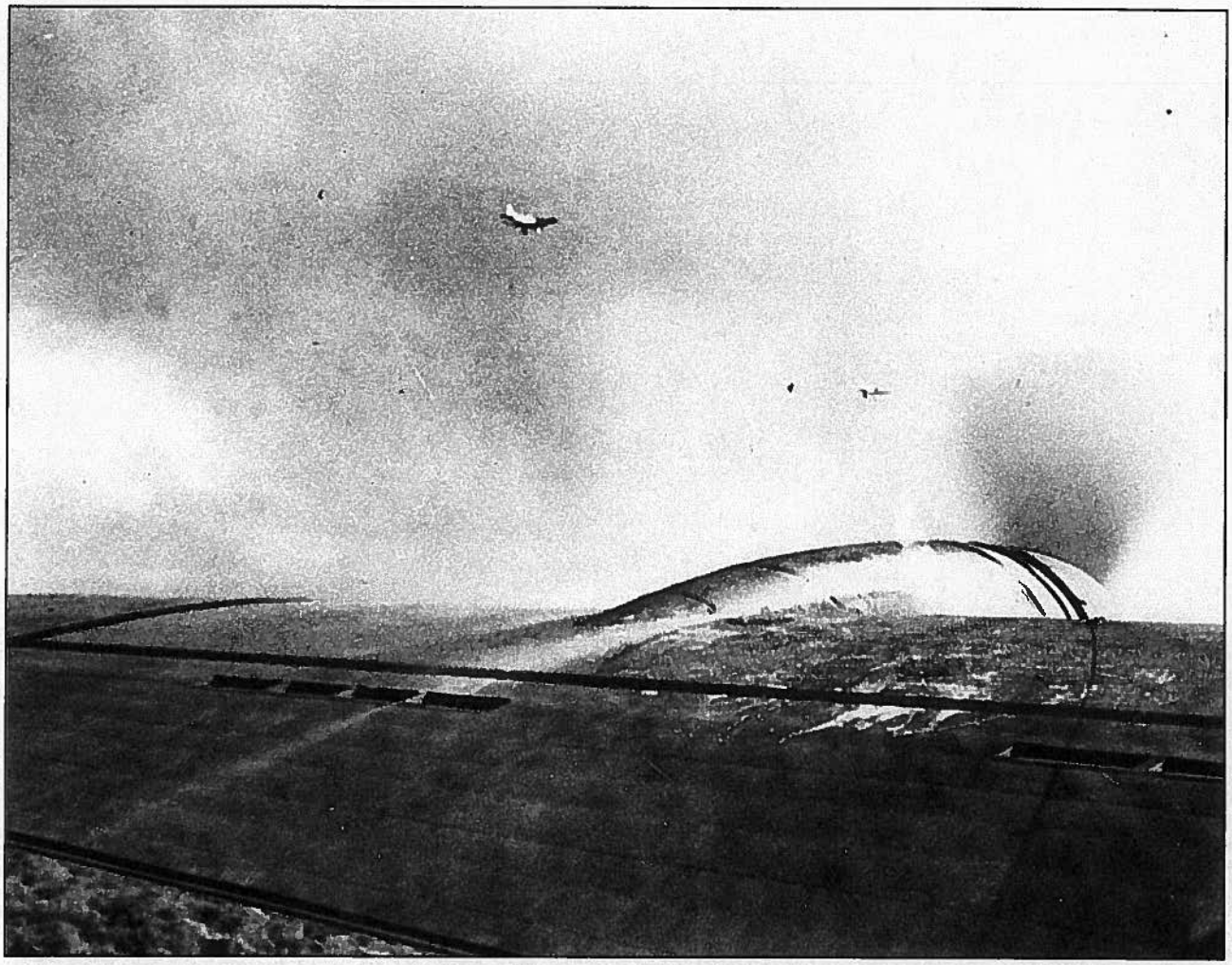


Figure 33 of 42 – Japanese Planes Circling Crash Site, Ewa Plain, December 7, 1941
(Source: Lee Embree Photograph Collection)

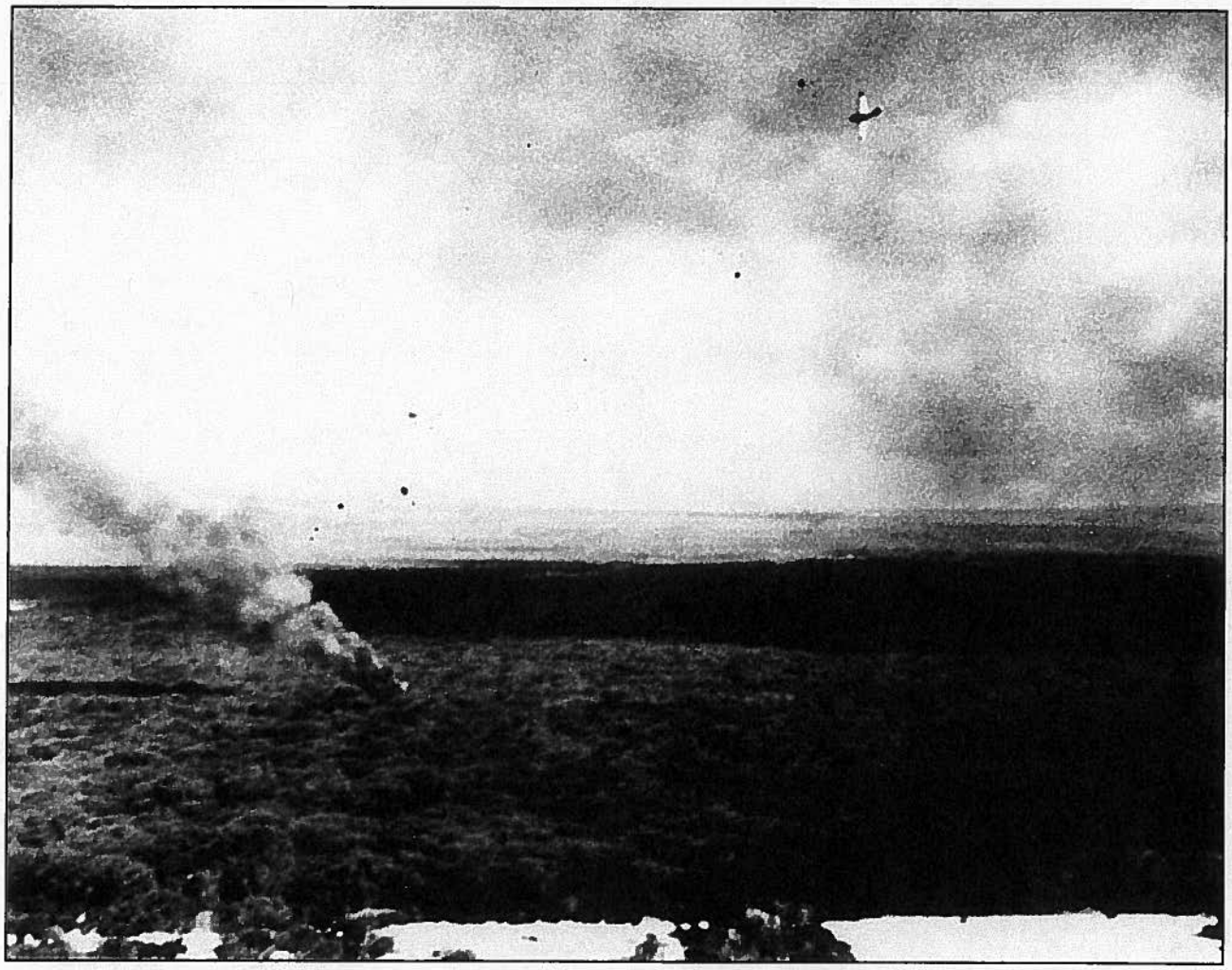


Figure 34 of 42 – Japanese Attack Routes (Source: NPS)

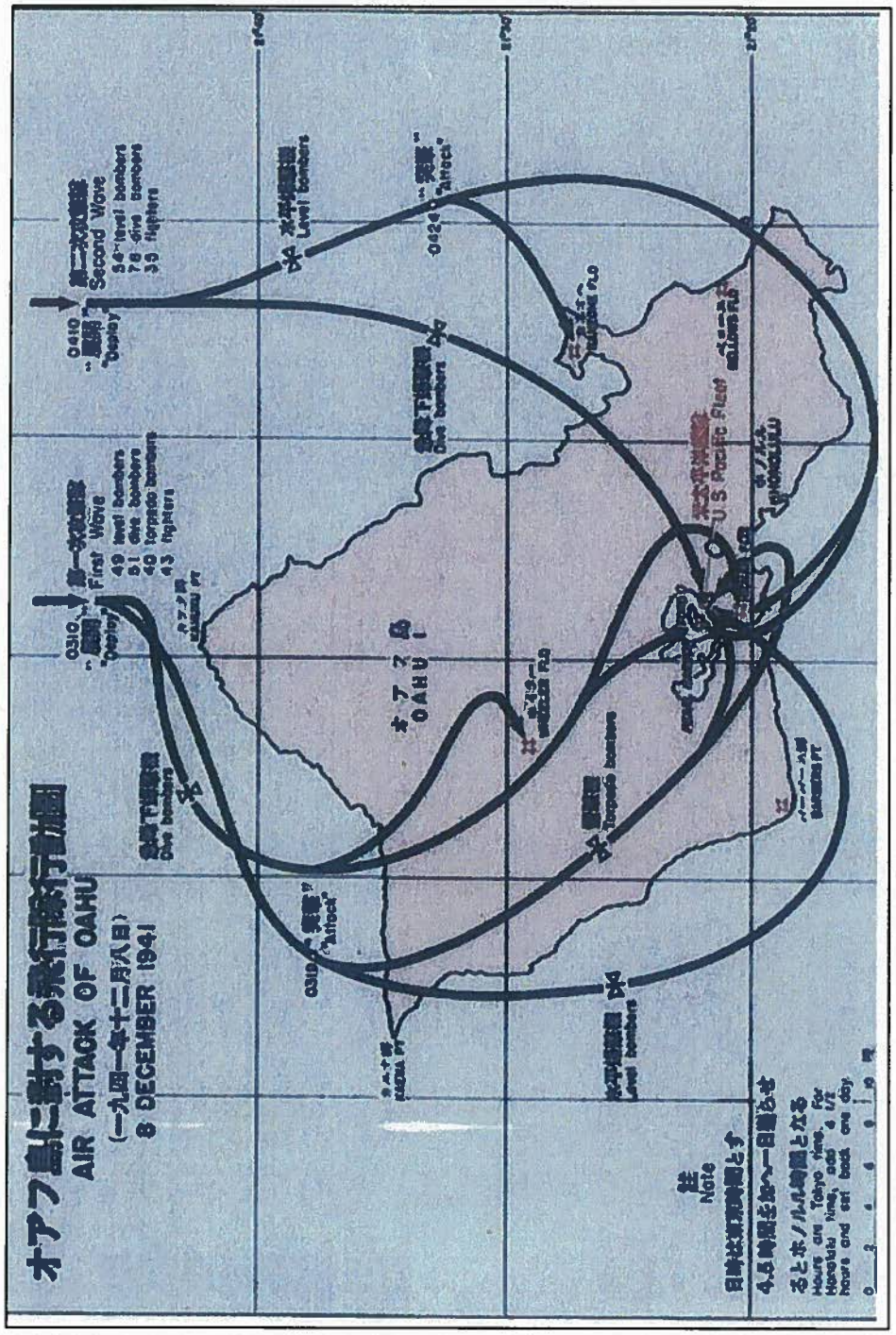
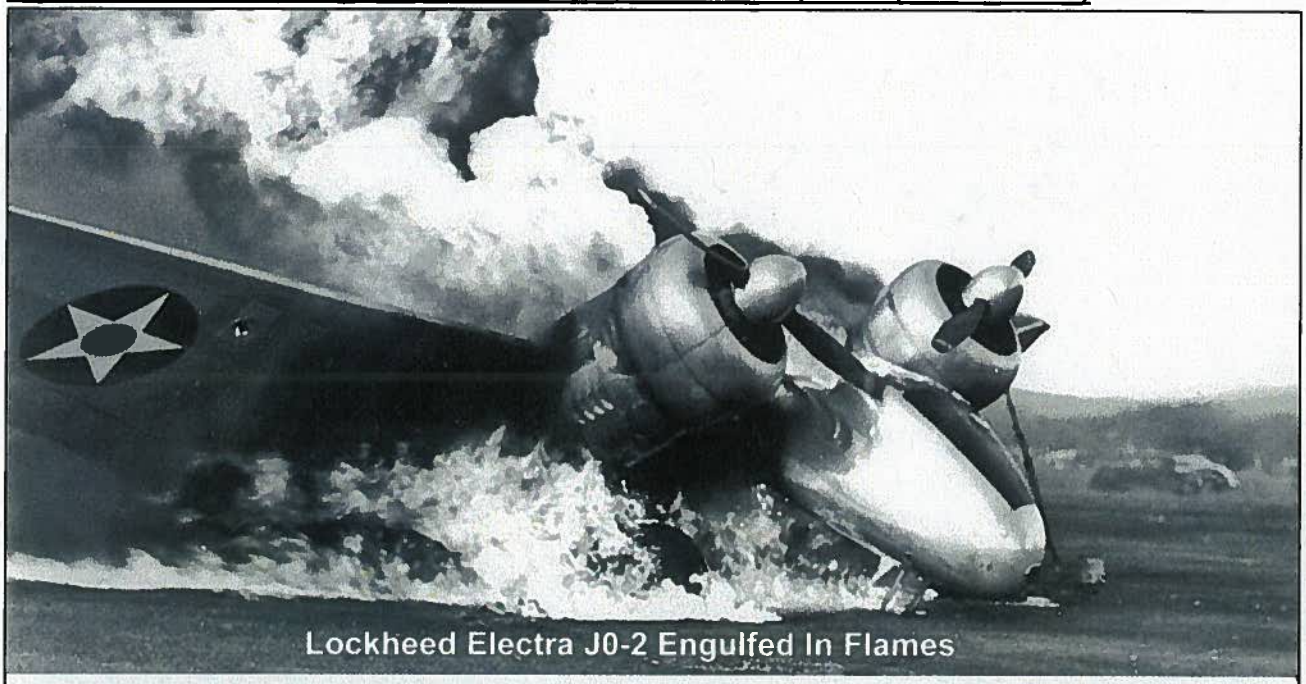


Figure 35 of 42 – Burning Aircraft, Ewa Field, December 7, 1941 (Source: NPS)



Lockheed Electra J0-2 Engulfed In Flames

Vought SB2U Vindicator A Burned Out Shell After Attack

Figure 36 of 42 – US Marine Corps Ambulance, Strafing Damage, Ewa Field, December 7, 1941 (Source: NPS)

USAR-1293 Wrecked US Marine Corps 1938 Ford Ambulance at Ewa Marine Corps Air Station, Dec. 1941.

Figure 37 of 42 – Damaged Vehicles from Strafing, Ewa Field, December 7, 1941
(Source: NPS)

USAR-1284 Three Fords, a 1934 Phaeton, a Model A Sedan, a 1932 Sport Coupe, damaged from strafing during attack.

Figure 38 of 42 – Anti-Aircraft Fire, December 7, 1941

Figure 39 of 42 – Injured Ewa Marine, December 7, 1941 (Source: NPS)

USAR-1298

Figure 40 of 42 – Battle Action, Ewa Plain

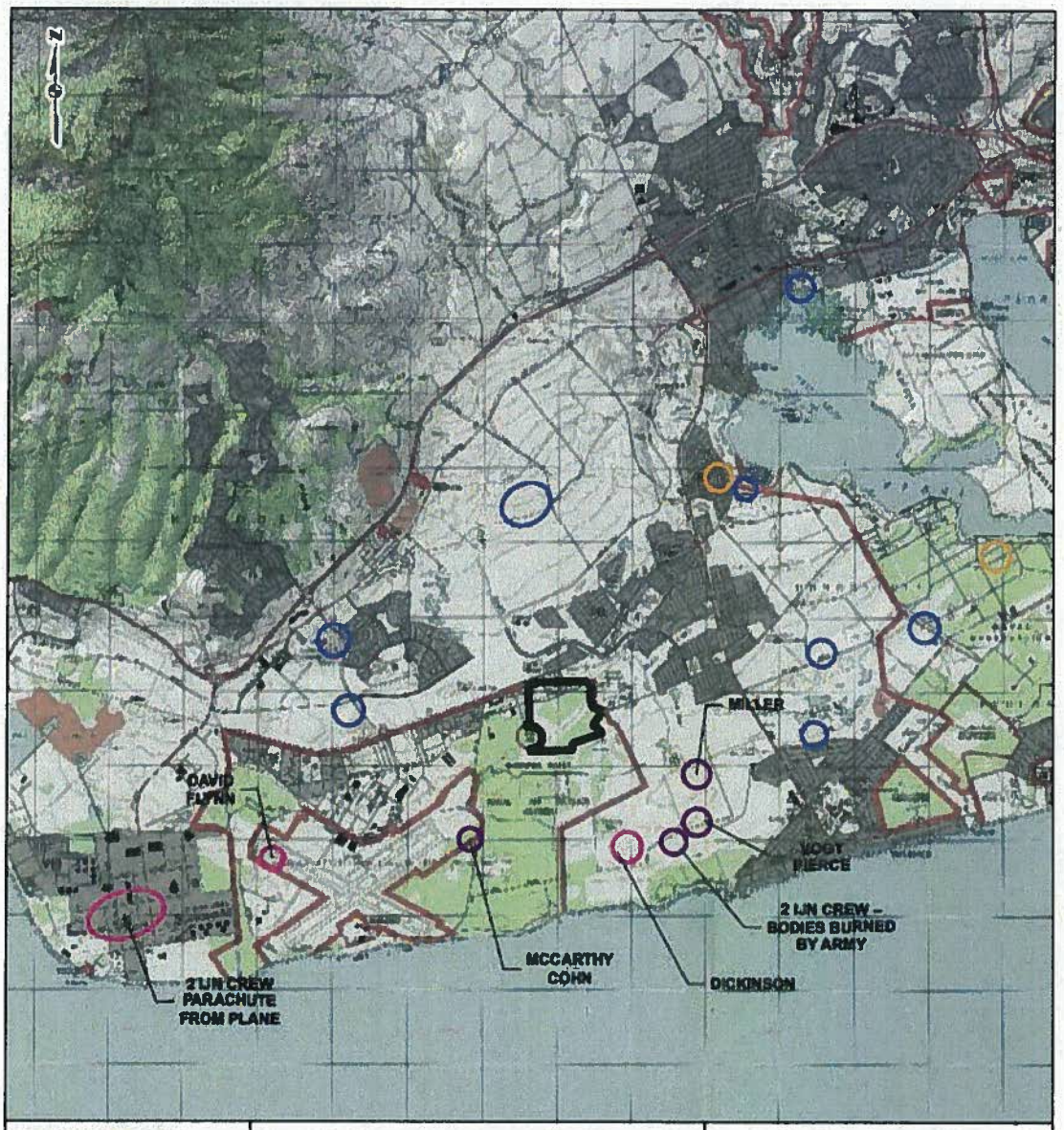


Figure 41 of 42 – Injured Ewa Field Photographer, December 7, 1941, (Source: NARA)

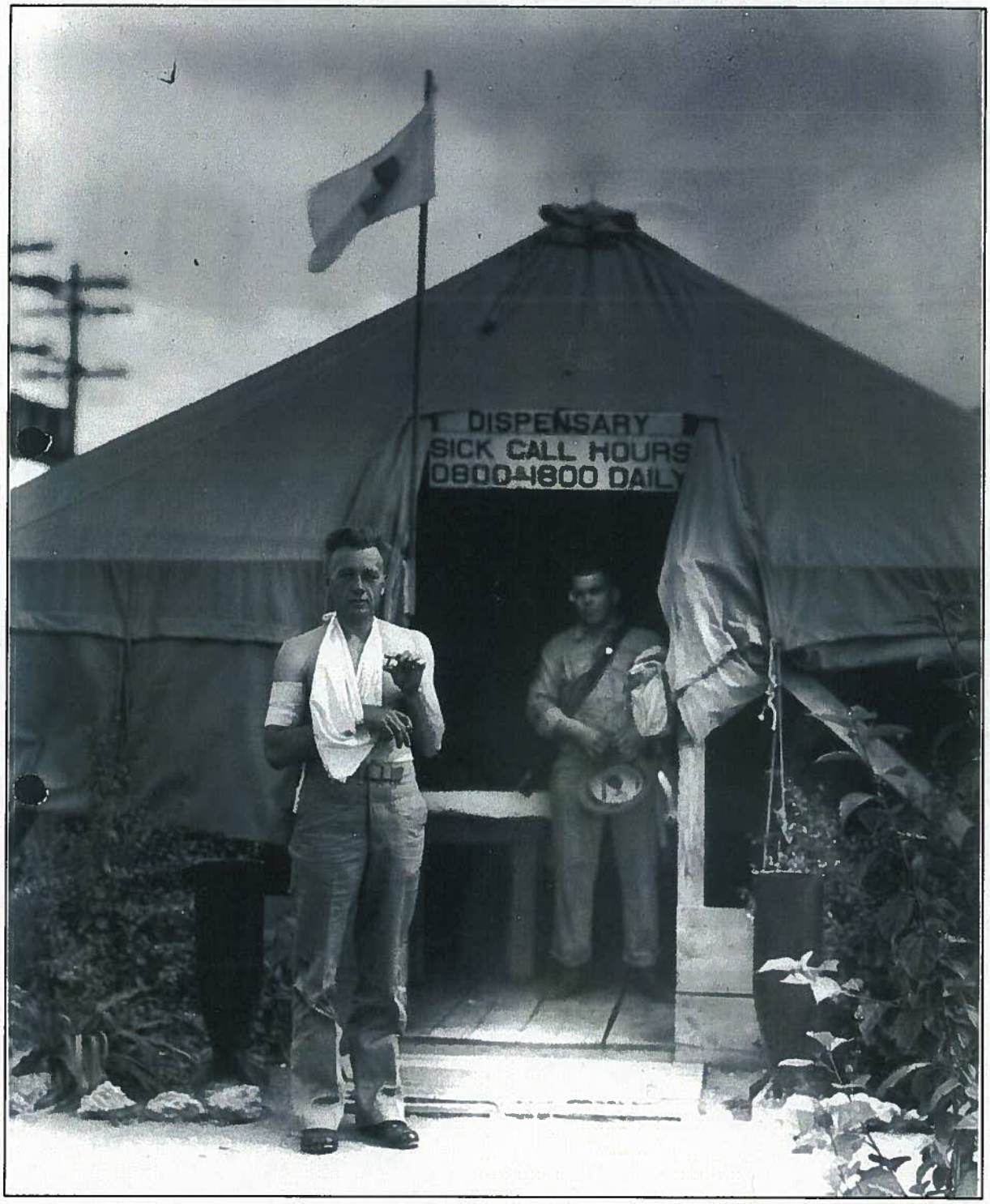


Figure 42 of 42 – Ewa Field, September 12, 1942, (Source: Naval History Heritage Command)

Appendix A

REPORT
INVESTIGATIONS AT MCAS EWA
ISLAND OF OAHU
HAWAII

Prepared for
GAI consultants, Inc.

July 2013

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TABLE OF CONTENTS

Page

1 Introduction 1

2 Methods 2
2.1 Reconnaissance 2
2.2 Geophysical Investigations 2

3 Site Reconnaissance 5

4 Geophysical Investigations 9
4.1 Fuel Storage Tanks 9
4.2 Latrine 9
4.3 Flagpole 10
4.4 Water Line GPR Reconnaissance 10
4.5 Swimming Pool 11
4.6 End of Coral Runway 11
4.7 Mooring Mast 11
4.8 Compass Rose 12

5 Summary of Results 13
5.1 Railroad Spur 13
5.2 Fuel Storage 13
5.3 Enlisted Barracks 13
5.4 Latrine 13
5.5 Flagpole 14
5.6 Armory 14
5.7 Water Lines 14
5.8 Swimming Pool 15
5.9 Dispensary 15
5.10 Officers Barracks 15
5.11 End of Coral Runway 15
5.12 Mooring Mast 16
5.13 Storage Building 16
5.14 Magazine 16
5.15 Compass Rose 16
5.16 Ammunition Dump 17
5.17 Magazine 17

LIST OF FIGURES

Figure No.	Title
1	Location of MCAS Ewa
2	MCAS Ewa – December 2, 1941
3	Reconnaissance Areas
4	Fuel Tank Location
5	Magnetometer Survey – Fuel Tank Location
6	GPR Survey – Latrine Area
7	GPR Survey Results – Latrine Area
8	Magnetometer Survey – Flagpole Area
9	Magnetometer Survey Results – Flagpole Area
10	GPR Survey Transects – Water Line Reconnaissance
11	GPR Line 1 – Water Line Reconnaissance
12	GPR Line 2 – Water Line Reconnaissance
13	Magnetometer Transect – Swimming Pool
14	GPR Transect – End of Coral Runway
15	Magnetometer Recon – Mooring Mast
16	Example of Magnetometer Data – Mooring Mast
17	Metal Detection Reconnaissance – Compass Rose

1 INTRODUCTION

This report presents the results of investigations conducted by myself at Marine Corps Air Station, Ewa, Hawaii (Ewa Field) in June, 2013 (Figure 1). The goal of this task of the project was to use geophysical methods to identify features at the airfield that were present when it was attacked on December 7, 1941. Before any geophysical surveys could be conducted, it was necessary to locate areas on the ground where buildings and other features were present at the time of the attack. Many features that were considered geophysical targets prior to the site reconnaissance were discovered to be so well exposed at the surface that no geophysical investigations were necessary to define them. My role in the investigation was expanded beyond geophysics to include exploration of the site to locate and identify 1941 features, thus allowing my client (Lori Frye, representing GAI Consultants, Inc.) to spend her time on the site more efficiently and have more time for her other project related tasks while in Hawaii.

Geophysical methods employed at the site are ground penetrating radar, magnetometery, and metal detection. These methods are discussed more in a later section of this report.

I received considerable and much appreciated assistance from Valerie Van der Veer, Project Manager Ewa Plains Stables Center (aka Ewa Plains Program), throughout the field investigation.

This report will present the results of the geophysical investigations and summarize the findings of the reconnaissance.

2 METHODS

2.1 Reconnaissance

Before any geophysical work could be conducted at Ewa Field, features that were present at the time of the Japanese attack on December 7, 1941 had to be located in the field. This was not a straightforward task because structures present at the time of the attack have been removed and much of the site is overgrown with weeds and thick brushy growth. Even roads that were at the site in 1941 have been changed. Few landmarks were present at the site to guide us to locations that corresponded to structures and other features that were present in 1941.

We were fortunate to have a copy of a December 2, 1941 air photo of Ewa Field (Figure 2) that we were able to georeference and import into a handheld GPS unit. This allowed us to locate ourselves within the 1941 image and determine what, if anything, was visible on the surface and if they were reasonable targets for geophysics.

2.2 Geophysical Investigations

Ground Penetrating Radar - Ground penetrating radar (GPR) has evolved over the past two decades into one of the most commonly applied techniques for imaging the shallow subsurface. The method offers the highest resolution of geophysical techniques commercially available today. In many cases, the time required for the acquisition of GPR profiles is minimal and subsurface profiles can normally be obtained in real time, making this tool very cost-effective. GPR works best in non-conductive soils, such as dry sand or sand saturated with fresh water.

The typical result of a GPR survey is a profile that presents radar wave amplitude as a function of distance along the line and two-way travel time. To know the depth to a reflector, it is necessary to know the average propagation velocity from the ground surface. The velocity of a radar pulse in an earth material is dependent on the relative dielectric constant of the material. This velocity can sometimes be estimated from

knowing the characteristics of the subsurface lithology. An average velocity of 0.1 meters/nanosecond is a typical velocity and was used for estimating depths here.

A factor affecting the depth of penetration of the radar signal is attenuation. This attenuation is caused by spreading and scattering losses, as well as electrical losses. Scattering and electrical losses are due primarily to the electrical conductivity of the subsurface materials, which in soils is due mainly to clay and moisture content. The GPR method was able to investigate to depth from 3 to 4 meters at this site.

Surveying with X3M system

Land use can create conditions that can be mapped by GPR. Natural soil layers that have been disrupted by digging can often be mapped by radar. Compaction along roads or paths also creates conditions that can be mapped. Discrete objects such as rocks, roots, and utility lines are also found with GPR.

A MALÅ Geoscience X3M radar system was used for this investigation. A shielded 250 MHZ antenna is used with this system.

Magnetometer - The magnetometer method measures the total magnetic field strength and is used to map variations in the magnetic field across a site. The total magnetic field consists of the sum of the earth's magnetic field and the field due to magnetic objects and features in the vicinity of the sensor. The earth's field is essentially constant across most sites, so variations in the measured magnetic field (anomalies) represent local features. Maps are generated that show spatial relationships and relative amplitudes of the magnetic anomalies. These are interpreted to determine location, extent, and probable nature of buried magnetic features.

Magnetic methods are used to map subtle changes in soil properties that can indicate historic or prehistoric land use. Magnetic properties of soil are related to its chemical composition, with compounds of iron being one of the most important factors. Land use and organic content of the soil can affect the chemical state of iron and therefore the magnetic properties. This makes it possible to map paths, floors, pits, postholes and

many other features with magnetometer surveys. Some materials that have been heated to high enough temperatures acquire permanent magnetism. Fired ceramics, hearths and even burned walls can be mapped with magnetic surveys.

Nails and metal typically produce much stronger responses than soil variations. Utility lines, buildings, fences, vehicles and other modern site features can also produce strong magnetometer anomalies.

Magnetometer survey with Geometrics G-858

The magnetometer survey was conducted with a Geometrics G-858 Cesium magnetometer. This instrument measures the total magnetic field with two sensors at different heights, and then calculates the vertical gradient from these two values. Gradient data provide higher resolution results than total field (single sensor) data and are not subject to the drift that the total field experiences throughout the day. By its nature, the vertical gradient provides information to a depth of about a meter and minimizes the response of deeper features.

Metal Detection – Metal detection is an inexpensive and efficient method of mapping shallow method and is part of the basic tool kit for some archaeological geophysicists. Modern metal detectors discriminate between ferrous and non-ferrous metal and provides depths and highly accurate locations.

A Garrett Ace 350 metal detector was used for this project. It was used to attempt to locate marking pins of the original compass rose beneath a later layer of asphalt. No digging was performed to identify the nature of metal detected by this method.

3 SITE RECONNAISSANCE

Figure 3 indicates specific areas at the site that were visited as part of the reconnaissance effort. The numbers used here correspond to the numbers in Figure 3. Several areas were identified for subsequent geophysical surveys based on this reconnaissance. These surveys are discussed in a later section of this report.

1. Railroad spur

It was possible to trace the railroad spur for over 500 feet, starting near the Roosevelt Avenue. The rails are no longer present, but the ties are still in place along the railroad spur. Many of the ties exhibited considerable burning.

No geophysical surveys were conducted in this area.

2. Fuel storage tanks

Four tanks are visible in the 1941 air photo. Reconnaissance found two pipes protruding from the ground at the location of the northern tank. One of the pipes smelled strongly of gasoline. An open access vault is adjacent to the suspected tank. Weeds cover most of this area but were not considered too thick for geophysical surveys. A magnetometer survey was conducted to determine if tanks were present. The weeds were too thick for a GPR survey.

3. Enlisted barracks

No evidence of these barracks was observed during a walkover of this area.

This area was not investigated with geophysical surveys.

4. Latrine

This area is located north of an abandoned post war building. A roadway on the north side of the building provided access for a geophysical investigation. A field north of the roadway also covers the latrine location but the growth was too thick to conduct a geophysical survey. GPR and magnetometer methods were used at this site.

5. Flagpole

No evidence for the flagpole or the surrounding sidewalks could be seen during a walkover of the area. A portion of this area is covered with knee to waist high weeds and part is mowed short. A magnetometer survey was conducted over a part of this area to look for evidence of the flagpole.

6. Armory

A concrete floor with a raised concrete platform was found at this location. A paved sidewalk is present alongside part of the floor. A possibly natural depression or sinkhole was found adjacent to the concrete floor. The GPR was run around the possible sinkhole to determine if any additional cavities in the rock were present.

7. Water lines

Later maps of the facility (1942) indicated that water lines were present in this area including a line that extended towards the armory. The area was mostly covered with knee-high weeds but in spite of this a few lines of GPR were conducted to try to detect the water lines.

8. Swimming pool

The pool was under construction at the time of the attack in 1941. It is now filled with dirt and hand rails of the pool's ladders protrude from the dirt. The pavement (sidewalk) surrounding the pool is present. Where exposed, traces of paint could be seen on the inside of the pool. A single magnetometer transect was run across the pool to determine if metal trash was present in the dirt that filled the pool.

9. Dispensary

The dispensary is probably partially covered by an extensive banyan tree that is located where the west side of the building would have been. No evidence of the dispensary was observed.

No geophysics was conducted in this area.

10. Officers barracks

The floors of four officers barracks (identified on later maps as A, B, C and D) were among the features found at this location. A raised curb was present along the outer edges of the floors. The floors exhibited traces of interior walls, doorways, and what were probably shower stalls. In one instance, portions of linoleum floor tiles were still present. Later additions to the barracks that connected barracks A to B and C to D were also present. These connecting structures were apparently latrines.

The floor of the building immediately northwest of barracks A is also present. This was a latrine and possibly showers as the support for a fuel tank for heating water is adjacent to the latrine floor.

The officers mess was located immediately west of barracks C and D. No evidence of this structure was observed, although the sidewalk visible along its south side in the 1941 photo is still present.

Along the roads on the east and north sides of the officers' barracks area are power poles upon which remain period light fixtures.

Geophysical investigations were not needed in the area of the officers barracks.

11. End of the earlier coral runway

A shorter coral runway existed before the paved runway was constructed. A GPR data along the runway was collected in an attempt to locate the end of the earlier runway.

12. Mooring mast

The area in the vicinity of the mooring mast and adjacent support buildings is now paved and covered with brush and small trees growing through the asphalt. The thick brush made conducting a gridded geophysical survey impossible. A magnetometer was used where it was possible to walk to see if evidence of the mooring mast and associated tie-downs existed.

13. Storage building

The floor of this building still exists and exhibits traces of interior walls and doorways.

No geophysical surveys were conducted in this area.

14. Armory

This structure is within a fenced area and not accessible for either a visual inspection or a geophysical survey.

15. Compass rose

No visible evidence of this compass rose was found. A metal detector was used to determine if brass pins such as those used in the later compass rose could be located.

16. Ammunition dump

This location is now covered with a large pile of rubble consisting of large pieces of concrete, asphalt and rock. The height of the pile is approximately 10 feet and is covered by vegetation. Walking on the top of the pile was treacherous as the gaps between pieces of rubble were obscured by vegetation and the risk of twisting an ankle was high.

No geophysical investigation could be conducted in this area.

17. Armory

The location of this armory is now paved with asphalt. No evidence of the structure could be seen.

No geophysical investigation was conducted here.

4 GEOPHYSICAL INVESTIGATIONS

4.1 Fuel Storage Tanks

The fuel storage area is reconnaissance area number 3 and is shown in Figure 4 on both 1941 and 2013 photographs. A magnetometer survey covering an area of 20 x 30 meters was conducted to determine if any tanks remained in the ground (Figure 5). The corners of the grid were placed using tapes but the weeds caused difficulties when turning a right angle which was not recognized until later. Therefore the survey area is not rectangular.

The pattern of magnetic anomalies indicates a buried object consistent with a tank and located over the northernmost tank as shown in the figure. The strongest part of the anomaly is probably the steel pipe protruding from the ground at the west end of the tank. There are no magnetic anomalies over the locations of the other three fuel tanks indicating these have been removed.

There was no visible cause for the unknown anomaly shown in Figure 5.

4.2 Latrine

The latrine area is reconnaissance area number 5. The only location over the latrine that could accommodate a geophysical survey was the roadway along the north side of the existing building. A GPR survey was conducted in the area shown in Figure 6. A magnetometer survey was initiated over the same area but interference from an unknown source caused the data to be unusable and the data collection was discontinued. The results of the GPR survey are shown in Figure 7.

The time-slice of GPR data shown in Figure 7 shows radar information from a depth of about 1 meter. Linear anomalies delineated in red are very near where the edge of the latrine was anticipated and are probably related to the latrine. One of the linear anomalies is at a completely different angle and may be a utility line.

4.3 Flagpole

The flagpole area is number 5 in Figure 3. This area was covered by a magnetometer survey with the intent of locating the base of the flagpole. The area covered by the survey is shown in Figure 8 on both the 1941 and 2013 air photos of the area. The results of the survey are shown in Figure 9. A strong magnetic anomaly is seen near the anticipated flagpole location and may be due to a cut-off remnant of the flagpole (if steel or iron). Another magnetic anomaly in the northwest corner of the data could be caused by remains of a building seen there in the 1941 photo. A utility vault is the cause of a strong anomaly in the northeast portion of the data and utilities, such as a water line, are the probably cause of the strong responses along the east side of the survey.

4.4 Water Line GPR Reconnaissance

GPR data were collected in reconnaissance area 7 to determine if water lines shown on a 1942 map are still present. GPR line 1 started at the edge of the paved road and was collected south along a dirt road. GPR line 2 was collected west to east near the edge of the runway. The location of the water lines shown in Figure 10 is approximate because of rescaling and the transferring of this information from another map.

Based on the mapping in Figure 10, Line 1 crossed water lines in 2 locations: approximately 14 meters and 43 meters from the start of the line. The GPR record shown in Figure 11 exhibits reflectors that could be due to water lines at about 17 meters and 41 meters. These are close enough to the anticipated water line locations to interpret these reflections at due to the water lines. A miss-orientation of the water line positions on the air photo is given as the reason for the discrepancy. Deep reflections (about 3 meters or 10 feet deep) detected between 76 and 84 meters are probably due to a cavity within the rock.

Line 2 (Figure 12) did not cross any mapped water lines but did cross a shallow object (probably metal) at about 12 meters. The data also show deeper reflection between 20 and 24 meters that may be due to a cavity within the rock. A roughly flat reflector from

about 45 to 50 meters may be due to a water line that runs nearly parallel to this GPR line.

4.5 Swimming Pool

The swimming pool (reconnaissance area 8) is visible at the surface and did not need to be defined using geophysical methods. The pool has been dirt filled so a magnetometer line was run to determine if the fill was primarily dirt or if other debris (presumably containing metal) was mixed in with the dirt. Figure 13 shows the position of the magnetometer line relative to the pool.

A plot of the magnetometer data is also shown in this figure. Four strong anomalies are clearly evident: two at metal fence posts and two at sides of the pool. The pool is presumably constructed of reinforced concrete or for some other reason has metal in its sides. There is no indication of metal within the pool.

4.6 End of Coral Runway

The investigation for the end of the earlier coral runway is reconnaissance area number 11. GPR data were collected near the side of the runway as shown in Figure 14. The approximate location where we expected the end of the runway to be is indicated by the rectangle. The transect is a total of about 425 meters long and was collected in 7 sections varying in length from 50 to 68 meters.

The GPR data provided no evidence of the end of the early runway.

4.7 Mooring Mast

The mooring mast location is identified as reconnaissance area 13 in Figure 3. The area is currently paved over with asphalt and thick with bushes and trees growing through the paving. The goal of the investigation in this area was to locate the base of the mooring mast and/or the anchors for the cables supporting the mooring mast. A systematic, gridded geophysical investigation was impossible because of the thick vegetation.

Magnetometer data were collected along unsurveyed paths where the operator could walk in the vicinity of the mast (Figure 15). It was hoped that the mast foundation and the cable anchors would be the strongest magnetic anomalies and therefore identifiable.

It was immediately evident while collecting the data that there were many very strong magnetic anomalies and not just the few that were expected. An example of magnetometer data from this area is shown in Figure 16. The conclusion was that there is widespread metal in addition to the mast foundation and cable anchors buried beneath the asphalt surface. It was not possible from this reconnaissance with the magnetometer to identify mast related features so the survey was inconclusive. It may not have been possible to distinguish these features from other buried metal if a gridded magnetometer survey had been conducted.

4.8 Compass Rose

The compass rose was reconnaissance area 15 and is shown in Figure 17. A later compass rose at Ewa used brass pins to mark its center and various compass bearings around the circle. It was hoped that brass pins were also used in the original compass rose. A magnetometer could not be used to determine if any brass pins are still present because brass is not magnetic. A metal detector with capabilities to discriminate different metal types was used to search for the brass pins.

There were so many metal responses within the vicinity of the compass rose that it was not possible to distinguish between brass and other metal. Since the metal detection survey was unable to isolate brass from all the metal responses, the survey was inconclusive.

5 SUMMARY OF RESULTS

5.1 Railroad Spur

Visual Inspection: Over 500 feet of railroad ties remain in place. Many are burned.

Geophysical Survey: None

Conclusion: Remains of the railroad spur are present.

5.2 Fuel Storage

Visual Inspection: Pipes are protruding from ground at the location of northern tank. A gasoline smell is present from one of the pipes. A vault is nearby.

Geophysical Survey: A magnetometer survey determined that the northern tank is present and the other three have been removed.

Conclusion: One tank is still present.

5.3 Enlisted Barracks

Visual Inspection: No evidence of the barracks was observed.

Geophysical Survey: None

Conclusion: No conclusions

5.4 Latrine

Visual Inspection: The latrine is partially covered by a paved roadway and a building is now located just south.

Geophysical Survey: A GPR survey detected what is interpreted as edges of the latrine. A magnetometer survey was ineffective because of high noise levels from an unknown source.

Conclusion: Remains of the latrine still exist beneath the surface.

5.5 Flagpole

Visual Inspection: No remnants of the flagpole, surrounding sidewalks, or adjacent buildings can be seen.

Geophysical Survey: A magnetometer survey may have mapped the flagpole base and one of the adjacent buildings.

Conclusion: Remains of the flagpole and foundations of an adjacent building may still be present beneath the surface.

5.6 Armory

Visual Inspection: The floor of the armory and a raised platform were found. A sidewalk around a part of the floor is present. A pit in the limestone adjacent to the armory floor is present.

Geophysical Survey: GPR detected no bedrock cavities in the vicinity of the pit.

Conclusion: The base of the armory is present. It is not known if the pit is related to the armory.

5.7 Water Lines

Visual Inspection: Most of the area of this reconnaissance effort is partially overgrown. No surface evidence of the water lines was seen.

Geophysical Survey: GPR data indicated reflectors near the locations anticipated for the pipe lines.

Conclusion: Water lines are probably present.

5.8 Swimming Pool

Visual Inspection: Edges of the pool, pool ladders and surrounding sidewalks are visible.

Geophysical Survey: A magnetometer transect across the pool detected only the edges and surrounding fence (poles).

Conclusion: The dirt fill in the pool contains no metal trash.

5.9 Dispensary

Visual Inspection: No evidence of the dispensary was observed on the ground.

Geophysical Survey: None

Conclusion: No Conclusions

5.10 Officers Barracks

Visual Inspection: Floors are present. Floors exhibit evidence of wall and door locations as well as shower stall locations. Period light fixtures are attached to the power poles near the barracks. The floor of the latrine and support for a fuel tank are present west of the barracks. Sidewalks are the only evidence of the nearby officers' mess.

Geophysical Survey: None

Conclusion: Remains of the officers' barracks are present.

5.11 End of Coral Runway

Visual Inspection: The coral runway is not visible.

Geophysical Survey: GPR data could not detect the end of the coral runway.

Conclusion: Inconclusive. The end of the coral runway may not be detectible by GPR.

5.12 Mooring Mast

Visual Inspection: There is no visual evidence of the mooring mast, cable anchors, or the associated buildings. The area is currently overgrown.

Geophysical Survey: A magnetometer reconnaissance (not a gridded survey) detected many magnetic anomalies and could not determine if any were related to the mooring mast.

Conclusion: Inconclusive

5.13 Storage Building

Visual Inspection: The floor of this building is present. Marks on the floor indicates possible interior wall locations and doorways.

Geophysical Survey: None

Conclusion: Remains of this building are present.

5.14 Magazine

Visual Inspection: This part of the site in fenced off and not accessable.

Geophysical Survey: None

Conclusion: No conclusion

5.15 Compass Rose

Visual Inspection: There is no visible evidence of the compass rose. The area is paved and partially overgrown.

Geophysical Survey: Metal was detected over a wide area and it was not possible to determine if brass pins associated with the compass rose remain

Conclusion: Inconclusive.

5.16 Ammunition Dump

Visual Inspection: A large pile of rubble is present over the site of the ammunition dump. The pile is estimated to be about 10 feet high.

Geophysical Survey: None

Conclusion: Inconclusive. There is no way to tell what is beneath the rubble.

5.17 Magazine

Visual Inspection: The area of the magazine is paved over.

Geophysical Survey: None

Conclusion: No conclusion

Figures

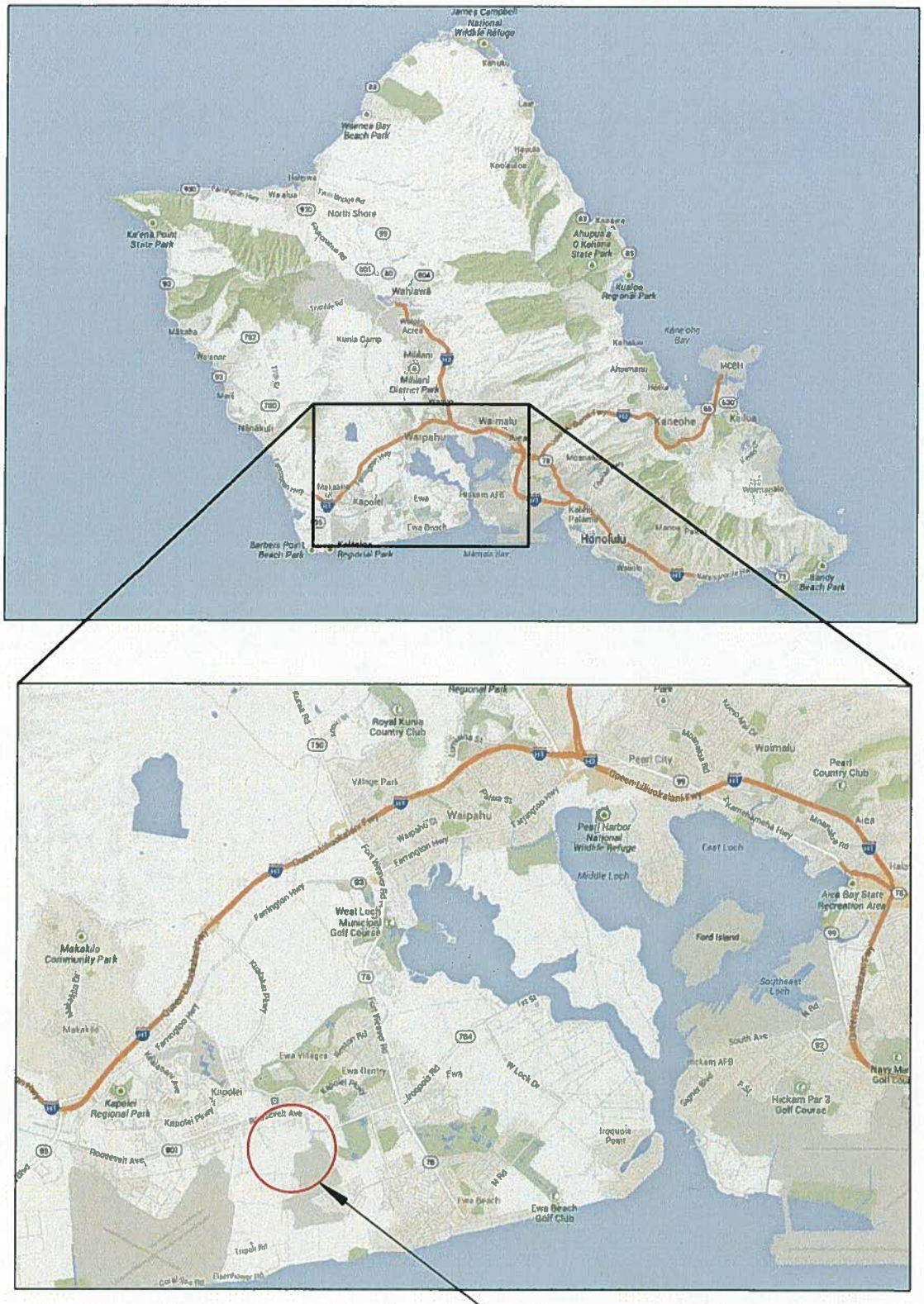


Figure 1
Location of MCAS Ewa
Island of Oahu
Hawaii

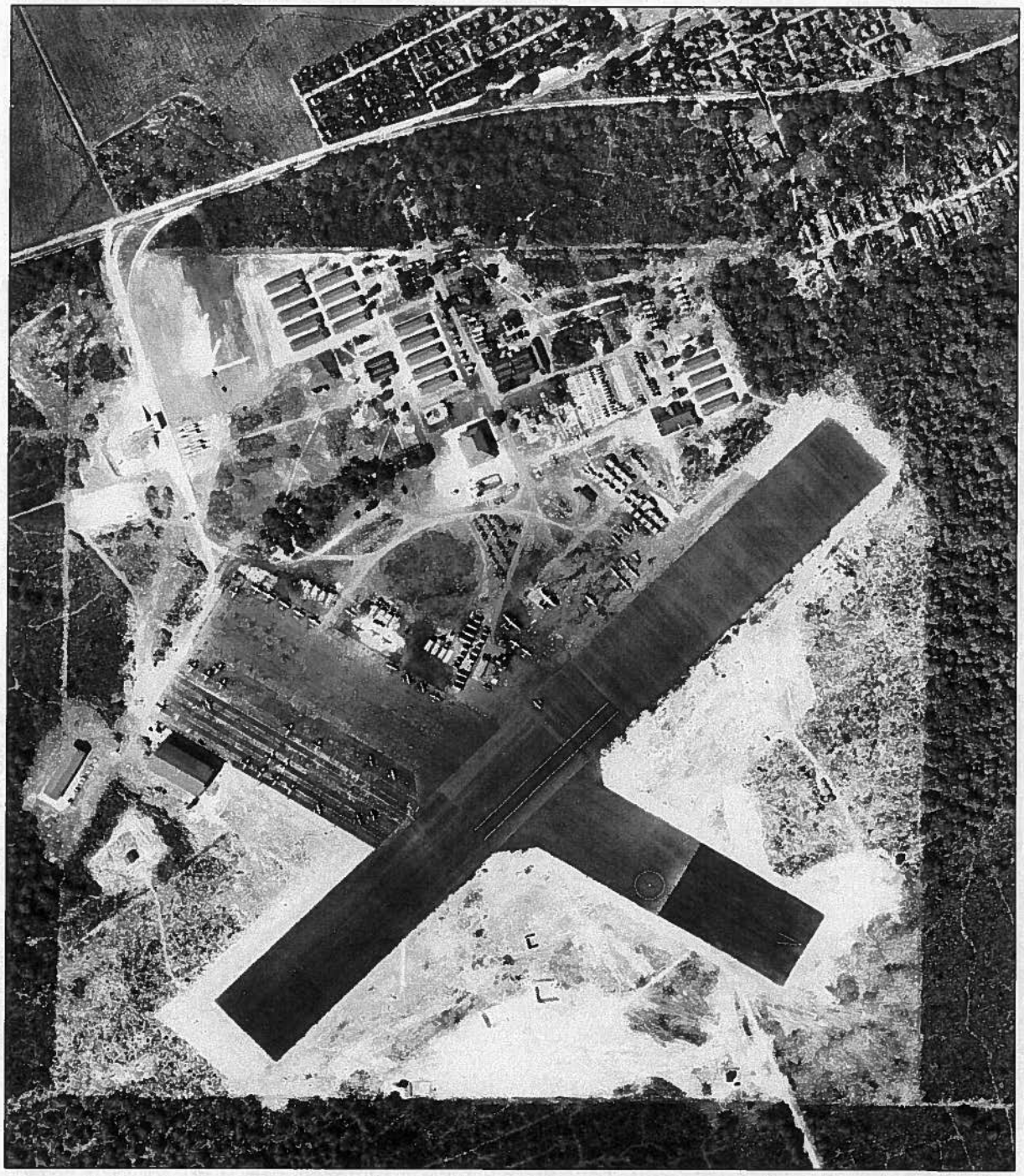
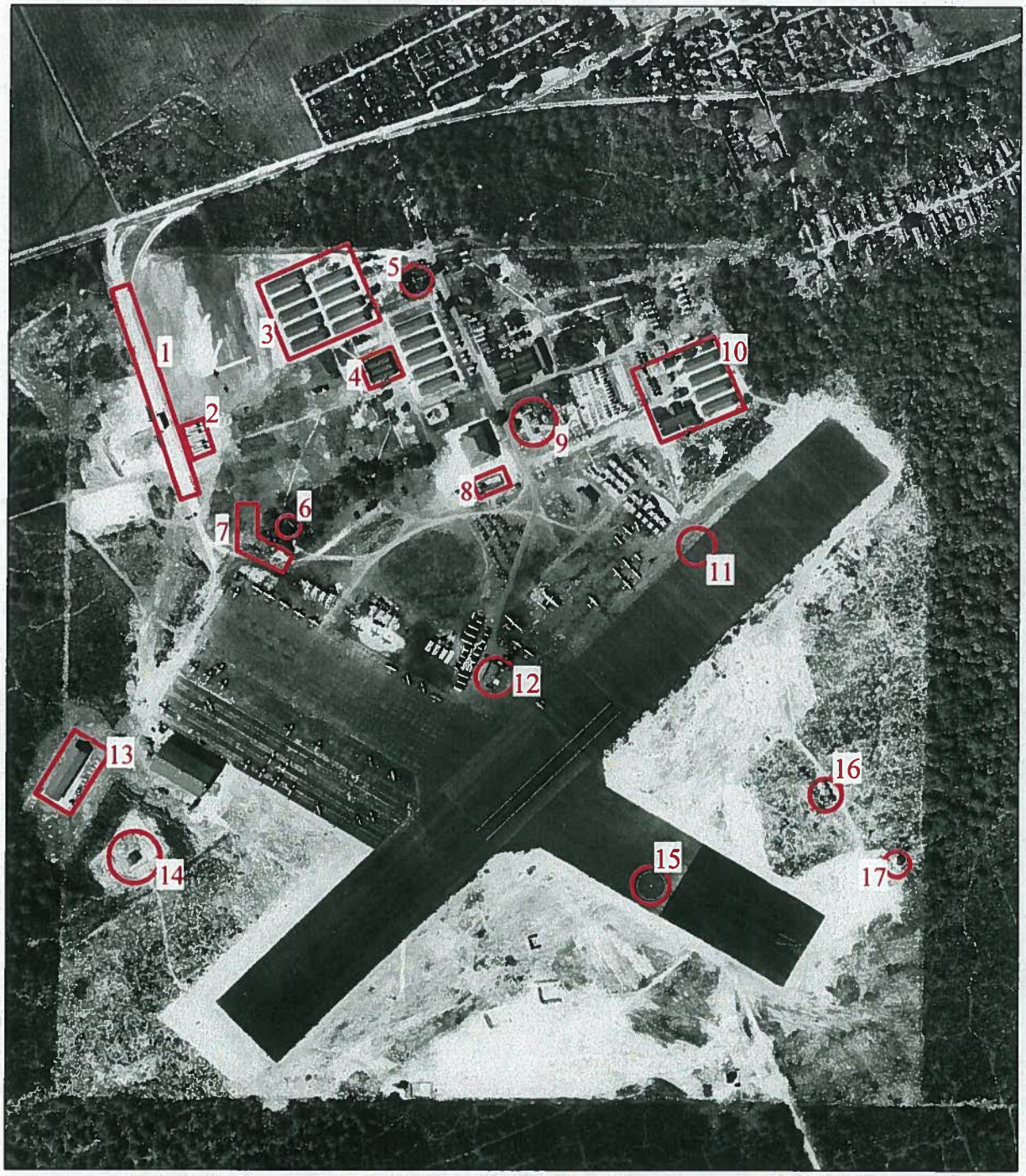


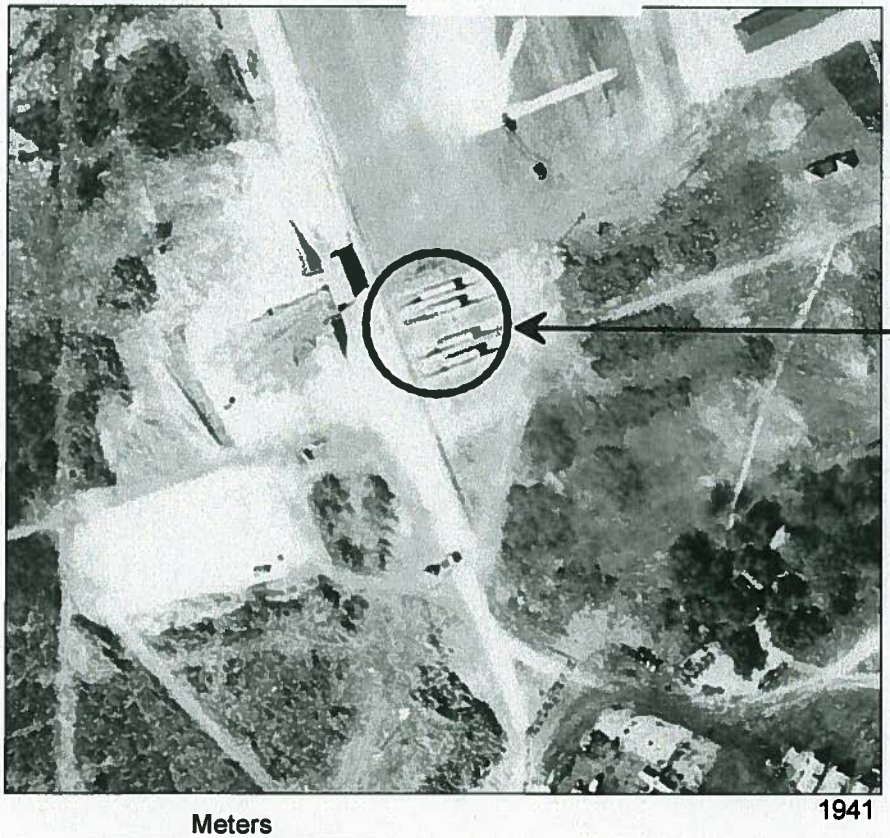
Figure 2
MCAS Ewa - December 2, 1941
Island of Oahu
Hawaii



1. Railroad spur
2. Fuel storage
3. Enlisted barracks
4. Latrine
5. Flagpole
6. Armory
7. Water lines
8. Swimming pool
9. Dispensary
10. Officers barracks
11. End of coral runway
12. Mooring mast
13. Storage building
14. Magazine
15. Compass rose
16. Ammuntion dump
17. Magazine

Figure 3
Reconnaissance Areas
MCAS Ewa
Island of Oahu
Hawaii

2013



1941

Figure 4
Fuel Tank Location
MCAS Ewa
Island of Oahu
Hawaii

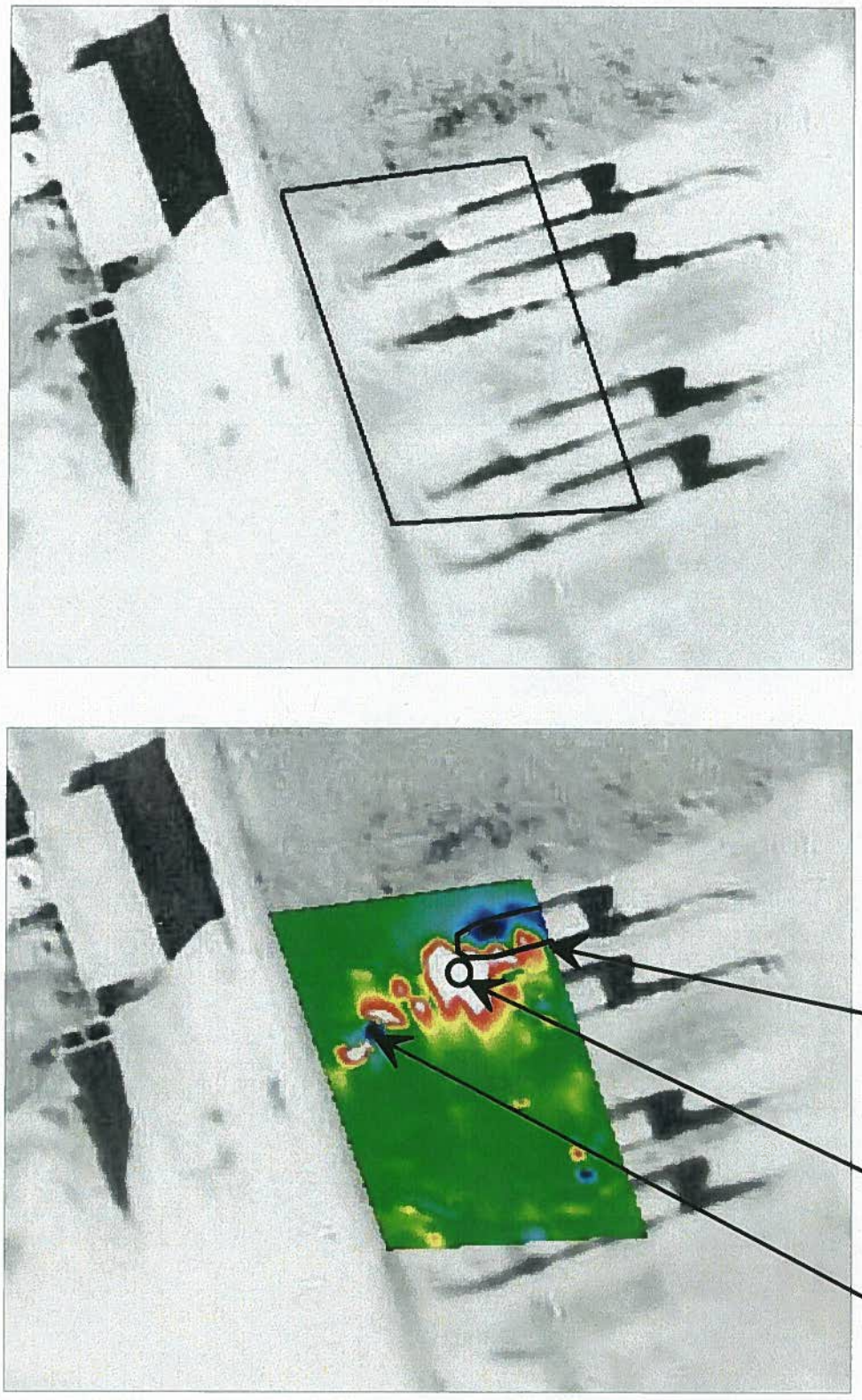


Figure 5
Magnetometer Survey
Fuel Tank Location
MCAS Ewa
Island of Oahu
Hawaii

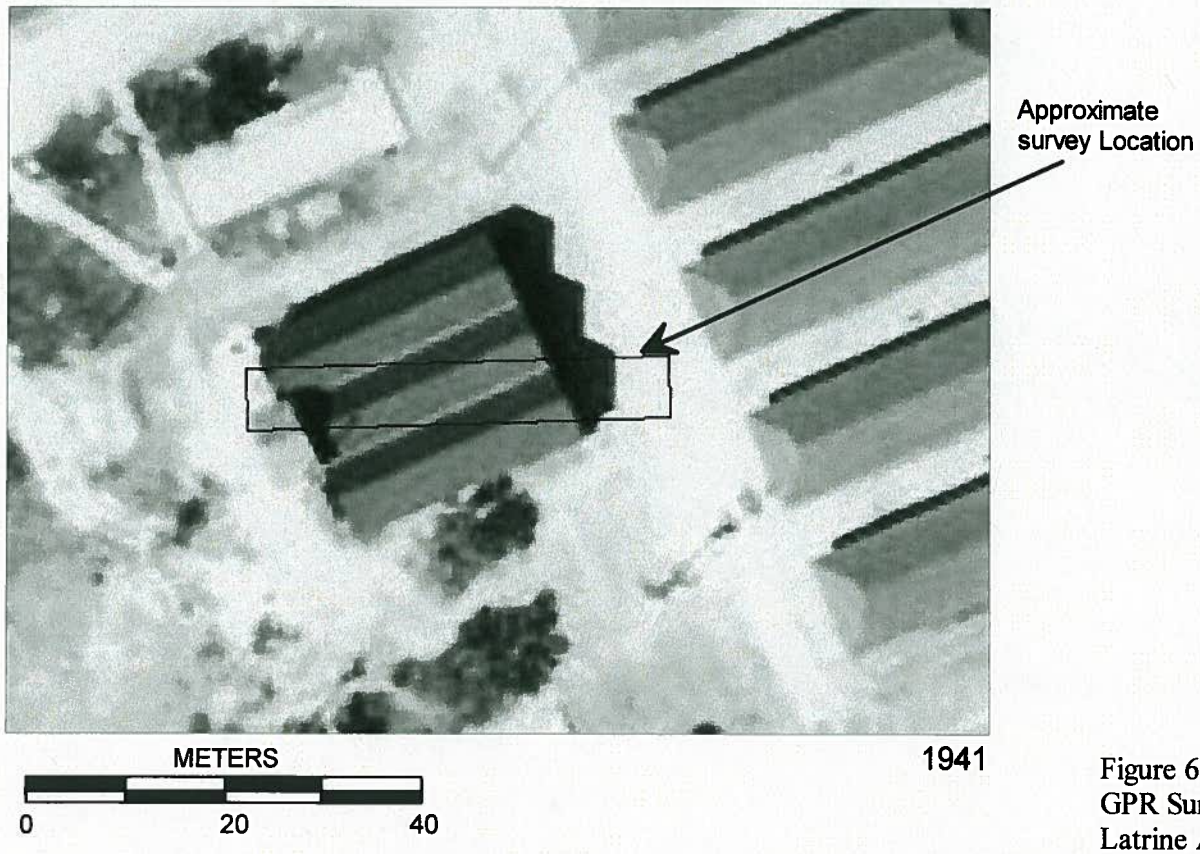


Figure 6
GPR Survey
Latrine Area
MCAS Ewa
Island of Oahu
Hawaii

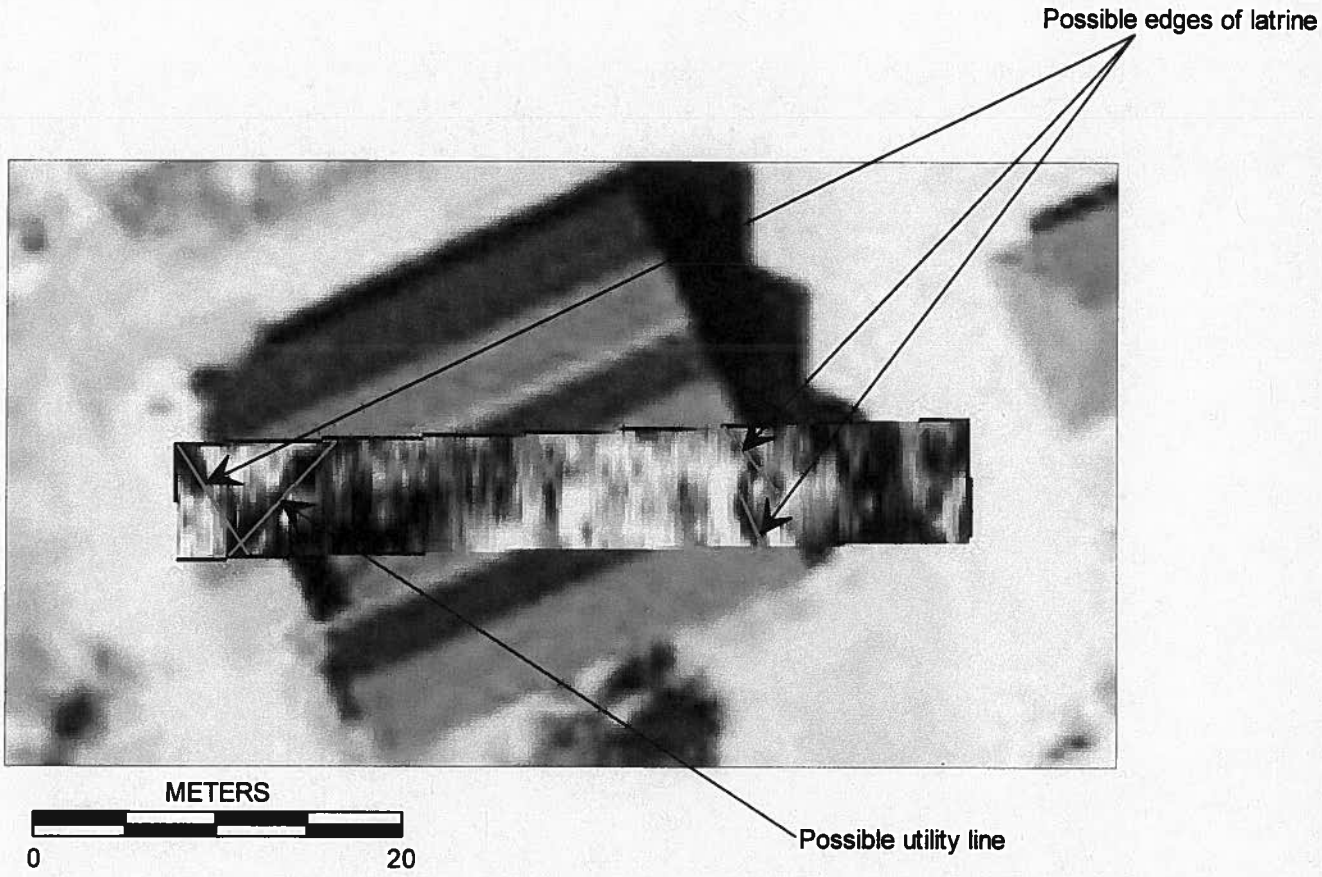


Figure 7
GPR Survey Results
Latrine Area
MCAS Ewa
Island of Oahu
Hawaii

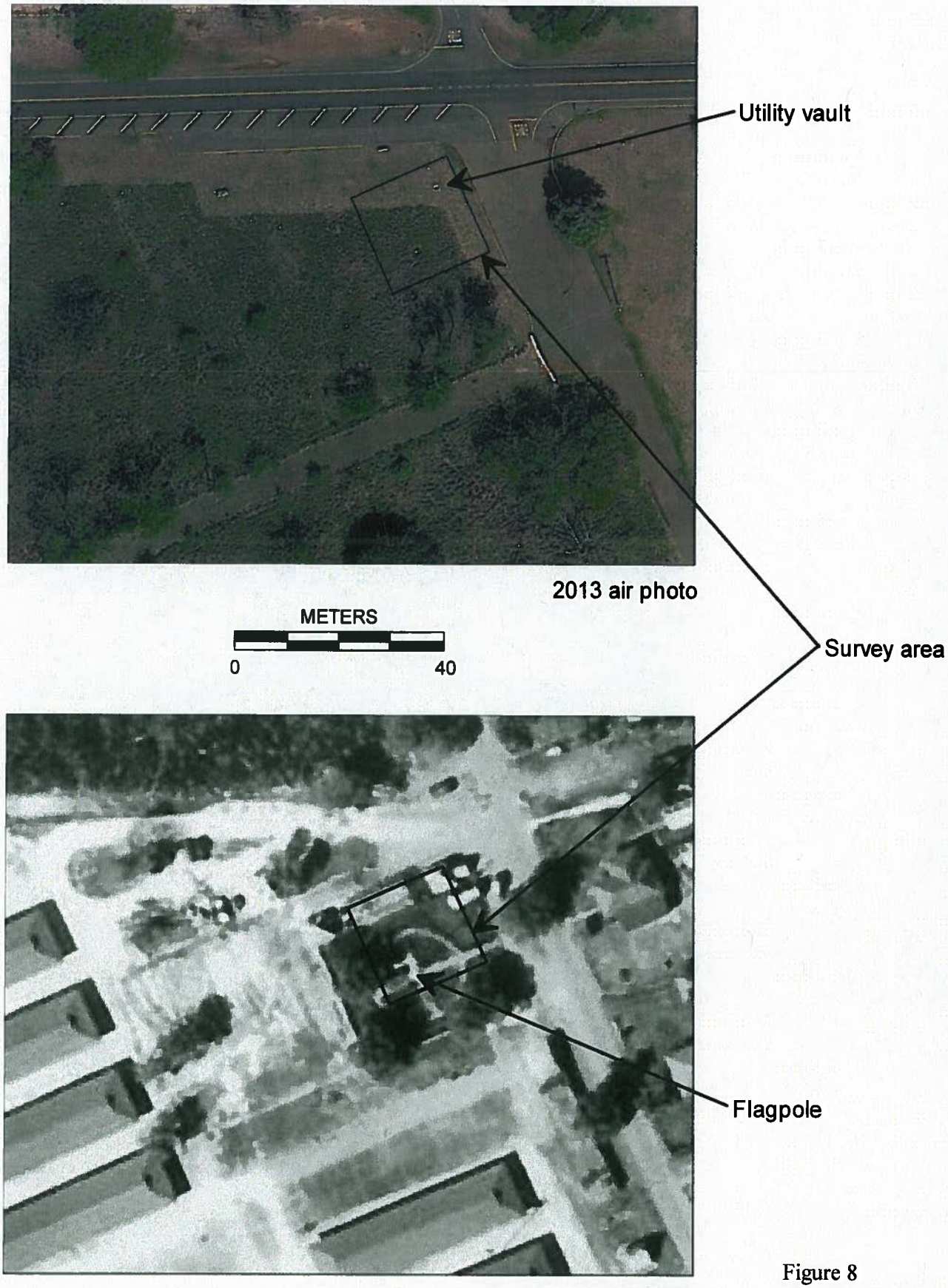
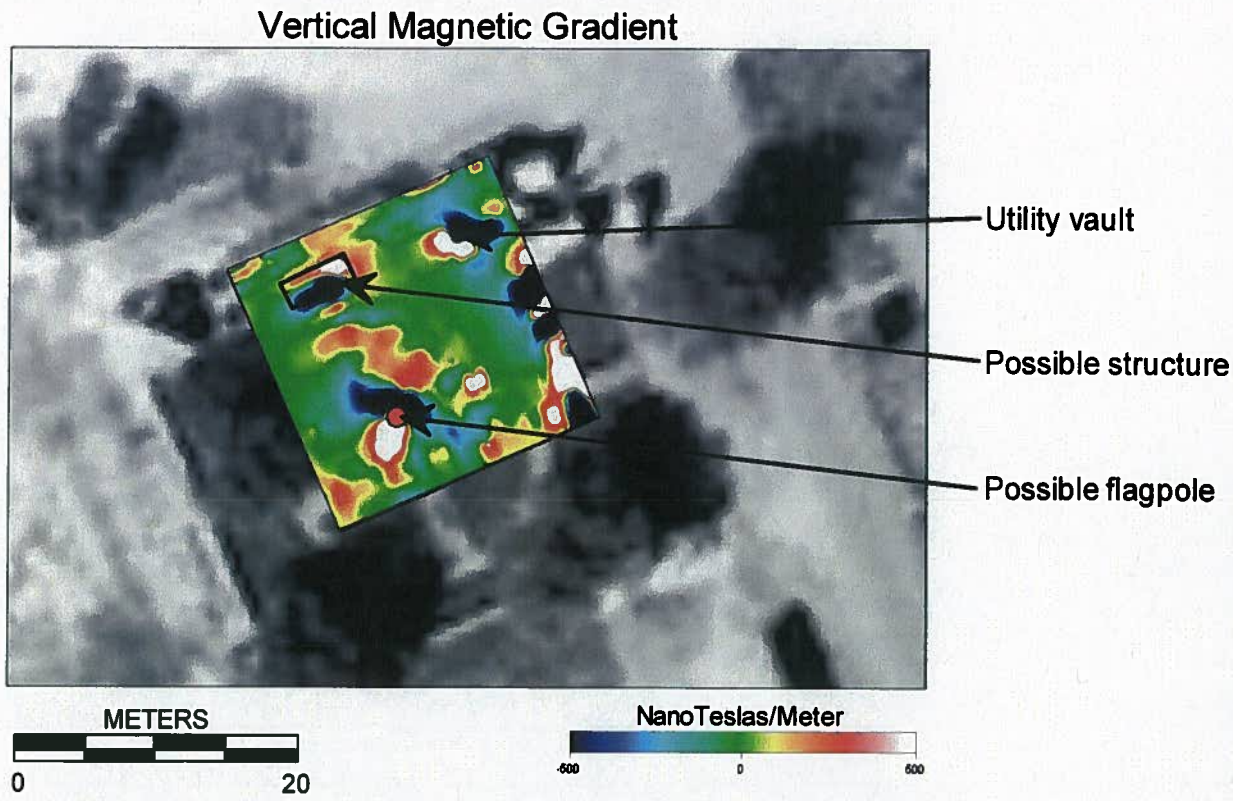


Figure 8
Magnetometer Survey
Flagpole Area
MCAS Ewa
Island of Oahu
Hawaii



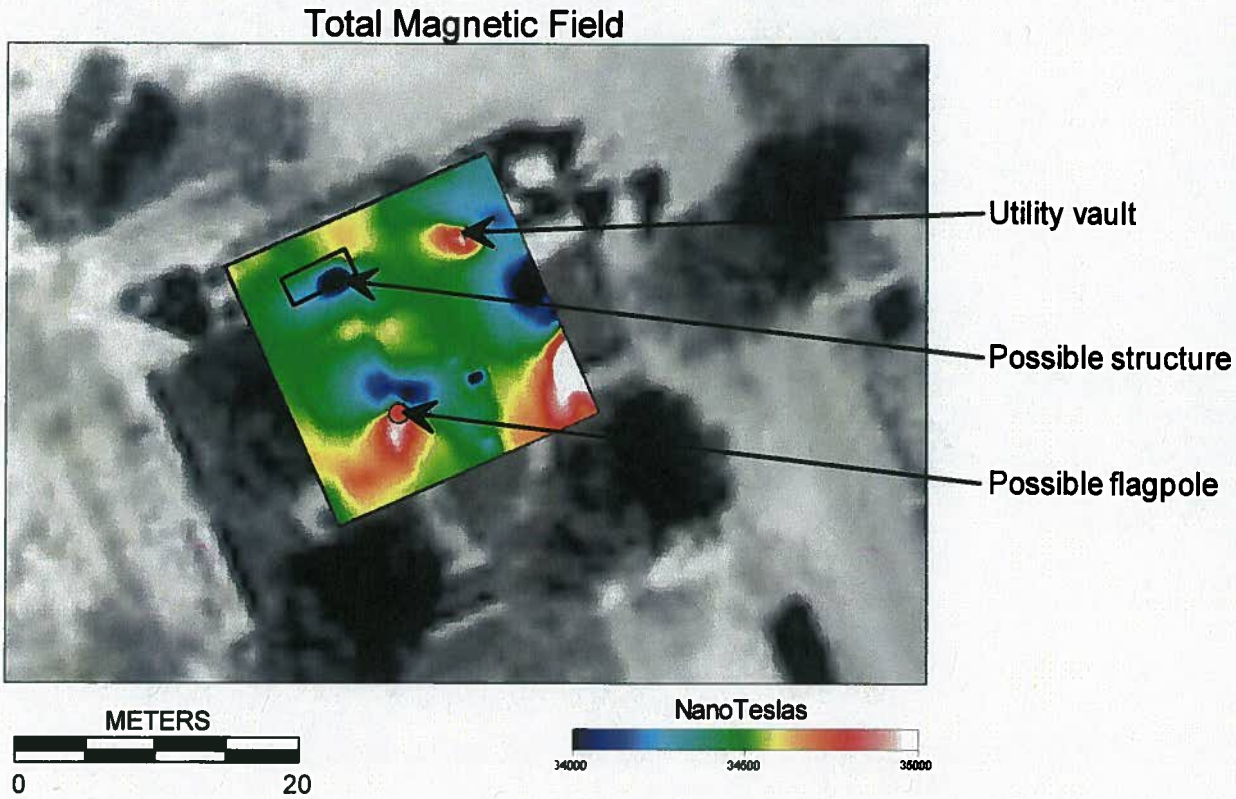


Figure 9
Magnetometer Survey Results
Flagpole Area
MCAS Ewa
Island of Oahu
Hawaii

Figure 10
GPR Survey Transects
Water Line Reconnaissance
MCAS Ewa
Island of Oahu
Hawaii

Line 1

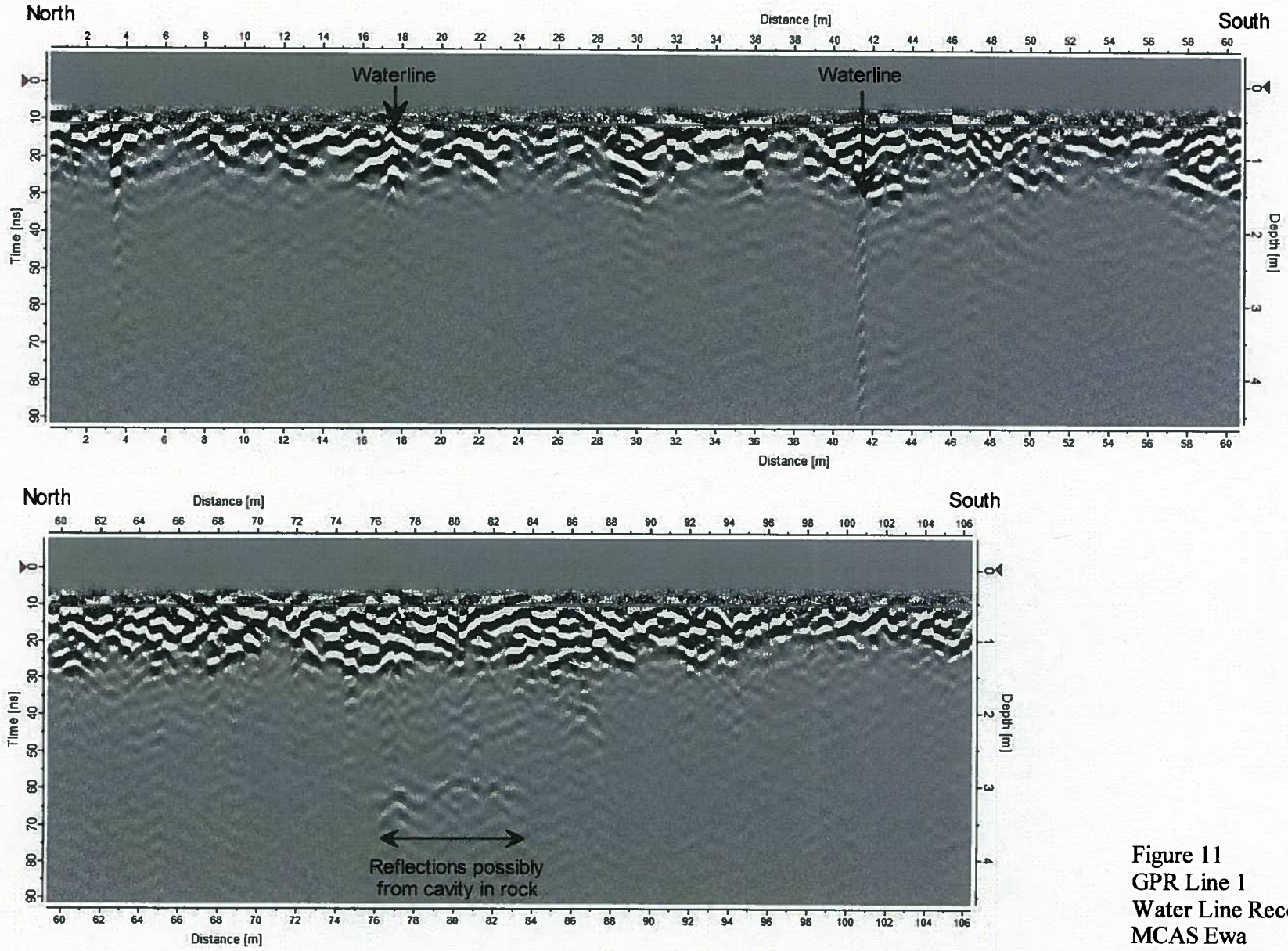


Figure 11
GPR Line 1
Water Line Reconnaissance
MCAS Ewa
Island of Oahu
Hawaii

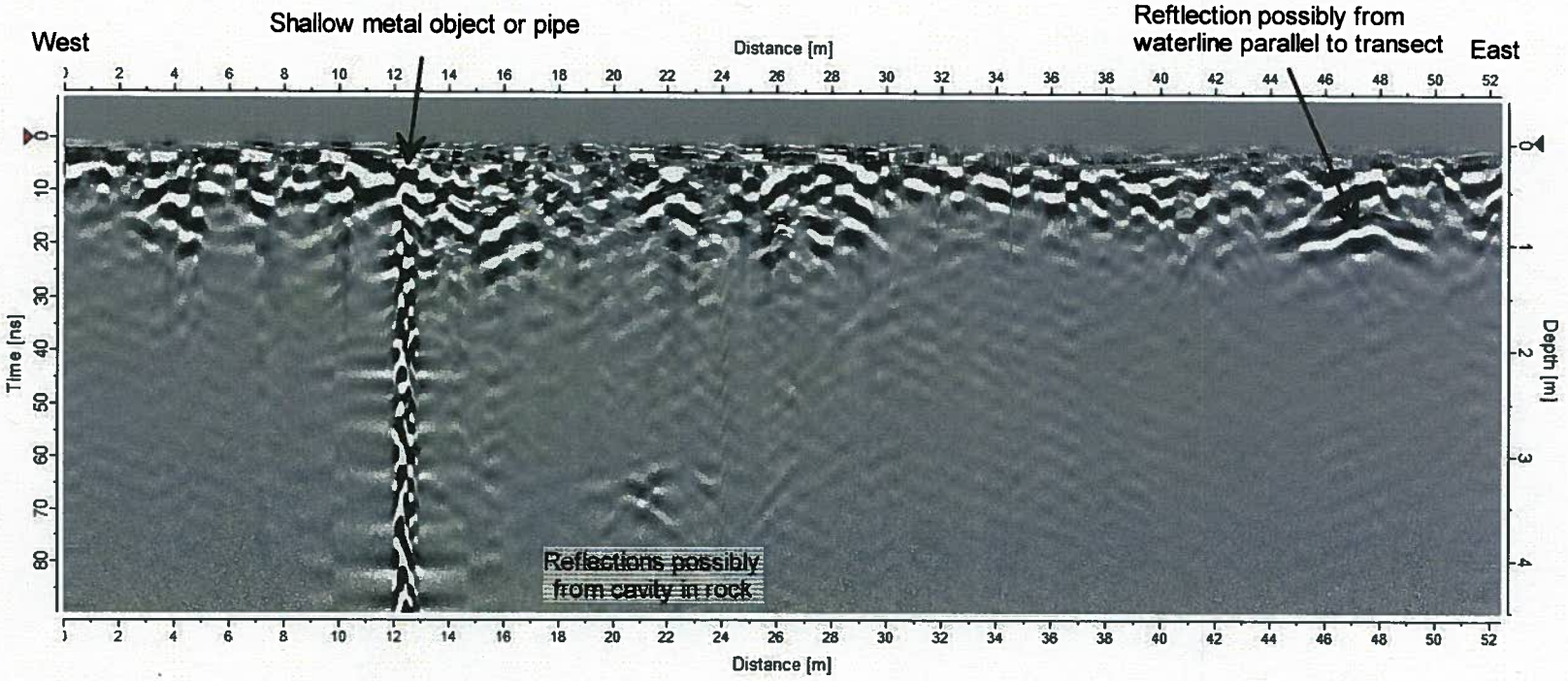


Figure 12
GPR Transect 2
Water Line Reconnaissance
MCAS Ewa
Island of Oahu
Hawaii

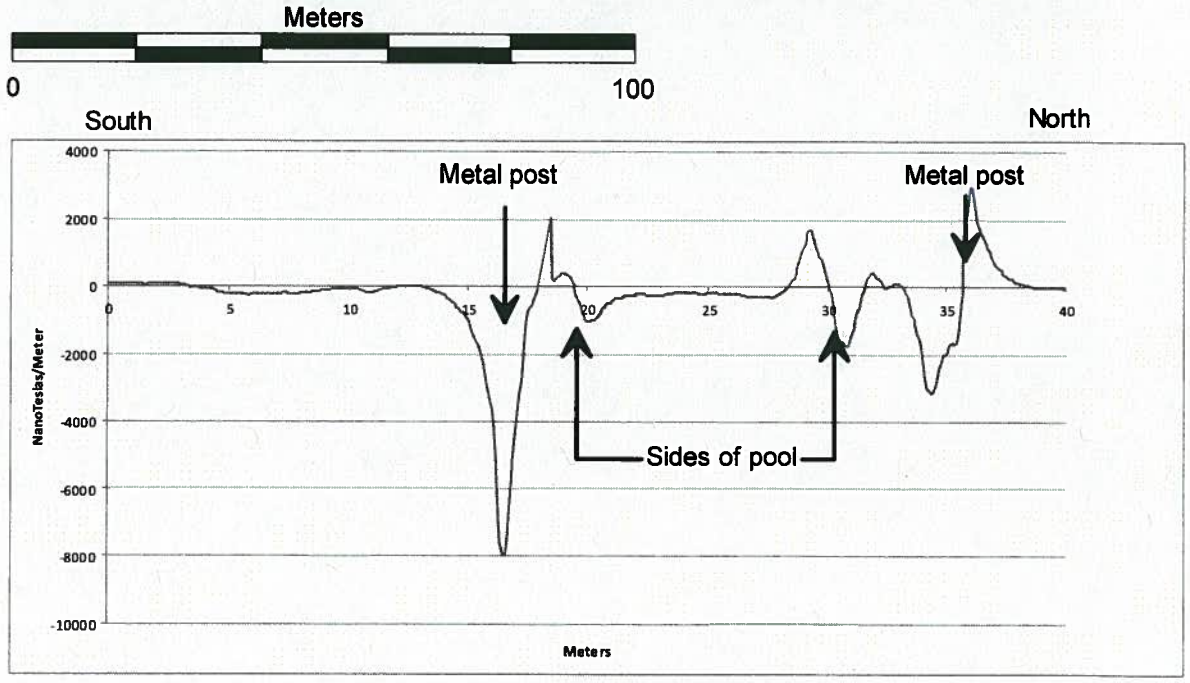


Figure 13
Magnetometer Transect
Swimming Pool
MCAS Ewa
Island of Oahu
Hawaii

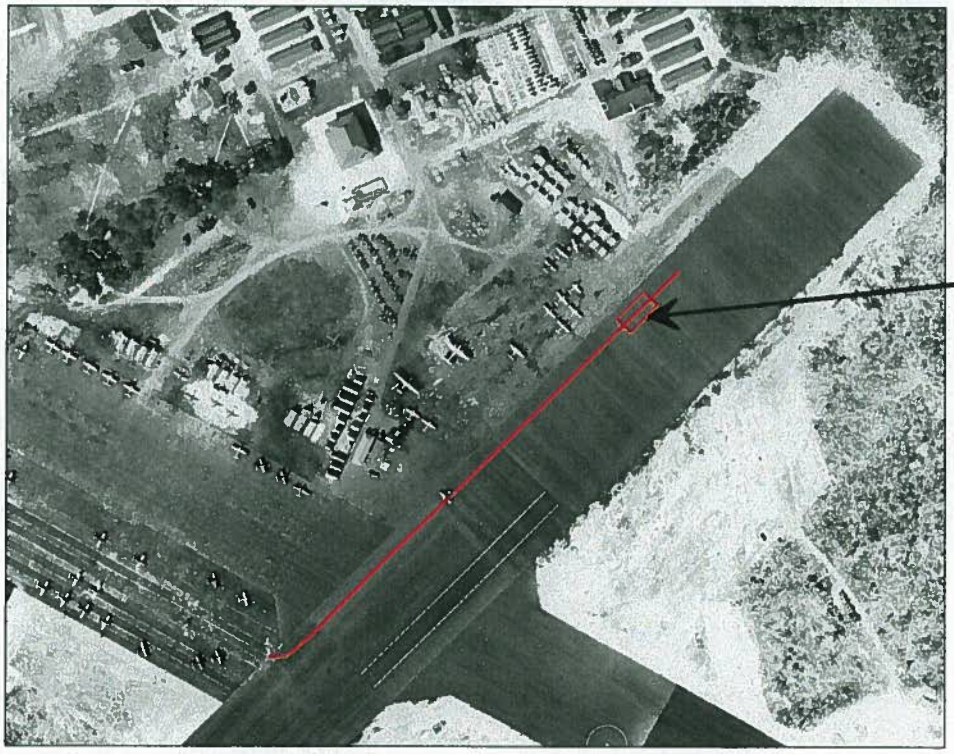
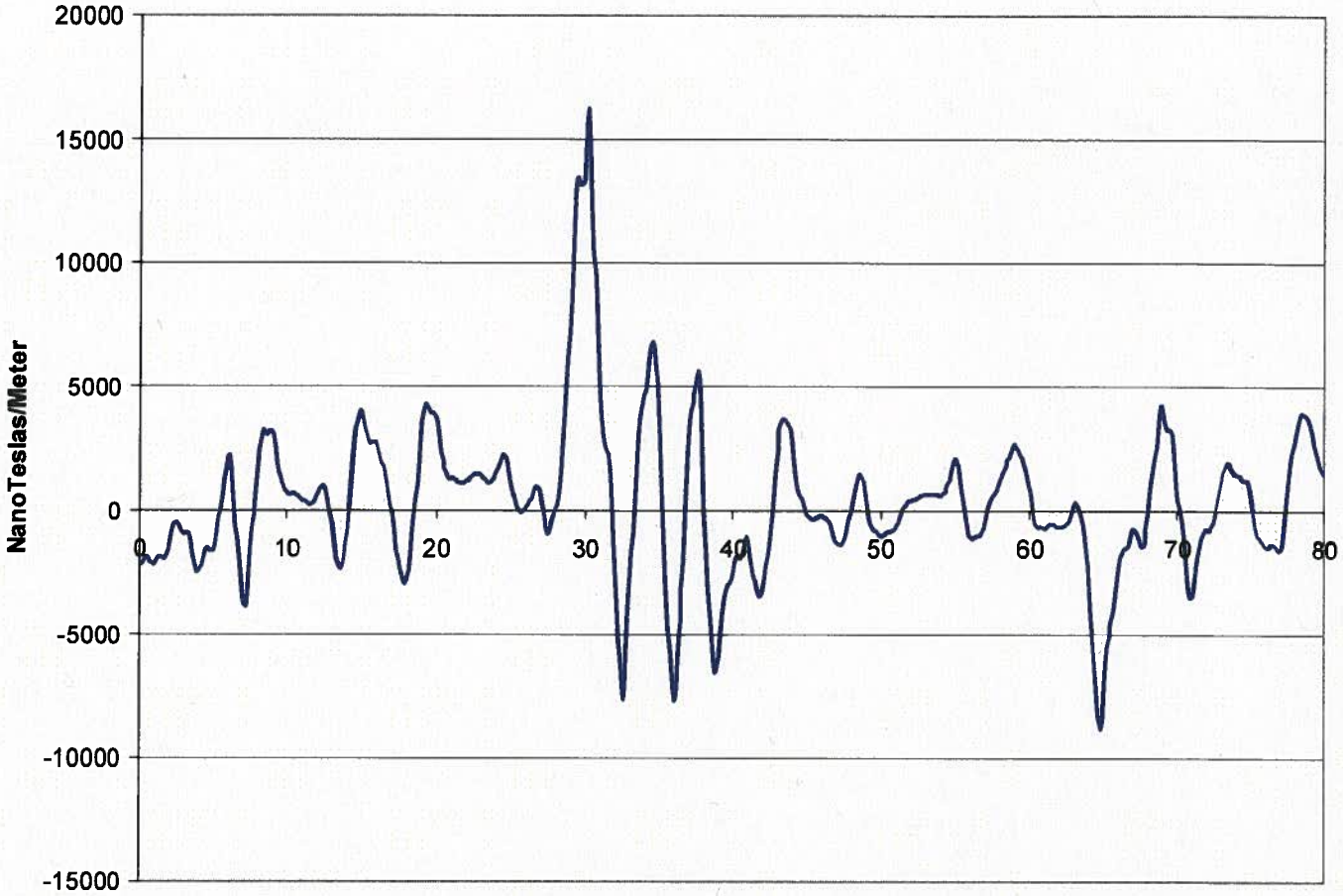


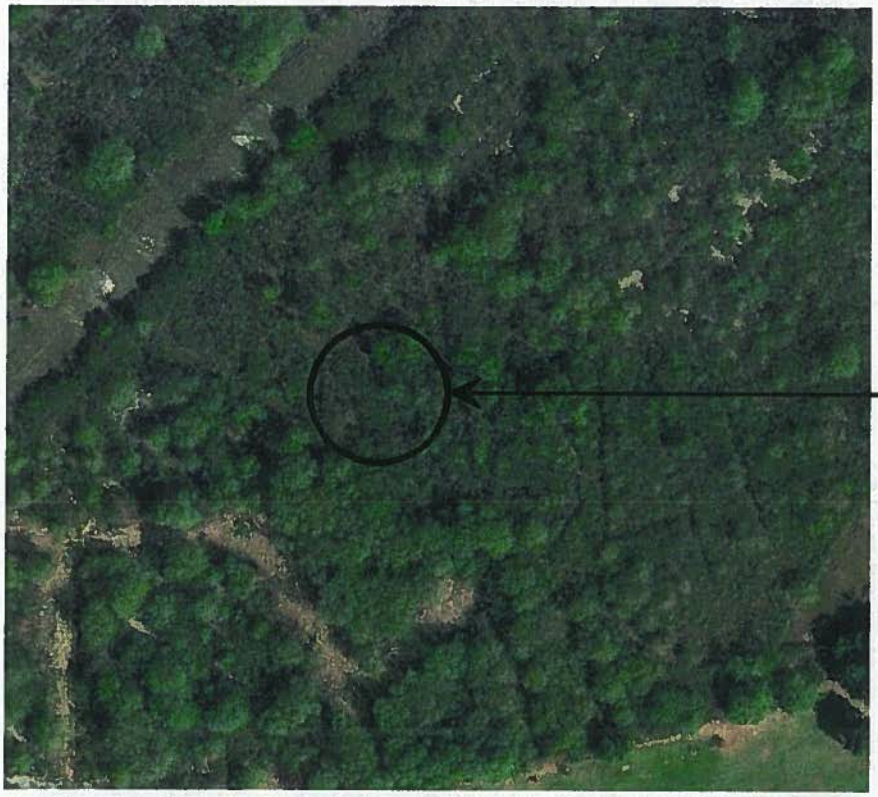
Figure 14
GPR Transect
End of Coral Runway
MCAS Ewa
Island of Oahu
Hawaii

Figure 15
Magnetometer Recon
Mooring Mast
MCAS Ewa
Island of Oahu
Hawaii

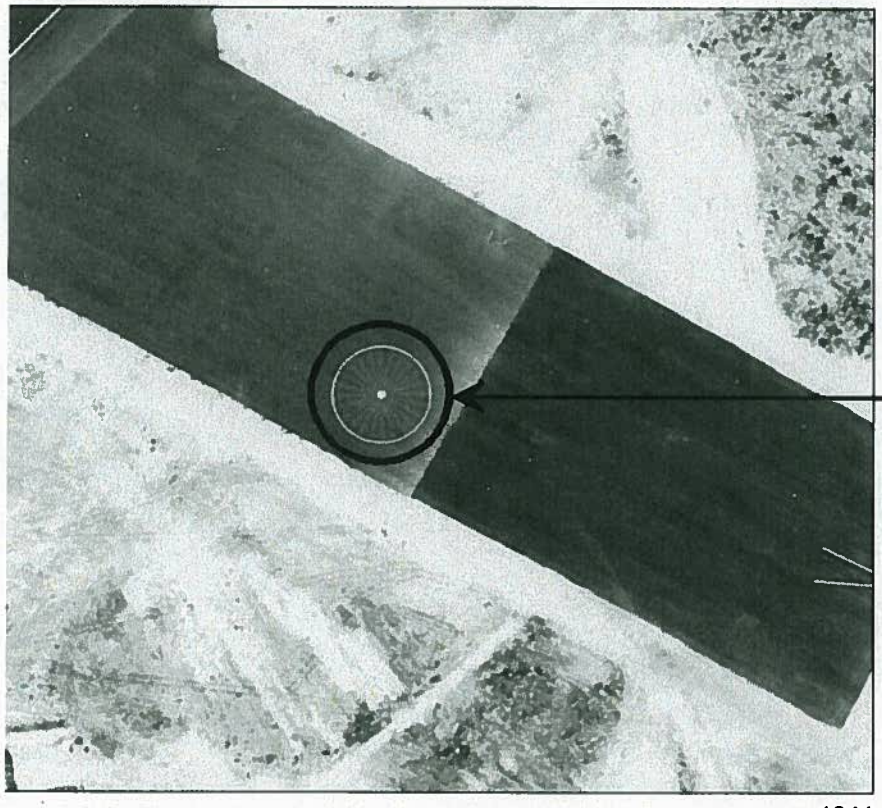


Example of magnetometer data in the vicinity of the mooring mast showing numerous strong anomalies.

Figure 16
Example of Magnetometer Data
Mooring Mast
MCAS Ewa
Island of Oahu
Hawaii



2013



1941

Meters

0 100

Figure 17
Metal Detection Reconnaissance
Compass Rose
MCAS Ewa
Island of Oahu
Hawaii

Guidelines on Exemptions from Preparing Environmental Review Documents

Once an agency determines that an action "triggers" the EIS law, it must decide if the action is either:

-- exempt from preparing a review document;

-- will require an relatively brief review via an environmental assessment;

-- or will require a full environmental impact statement.

Minor Projects Should be Declared Exempt

Certain activities are deemed minor or routine by the state or county agency that has oversight. The agency can declare the activity exempt from environmental review. There are 10 classes of exempt action under the EIS rules. The exempt classes of actions are summarized as follows:

1. Operation, repairs, or maintenance of existing facilities or topographical features.
2. Replacement or reconstruction of existing structures and facilities.
3. Construction and location of single, new, small facilities or structures.
4. Minor alterations in the conditions of land, water, or vegetation.
5. Basic data collection, research and experimental management.
6. Construction or placement of minor structures accessory to existing facilities.
7. Interior alterations.
8. Demolition of structures except historic structures.
9. Zoning variances except shoreline setback variances.
10. Continuing administrative activities such as purchasing supplies.

Examples of Exemptions

Here are some examples of actions usually declared exempt from environmental review. The exemption class is noted below in italics.

- Equipment that is on state land (a trigger) requires an overhaul; this exemption represents *repair of existing facilities.*
- Replacement of a drainage culvert, paid for by county funds (a trigger) is considered *replacement of existing structures.*
- In the conservation district (a trigger) a homeowner wishes to add a porch to his home; this is *a minor accessory structure to an existing facility.*

Exclusions to the Exemptions

In some cases, an action that would usually be considered exempt can still require an environmental review. If an exempt action is proposed in a particularly sensitive environment, or if successive exempt actions could have a cumulative significant impact, the exempt status of the action would be invalid. Environmentally sensitive areas may include significant flood plains, wetlands, beaches and coastal areas, erosion-prone areas, geologically hazardous land, critical habitat and estuaries.

amendments to the lists must be submitted to the council for review and concurrence. Agencies should review their exemption list every five years and revise it as appropriate. The following are the steps involved in finalizing a new or revised agency exemption list.

Steps in Preparing a New or Revised Agency Exemption List

1. Agency prepares draft exemption list. A review of previous exemption memos would be an excellent start to drafting the exemption list.
2. Agency submits the draft exemption list to the Environmental Council. *[Changes to the old list should be clearly distinguished (such as in Ramseyer format). Agency should also submit the exemption list on computer disk.]*
3. OEQC publishes draft exemption list in *The Environmental Notice*. This begins the 30 day review period for the public, agencies, OEQC and the Environmental Council. Council Members, in their individual capacities, may submit comments made during the 30-day review period.
4. Agency responds to comment letters received from the public and other agencies. Agency prepares pre-final exemption list package. This package includes:
    a. The pre-final exemption list
    b. Copies of comments received from the public or other agencies
    c. Responses to the comments
5. Environmental Council's Exemption List Committee meets to discuss pre-final exemption list. *[Agency representative should be present to answer questions.]*
6. Full Environmental Council meets to review and concur on the exemption list. *[Agency representative should be present to answer questions. This meeting is usually scheduled immediately after the committee meeting.]*
7. Agency finalizes new exemption list and files the list with OEQC.

Council's Periodic Review of Agency Exemption Lists

In compliance with the EIS Rules, the Council will periodically review agency exemption lists that are on file. Based on the review, the Council will recommend that the affected agency revise its exemption list and submit the amended list in accordance with the steps shown above.

An Example of an Agency Exemption List

COMPREHENSIVE EXEMPTION LIST FOR THE COUNTY OF XXX
DEPARTMENT OF YYY
Date

According to section 11-200-8, Hawaii Revised Rules, the (agency) may declare exempt the following types of actions from the requirement to prepare an environmental assessment.

The (agency) shall not make exemption declarations when the cumulative impact of planned successive actions in the same place, over time, is significant, or when an action that is normally insignificant in its impact on the environment may be significant, in a particularly sensitive environment. Sensitive areas may include, but are not limited to significant historical, archaeological, and cultural sites, flood plains, wetlands, beaches, coastal areas, erosion–prone areas, geologically hazardous land, critical habitats, and estuaries.

EXEMPTION CLASS #8: Demolition of structures, except those structures located on any historic site as designated in the national register or Hawaii register as provided for in the National Historic Preservation Act of 1966, Public Law 89-665, 16 U.S. C. Sec. 470, as amended, or Chapter 6E, HRS.

1. Demolition of County structures, except those structures located on any historic site

EXEMPTION CLASS #9: Zoning variances except shoreline setback variances.

1. Zoning variances of County properties except shoreline setback variances

EXEMPTION CLASS # 10: Continuing administrative activities including, but not limited to, purchase of supplies and personnel-related actions.

1. Buying motor vehicles

What the EIS Rules Say About Exemptions

EIS Rules, Section 11-200-8, Exempt classes of action.

(a) Chapter 343, HRS, states that a list of classes of actions shall be drawn up which, because they will probably have minimal or no significant effect on the environment, may be declared exempt by the proposing agency or approving agency from the preparation of an environmental assessment provided that agencies declaring an action exempt under this section shall obtain the advice of other outside agencies or individuals having jurisdiction or expertise as to the propriety of the exemption. Actions declared exempt from the preparation of an environmental assessment under this section are not exempt from complying with any other applicable statute or rule. The following list represents exempt classes of action:

(1) Operations, repairs, or maintenance of existing structures, facilities, equipment, or topographical features, involving negligible or no expansion or change of use beyond that previously existing;

(2) Replacement or reconstruction of existing structures and facilities where the new structure will be located generally on the same site and will have substantially the same purpose, capacity, density, height, and dimensions as the structure replaced;

(3) Construction and location of single, new, small facilities or structures and the alteration and modification of the same and installation of new, small, equipment and facilities and the alteration and modification of same, including, but not limited to:

(A) Single-family residences less than 3,500 square feet not in conjunction with the building of two or more such units;

(B) Multi-unit structures designed for not more than four dwelling units if not in conjunction with the building of two or more such structures;

(C) Stores, offices, and restaurants designed for total occupant load of 20 persons or less per structure, if not in conjunction with the building of two or more such structures; and

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Hawaii County - Kawaihae Battlefield

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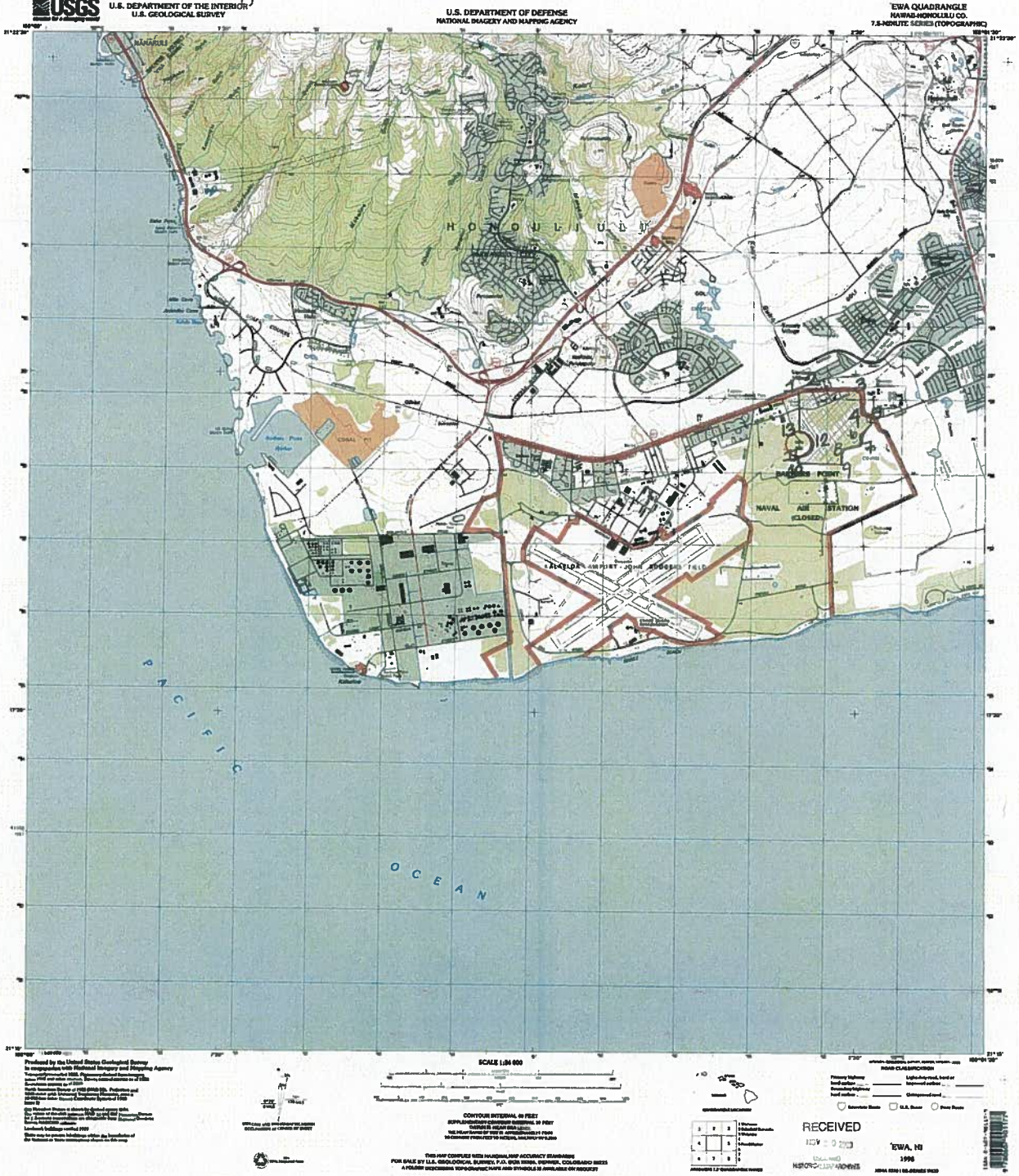
Ewa Plain Battlefield
Ewa, Honolulu County, HI



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