

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



MCAS Ewa Field on December 2, 1941. NARA

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Part 1: Ewa Field Battlefield Evaluation

by AECOM.

Introduction

This preliminary evaluation was prepared for the purpose of assessing the historical integrity of Ewa Field as a battlefield site. Ewa Field is a former military airfield located west of Honolulu and Pearl Harbor on the Ewa coastal plain of Oahu. It was among the sites attacked by the Japanese on December 7, 1941, precipitating U.S. entry into World War II. Ewa Field (also known historically as Ewa Mooring Mast Field), a Navy property used by the Marine Corps, was decommissioned in 1952 and incorporated into the adjacent Naval Air Station (NAS) Barbers Point (*History of the Marine Corps Air Station Ewa*, 79). After 1942 it was known as Marine Corps Air Station (MCAS) Ewa.

AECOM was retained by Mason Architects (MAI) to prepare this evaluation for their client, Ford Island Ventures, the lessee of much of the former Ewa Field property from the Navy. This evaluation was developed in coordination with MAI's Inventory Survey Report for the property, which provided base data, documentation of the installation's significance, and historic context.

In order to support this evaluation, available Ewa Field documentation was reviewed to locate any existing assessments of the site's integrity as a battlefield. None were found, and it appears that Ewa Field's battlefield integrity has not been comprehensively addressed to date. The scope of this evaluation is limited to undertaking a preliminary analysis of existing documentation of historical and existing conditions related to the integrity of Ewa Field as a site of a significant battle event, using the National Register criteria for evaluation. Ewa Field's role during the Japanese attack on Oahu on December 7, 1941, is considered, and the known physical features (whether surviving or missing) that support an understanding of that significant event are identified and assessed. This evaluation is not a determination of eligibility for the National Register of Historic Places, and does not represent the level of effort required for a National Register nomination, Cultural Landscape Report, or Determination of Eligibility.

This evaluation is specific to the battlefield significance of Ewa Field. While Ewa Field may include other resources from other historic periods, associated with other kinds of significance, such as World War II installation design or the Cold War, these are not assessed.

This report includes the following contents:

- **Introduction**, presents background of the project, a summary of findings, a discussion of sources used, and a summary of the evaluation methodology.
- **Identification of Battlefield Boundary**, provides a step-by-step explanation of how the preliminary boundary of the battlefield was determined. This includes defining a battlefield site; discussion and application of the concepts of core area, study area, and battlefield setting; identification of battlefield defining features; description of the Ewa Field boundary.
- **Evaluation of Battlefield Integrity**, examines the area within the boundary to identify its historical integrity. This section includes discussion of integrity considerations for

battlefields, overview of integrity evaluation for the Ewa Field survey area, and integrity related to other aspects of significance.

- **Sources**, includes a list of sources mentioned and cited. In-text parenthetical citations identify sources of historical information related to specific battlefield defining features.
- **Figures**, includes a set of selected figures supporting the text.

Summary of Findings

Ewa Field retains minimal integrity as a battlefield site. Most physical locations of key attack events at Ewa Field are known today and some remain legible on the landscape. These individual sites known to be associated with the attack are evident, including remnant aviation features with attack damage visible. Ewa Field retains characteristics, such as strafing damage, found at other attack sites, and its character reads as a part of the larger archipelago of December 7, 1941 attack sites on Oahu.

However, the integrity of Ewa Field is diminished due to various factors, including post-attack alterations, the loss of many features, and the poor condition of surviving features. While as a designed installation (either to its 1941 or World War II-era boundaries, or as part of NAS Barbers Point) it does not retain integrity, the fact of the event that occurred can still be discerned in the surviving features, retaining a minimal level of integrity for this battlefield site.

The battlefield boundary shown in Figure 1 (p. 25) identifies the area that was affected by the attack. This core area is not contiguous with the installation boundary; it encompasses the areas reported as directly involved in combat action, including the aviation areas and nearby facilities such as the enlisted parking lot, entrance road, camp area of buildings and tents, and swimming pool. The surviving battlefield defining features that remain to support integrity are also identified on Figure 1 (p. 25).

Sources

Battlefield analysis and evaluation standards and guidelines developed by the U.S. Department of Interior, National Park Service provide much of the framework for this evaluation. These standards include National Register Bulletin 15: *How to Apply the National Register Criteria for Evaluation*; National Register Bulletin 40: *Guidelines for Identifying, Evaluating, and Registering America's Historic Battlefields*; and the National Park Service American Battlefield Protection Program (ABPP) guidance for research design. In addition, battlefield and military historic site guidance was consulted, including the Civil War Sites Advisory Commission (CWSAC) methods for identifying boundaries of battlefields and other accepted standard techniques used for analysis of historic battlefields (including military terrain analysis, also known as OCOKA or KOCOAs). Full citations for these methodological sources are located at the end of this document.

Other guidance for military sites that may be relevant to the potential design significance of the installation, but were not utilized in this report, includes National Register Bulletin 43, "Guidelines for Evaluating and Registering Historic Aviation Properties," and the U.S. Army Corps of Engineers (USACERL) *Guidelines for Documenting and Evaluating Historic Military Landscapes: An Integrated Landscape Approach*.

The particulars of an aerial attack necessitated some divergence from a Civil War-based battlefield evaluation approach, as discussed in more detail below. In developing this preliminary evaluation, the ABPP and other sources were contacted regarding up-to-date standards for addressing aviation-based sites for World War II and other modern conflicts. Such standards do not yet exist within the U.S., but are evolving, and a variety of attempts have been made to address this question. This evaluation adapts the existing battlefield guidance and standards, based on professional judgment, and acknowledges that when and if standards for evaluating aviation combat sites become available, it may be worthwhile to revisit and refine this evaluation using them.

Although no existing, comprehensive historic context has been located that describes the whole landscape affected by the December 7, 1941 Japanese attack on Oahu, individual military installations on the island have been listed in the National Register or have been designated National Historic Landmarks (NHLs) based partially or completely on their association with the attack. Kaneohe NAS, Wheeler Field, Pearl Harbor Naval Complex, and Hickam Field are listed as NHL districts. Opana Radar Site, where the incoming Japanese planes were first identified on a mobile radar station, is listed as a NHL, although there are no surviving features and the location is only approximately known. Several other attack sites and installations are not listed in the National Register, including Ewa Field.

Some popular misconceptions about the Ewa Field site are often cited. For instance, some later histories and secondary sources mistakenly identify the adjacent Barbers Point airfield as the site of the attack. After 1952, Ewa Field was no longer used as an airfield, and was subsumed into the Barbers Point property, leaving NAS Barbers Point as the only evident airfield in the area. It has been overlooked that the NAS Barbers Point airfield was under construction and not yet operational in December 1941, but the location of the attack has been mis-identified in some documents as a result of this confusion.

It is also worth noting that other events of December 7, 1941 garnered much of the attention of both Marine Corps and Navy historians. The Marine Corps histories tend to focus on Wake Island, a long and intense battle primarily involving the Marines (including many based at Ewa Field), which occurred concurrently with the Pearl Harbor attack (*History of the Marine Corps Air Station Ewa*, 66). The Navy histories focus on Pearl Harbor, where the Navy bore the brunt of the attack's casualties and damage. In many ways, Ewa Field, with its relatively light casualties, fell "between the cracks" in the broader story of December 7, 1941, despite its importance as one of the places that were part of this significant event.

Although the analysis focuses on the attack on Ewa Field, this was part of a larger event, and should not be considered in isolation. The attack on this installation played a role in the overall Japanese strategy, in how the actions of the day unfolded, and in the successes and failures of the participants. A basic understanding of what was happening on Oahu on December 7, 1941 is provided in the historic context of the accompanying inventory report by MAI.

Methodology

This integrity evaluation was undertaken using the standards and sources noted above. AECOM specialists reviewed the historical data collected by MAI, and relied on MAI's detailed

inventory report of existing conditions. Related planning documents, such as the *Environmental Assessment for Conveyance of Navy Retained Land and Utility Systems at Kalaeloa* (2008) were also reviewed. In addition, a field visit was made by AECOM and MAI personnel on December 8, 2010 to view existing landscape conditions and identify surviving features on the ground at the Ewa Field site.

AECOM reviewed collected historical documents including maps, plans, aerials, ground photographs, and written accounts of the attack. These documents included official reports and primary sources, as well as secondary sources. Those used extensively in this evaluation are listed at the end of this report. For a full bibliography of historical information, see MAI's inventory report. Especially useful were an installation plan from June 30, 1941 (Figure 2, p. 26); an aerial photo of Ewa Field from December 2, 1941, less than a week before the attack (Figure 3, p. 27); and the official history and supporting documents from the U.S. Marine Corps Historical Division, including the commanding officer's report and other detailed accounts.

The specific locations and features shown or mentioned in the historical accounts were identified and considered in military terrain analysis terms (also known as OCOKA or KOCOAs). A preliminary battlefield core area boundary was drawn based on the locations of identified battlefield defining features. The boundary reflects the core area of the attack, but not integrity; it is intended to identify the area to be evaluated for integrity. Battlefield defining features that survive and support integrity are also shown, along with those that are missing; these are also listed in Table 1 (p. 13). The diagrammatic map showing the preliminary battlefield boundary and defining features is shown in Figure 1 (p. 25).

In the integrity evaluation, the historic and existing character, role of features during the attack events, and current conditions of battlefield defining features are considered. Integrity is summarized for the entire area within the battlefield boundary as well as for individual features, and described in terms of the National Register's aspects of integrity (noted in Table 2, p. 21).

1.1. Identification of the Battlefield Boundary

1.1.1: DEFINING A BATTLEFIELD SITE

Places where battles and other significant events in history occurred are identified as *sites* in National Register guidelines. It is helpful to understand how National Register property types are defined: while battlefields are always classified as sites, according to National Register Bulletin 15, this definition is expanded in National Register Bulletin 40, and other property types, such as districts, are addressed in detail as they relate to the listing of battlefields. For purposes of this evaluation, the National Register definition of *site* is used as follows:

"A site is the location of a significant event... whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archeological value regardless of the value of any existing structure... A site can possess associative significance or information potential or both, and can be significant under any or all of the four criteria. A site need not be marked by physical remains if it is the location of a prehistoric or historic event or pattern of events and if no buildings, structures, or objects marked it at the time of the events." (National Register Bulletin 15)

The importance of physical features when evaluating a site varies, depending on how these features reflect or convey the site's significance and character. While it is necessary to have some surviving features in order to convey historic character, it is not required that the site remain unchanged. Identifying the defining features of the battlefield that were important at the time of the event, and their role, is essential to determining a boundary for the battlefield.

The boundary of a battlefield and its defining features can be determined using techniques that were developed for U.S. Civil War battlefields such as Gettysburg, Vicksburg, and Petersburg. The preliminary boundaries (defined below in Section 2.2) of a battlefield can be defined by applying standard military terrain analysis techniques (defined below in Section 2.3). Once the battlefield's defining features have been identified and the boundary established, the integrity of the battlefield can be assessed.

It should be noted that World War II battlefields are shaped by different strategies, movements, and decisive actions than the 18th- and 19th-century battlefields for which assessment methods were originally developed. For example, essential parts of the December 7, 1941 attack did not occur on land; the entire avenues of approach by the Japanese attackers were via sea and air (Figure 4, p. 28). The approach routes taken by the Japanese aviation units were shaped to some degree by large landforms, landmarks, and targets (although not as substantially as for a ground force). The avenues of approach taken by the attackers and their routes between the target installations are generally known and an important element of the overall attack event, but their effect on the landscape outside of the combat areas was negligible, as they occupied only the airspace above.

The areas of the landscape considered for inclusion in the boundary are those where combat occurred. The battlefield boundary encompasses a core area as explained below in Section 2.2. Although it was considered, the concept of the study area boundary has not been used in this evaluation; it was determined that for comprehension of this conflict it makes more sense to focus on setting, as described in National Register Bulletin 40.

Battlefield defining features are those that existed at the time of the attack and played a role in how the event occurred. These include, for December 7, 1941, the various Oahu installations' runways, warm-up platforms, parking areas, hangars, and other aviation features; groups of buildings and structures, whether permanent or temporary; ship moorings and other working waterfront facilities; roads, parking areas, and circulation features; and the surrounding topography and vegetation. Battlefield defining features also include artifacts of the attack, such as strafing damage, bomb craters, and the wrecks of planes, ships, and other equipment.

1.1.2: CORE AREA, STUDY AREA, AND BATTLEFIELD SETTING

A method for determining battlefield boundaries, and specifically focused on battlefield preservation, was developed by the Civil War Sites Advisory Commission (CWSAC), a Congressionally-appointed commission established in 1990 to identify and assess Civil War battlefields. In the methodology they developed (using documentation from official records and other historical sources, as well as established survey and evaluation criteria), two types of battlefield boundaries were delineated: the core area and the study area.

The *core area* of a battlefield is within the study area and includes only the locations of the direct combat engagement and key associated physical features. The core area includes what often is described as “hallowed ground,” where soldiers died and combat actions occurred. To identify this area, the maneuvers and actions that made up the attack must be understood.

The Ewa Field battlefield boundary encompasses just one part of a larger battlefield spread across Oahu, including the core areas at all locations where active combat and key battle events occurred, such as Pearl Harbor’s Battleship Row, Carrier Row, and dry docks; the aviation areas at Ford Island, Hickam Field, Wheeler Field, NAS Kaneohe, and Ewa Field; and other buildings and sites where fire was exchanged or damage occurred.

The *study area* of a battlefield includes all places related or contributing to the battle event: where troops deployed and maneuvered before, during, and after the engagement. The study area is the maximum delineation of the historical site and provides the tactical context of a battle. Outside of active combat, the actions of the Japanese attack on December 7 were entirely aerial; and there is little to no study area associated with U.S. maneuvering, deployment, or construction of defenses directly related to the air raid. At Ewa Field and other December 7 related installations, it appears that a battlefield boundary would accurately encompass only what CWSAC would consider to be core areas. However, battle core areas cannot be addressed in isolation – the setting must be recognized, even if secondary to the core areas where combatants perished and/or ruins with attack damage remain.

The *setting* of the battlefield, as defined in Bulletin 40, encompasses the broad landscape context within which battlefield events occurred: the larger patterns and features surrounding the battlefield, such as topography and developed and natural landscape patterns. For Ewa Field, setting includes the large topographic patterns that contribute to the way the attack unfolded at the installation. The setting also includes the other sites attacked on December 7, 1941, which provide an important context across the entire island of Oahu, providing an understanding of its role within the larger attack. Because the focus of this study is on the landscape features within the Ewa Field core area, establishment of a boundary for setting – which would be vast – was not undertaken. It is considered as part of the integrity evaluation, under the aspect of setting.

1.1.3: IDENTIFICATION OF BATTLEFIELD DEFINING FEATURES

National Register Bulletin 40 states that a defensible boundary for a battlefield must be based on the extent of related actions and encounters between the two sides during the battle. This definition has been refined further by CWSAC, as noted above, and also in guidance provided by the ABPP, which recommends employing military terrain analysis, also known as KOCO or OCOKA, to identify battlefield defining features.

OCOKA is an acronym for the following attributes:

- **O**bservation and Fields of Fire
- **C**over and Concealment
- **O**bstacles
- **K**ey or Decisive Terrain
- **A**venues of Approach

This military terrain analysis method has been a formal part of U.S. military officer training for over a century, analyzing historic battlefields to foster an understanding of the inherent connection between tactics and terrain. The method is founded on the idea that “terrain has a direct impact on selecting objectives; location movement, and control of forces; effectiveness of weapons and other systems; and protective measures.” (*U.S. Army Field Manual*, App. B).

For Ewa Field, the following summarizes the physical features of the landscape relating to each aspect listed above. See MAI’s Inventory Survey Report for additional detailed descriptions and condition documentation of physical features.

Observation and Fields of Fire

Observation relates to reconnaissance, surveillance, and target acquisition. The *field of fire* is the area a weapon can cover effectively from a given point. The evaluation of observation and fields of fire allows for identification of engagement areas, defensible terrain, weapon positions, and locations where forces were vulnerable to fire while maneuvering.

Observation points were limited on the day of the attack. The Opana mobile radar unit, sited along the North Shore of Oahu, picked up the approach of the first wave of Japanese planes over the sea to the north, but this observation was not understood until after the attack (Figure 4, p. 28). The radar on the ships in Pearl Harbor were in operation, but effectiveness was limited by the high terrain surrounding the harbor. The first attacking squadron of Japanese planes was initially eyewitnessed by an officer who had stepped out of the mess hall at Ewa Field, according to official reports (Hollingshead, 8).

Fields of fire included the area defended by anti-aircraft guns, as well as plane-mounted guns and handheld weapons on the ground. The Japanese had a clear advantage in terms of fields of fire from the air, with an ability to maneuver and target all critical areas of the installation at Ewa Field. Anti-aircraft batteries at Fort Weaver and Fort Barrett—the two sites equipped with anti-aircraft defenses closest to Ewa—were intended to protect the forts’ coastal defense guns. The guns mounted on ships in Pearl Harbor (too distant to assist with Ewa Field’s defense) presented the primary anti-aircraft defensive fire during the attack.

Military personnel on the ground at Ewa Field, as at the other installations, were left to fight the air attackers using whatever weaponry was at hand: rifles, sidearms, and machine guns stripped from damaged aircraft (Hollingshead, 9-10). Fields of fire for these weapons were small, especially within the scale of an aerial attack, presenting a distinct disadvantage. There

are numerous accounts of Marines at Ewa Field defending against the air attack with small or jury-rigged weapons, in some cases even succeeding in damaging or destroying enemy aircraft.

After the first attack, Commanding Officer Lieutenant Colonel Larkin ordered temporary guard posts and gun positions to be set up. This immediate response allowed for some measure of defense in the second and third attacks. Appendix O of the official Marine Corps Ewa Field History of 1941-1944 includes a memorandum listing the temporary defensive measures and positions created on December 7, 1941, and refers to a chart for locations of positions and assembly areas. However, the chart is not included in the collected documentation, although one gun position is described as “in the tower” – referencing the one tower on the installation – the former mooring mast.

“The second attack was met by heavy fire from rifles, Thompson submachine guns, and 30-caliber machine gun fire from small groups and individuals who had taken cover in and around the field area.” (Hollingshead, 10). During the second attack, the Japanese strafing tactics “consisted of the pilots firing their forward guns from extremely low altitudes, then pulling up into a steep wing-over, whereupon the free gunners opened fire...” (Hollingshead, 10). Recorded defensive actions were taken during the second attack by Marines at Ewa Field, such as Master Technical Sergeant Peters and Private Turner, who manned a gun on a grounded aircraft near the VMSB (Marine Scout Bombing Squadron) tents despite heavy return fire from Japanese planes (Hollingshead, 10), and others who fired back from positions including the swimming pool excavation and the area of the mooring mast (Hollingshead, 10-11).

Battlefield defining features related to observation and fields of fire at Ewa Field included:

- Mess hall
- Mooring mast
- Temporary guard posts and gun positions (VMSB tents, other locations undetermined)
- Swimming pool site
- Lack of formal anti-aircraft defenses

Cover and Concealment

Cover is protection from the effects of weapons fire: direct, indirect, and air-to-ground.

Concealment is protection from observation, either from the air or from the ground.

Very little cover and concealment was available on the ground at Ewa Field. The airfield's very open, level, exposed position on the Ewa Plain offered few opportunities for shelter for personnel or equipment. Much of the facility was in a state of construction, and there were no completed hangars, and no revetments or sheltered areas to conceal and protect aircraft and equipment (Figures 2, p. 26 and 3, p. 27). The single large hangar was under construction at the time, composed only of a roof and framing (Figure 5, p. 28). Further, anti-sabotage measures at Ewa Field, as at other installations, had required the planes to be lined up on the open aviation areas wing-to-wing to enable easy guarding – but left them utterly exposed to the unexpected air attack (Figure 3, p. 27).

Personnel shelter at Ewa Field was inadequate in the face of bombs and low-altitude strafing by the Japanese attackers. Marines used whatever cover was available in the moment, including

many ephemeral features, such as parked vehicles and tents. The attempts to salvage equipment and planes, extinguish fires, and rescue the wounded necessitated repeated exposure to enemy fire.

Today, the topography's flat and open character remains legible and the consequences of the site's openness and lack of cover during the attack are easily understood.

A few specific cover locations during the attack can be identified using reports of the events, together with plans and aerials. For example, the swimming pool was noted as a site of brave defensive actions by the Marines. Up to 50 men took shelter in the pool excavation, which served as a makeshift earthwork, according to the official report. They returned fire with handheld arms against the attacking planes. One of the most well-known photos from Ewa Field during the attack was taken at this location (Figure 6, p. 29).

Temporary cover and concealment features such as vehicles and tents described in accounts are now missing. In many cases, their exact locations are undetermined, such as the VMSB tents where Peters and Turner defended against the Japanese second and third attacks from a grounded plane; or the photographic section tent where Sergeant Anglin and his three-year-old son were standing at the onset of the first attack (*History of the Marine Corps Air Station Ewa*, 43 and Appendix M). The dispensary and sick bay, housed in tents, was described as damaged by incendiary ammunition during the first attack (Hollingshead, 10). It is assumed that they were within the clusters of tents and buildings visible in the December 2, 1941 aerial photograph of the installation, all of which are no longer extant.

Battlefield defining features related to cover and concealment at Ewa Field included:

- Open, level terrain and exposed positions
- Aviation areas
- Camp area, including temporary features such as VMSB tents, photographic section tent, dispensary and sick bay, etc.
- Swimming pool site

Obstacles

An obstacle is any natural or manmade feature that impedes, slows, halts, or diverts movement, including such features as steep terrain, cliffs, rivers, swamps, trenches, or barbed wire. In aviation, this also includes areas that are masked by terrain, for example, lowland below a steep mountain ridge that does not allow safe aerial approach or clear line of sight from aircraft to targets (United States Army Intelligence Center, *Intelligence Preparation of the Battlefield*, 7-6).

No battlefield-defining obstacles have been identified at Ewa Field. Its open, level terrain and exposed position lacked obstacles to such a degree that the Japanese attackers were able to repeatedly approach at very low altitudes—according to the official reports, in some cases as low as 20 feet above the ground, so close the pilots' faces were visible to the Marines on the ground. The lack of impediments allowed them to wreak substantial damage on Ewa Field in a very short period of time.

Battlefield defining features related to obstacles at Ewa Field include:

- Open, level terrain and exposed positions

Key or Decisive Terrain and Targets

A landform or terrain feature (natural or manmade) which provides a marked advantage to whichever side controls it is considered *key or decisive terrain*. *Key terrain* is often identified for use as a battle position or objective; the mission depends on seizing or retaining it. *Targets* are identifiable objectives in the landscape, of which key terrain may be one type; they may also include constructed or natural landmarks, groups of buildings, or other features on the ground that are identified as essential objectives of a maneuver or strategy (U.S. Army Intelligence Center, 2-11 and 7-9). For purposes of this evaluation, targets and key terrain are looked at together.

On a large scale, the terrain and topography was important to the way the events played out at Ewa Field, and is part of the installation's setting. Key terrain can restrict or enable aerial maneuvers in a combat situation (United States Army Intelligence Center, 7-26). The destruction at Ewa Field during the attack was quickly and thoroughly completed due in part to its exposed and level location on the site of a former sisal hemp plantation on the Ewa Plain, a flat, poorly-drained, sparsely vegetated coastal coral plateau (*History of the Marine Corps Air Station Ewa*, 41 and 78) (Figure 7, p. 29). The topography of the plain was ideal for siting an airfield due to its expansive, level landform, and the availability of coral material for building and leveling runways. However, it also allowed the Japanese attacking aircraft devastating access to their targets.

The Waianae Mountains are visible to the north of Ewa Field. This range along the central-west side of Oahu presented both a means of concealment and an obstacle. The Japanese first wave squadrons approached undetected over the saddle in central Oahu between these mountains and the Koolau Mountains to the east (Figure 4, p. 28).

Pearl Harbor, where the fleet was in port, was the primary target of the Japanese attack. The harbor is located several miles to the east, and would have been visible from the airspace above Ewa Field.

At a smaller scale, *targets* fall within key terrain as important land-based features that form an objective for aerial combatants. At Ewa Field, the "X" form of the runways and paved aviation areas provided a clear target to the attackers from the air, a landmark on the route to and from Pearl Harbor (Figure 3, p. 27). Within the Ewa Field aviation areas, the first Japanese attack group targeted the U.S. aircraft parked on the level, open parking areas and the concrete warm-up platform. They were reportedly able to effectively destroy their targets in less than 25 minutes, approaching low and releasing short bursts of gunfire to disable and destroy individual planes, rendering air pursuit impossible (Figure 8, p. 30).

In the subsequent two attacks, the targets expanded to include the vehicles in the enlisted parking lot, as well as buildings, vehicles, and personnel on the ground. The second attack was marked by heavy strafing and 60 kg bombs. After observing that the planes on the ground were clearly destroyed by the first attack, the second attack group concentrated on the camp area, including tents, buildings and personnel (*History of the Marine Corps Air Station Ewa*, 51;

Hollingshead, 10). Some camp features are mentioned in accounts, but not specifically located, such as the guard house, USMB 232 squadron tents, VMSB tents, radio trailer, and photographic section tent (Figure 3, p. 27). The camp area also includes the entrance road and gate, which were also reportedly strafed.

Battlefield defining features related to key or decisive terrain and targets at Ewa Field included:

- Topographic/setting features:
 - Open, level terrain of the Ewa Plain
 - Distant, key features including Pearl Harbor and Waianae Mountains
- Aviation areas
 - Parking apron
 - Warm-up platform
 - Runways
- Camp area (including guard house, VMSB tents, photographic section tent, dispensary and sick bay, other tents, buildings, etc.)
 - Entrance road and gate
- Enlisted parking lot

Avenues of Approach

An *avenue of approach* is the air or ground route of an attacking force leading to its objective or to key terrain. Avenues of approach at Ewa Field, and throughout Oahu on December 7, were via air and therefore have not been mapped on the landscape. There are many existing diagrams showing the first and second waves of Japanese planes, but these vary slightly from source to source, and it appears that precise air routes are not possible to determine (Figure 4, p. 28). However, it is important to review the avenues of approach in order to understand the impacts on the ground at Ewa Field from the aerial attack. These avenues of approach can be considered part of the broader setting of the battlefield.

The official records describe three attacks on Ewa Field during the course of December 7, 1941. The first attack group included two Japanese squadrons (about 18-24 “Zero” single-seaters), one approaching from the northwest over the hills from the direction of Nanakuli at 7:53 a.m., the other from the direction of Barbers Point (according to the Congressional report on the attacks, published in 1946; Hollingshead, 8; and *History of the Marine Corps Air Station Ewa*, 45 and Appendix L). The first group of Japanese planes approached in a well-synchronized “string formation,” descending to a very low altitude to open fire on parked aircraft, while the second continued past Ewa toward Pearl Harbor. The attack group wheeled around above the tree tops and returned over the same alignment, causing heavy damage to almost all the parked aircraft in just a few passes. The damage complete, the squadron departed to the east toward Pearl Harbor and Hickam Field within about 25 minutes of their first appearance (*History of the Marine Corps Air Station Ewa*, 50-53 and Appendix L; Hollingshead, 8-9).

The second attack group (of “Kate” bombers) began to arrive at Ewa Field from the east about ten minutes later, at 8:35 a.m., from the direction of Pearl Harbor, and “delivered their attack ‘from a straggling column from just off the tree tops surrounding the field.’” (*History of the Marine Corps Air Station Ewa*, 51; Hollingshead, 10). This steady stream of planes from Pearl

Harbor towards an assembly point west of Barbers Point, attacked Ewa Field en route. It was during this attack that two U.S. P-40s from Haleiwa appeared overhead, mounting some of the only airborne resistance to the Japanese in an intense dog-fight over Ewa Field.

Six scout bombers (SBDs) from the carrier USS *Enterprise*, out at sea, landed on the runway at Ewa Field between the second and third attacks, but were ordered airborne despite a need for fuel and servicing due to the risk of being destroyed on the ground by further Japanese attacks (*History of the Marine Corps Air Station Ewa*, Appendix N). The SBDs were having trouble approaching Ford Island or Hickam for landing due to the anti-aircraft fire coming from Pearl Harbor.

The third and final attack involved “Val” fixed-landing-gear fighters approaching from low altitude from the direction of Pearl Harbor, “just off the tree tops,” but relatively ineffectual as the Marines on the ground had organized defensive fire. The attackers pulled off to the west towards Barbers Point and out to sea, although a few lagged behind to target strafing against some personnel on the ground (*History of the Marine Corps Air Station Ewa*, 52; Hollingshead, 11). The attack was completely over by 9:45 a.m., not quite two hours after it began.

Four of the SBDs from USS *Enterprise* landed again for refueling and service. One remained as others rendezvoused at Hickam with B-17s (*History of the Marine Corps Air Station Ewa*, 53-54 and Appendix N) (Figure 5, p. 28). There were also reported plane crashes in the area during combat, but the locations are vague in accounts, and do not appear to have been confirmed or identified at this time (for example, *History of the Marine Corps Air Station Ewa*, Appendix N).

Table 1. OCOKA Analysis Table

Name	Location	Relevance to Battle	OCOKA Analysis	Sources
Aviation areas	Includes runways, parking apron, warm-up platform, hangar.	These open-exposed areas were the locations where planes were parked, and were the initial focus of the Japanese attack. These areas provided no concealment, which was a critical factor in the effectiveness of the Japanese attack.	Cover and concealment; key terrain/target.	
Parking apron (or parking mat)	Part of aviation areas.	Parked aircraft were the primary target of the Japanese, and the focus of their first attack on Ewa. During the first attack, Japanese strafing from low altitudes effectively destroyed the aviation capabilities of Ewa Field within about 15 minutes. The Marines rushed out onto the concrete and macadam parking areas to try to save the burning planes, and pulled two SBDs off the paved area to use their guns in defense during the second attack.	Key terrain/target.	Hollingshead, 8; Cressman; Shettle; 6/30/41 plan; 12/2/41 aerial
Warm-up platform (or parking mat)	Part of aviation areas.	Parked aircraft were the primary target of the Japanese, and the focus of their first attack on Ewa. During the first attack, Japanese strafing from low altitudes effectively destroyed the aviation capabilities of Ewa Field within 15 minutes. The Marines rushed out onto the concrete and macadam parking areas to try to save the burning planes, and pulled two SBDs off the paved area to use their guns in defense during the second attack.	Key terrain/target.	12/2/41 aerial; Cressman; Shettle; Hollingshead, 8

Name	Location	Relevance to Battle	OCOKA Analysis	Sources
Runways	Part of aviation areas.	Marines blocked the runways with their remaining operable vehicles after the first attack to prevent the Japanese from landing. U.S. SBDs from USS Enterprise landed on the runways between the second and third attacks, and again after the third attack.	Key terrain/target.	Hollingshead, 10; Shettle, 88
Hangar	SW edge of concrete warm-up platform; part of aviation areas.	Under construction on December 7, 1941. Hangar had a roof but no sides at the time of the attack. It appears that no planes were inside.	Cover and concealment.	Goldstein et al, 89 (photo)
Enlisted parking lot	North edge of airfield.	Cars in the enlisted parking lot, an open space near the aviation area, were targeted by Japanese strafers. Destruction of vehicles occurred in the second attack, when it was "reduced to a junkyard" (Shettle, 88).	Key terrain/target.	Shettle, 88; Cressman, 20
Swimming pool site	North edge of airfield/south part of camp area.	The pool was under construction on December 7, 1941. It is noted as a site of defensive actions by the Marines. Up to 50 men took shelter in the pool excavation, which served as a makeshift earthwork. They returned fire with handheld arms against the attacking planes.	Cover and concealment; field of fire.	Cressman, 21; Shettle, 28; 12/2/41 aerial

Name	Location	Relevance to Battle	OCOKA Analysis	Sources
Mooring mast	North edge of airfield.	The Mooring mast was used as a temporary control tower in 1941, and served as a landmark for the airfield. There was a defensive gun position placed in the mast after the first attack. In accounts, it is mentioned that the installation's ambulance had its tires shot out by a Japanese strafing plane in this vicinity as the driver attempted to reach the burning planes on the parking mat.	Field of fire.	ND 14, Appendix O; Shettle, 87; 6/30/41 plan; Cressman
Camp area		See features below. Includes sites of mess hall, gatehouse, VMSB tents, dispensary and sick bay, photographic section tent, and other support buildings and tents.	Field of fire, cover and concealment, key terrain/target.	
Mess hall	Camp area.	Where Marine officers first witnessed the arrival of the first Japanese attack group at Ewa.	Observation.	Hollingshead, 8; 6/30/41 plan
VMSB tents	Camp area.	A damaged SBD was reportedly dragged off the parking mat and concealed behind these tents after the first attack, used in the second and third as a machine gun mount by two Marines, Peters and Turner. They are also mentioned as locations of shelter.	Field of fire, cover and concealment.	Hollingshead, 9; 12/2/41 aerial
Dispensary and sick bay	Camp area.	These facilities and others, housed in canvas tents, were set on fire by incendiary ammunition during the first attack.	Key terrain/target.	Hollingshead, 10; 6/30/41 plan

Name	Location	Relevance to Battle	OCOKA Analysis	Sources
Temporary guard posts and gun positions	Undetermined.	These were created in response to the first attack under direction of Lieutenant Colonel Larkin, who was in charge of the installation. This immediate response allowed for some measure of defense in the second and third attacks.	Field of fire.	Hollingshead, 9
Open, level terrain (Ewa Plain)	Setting, including entire installation	The open, level terrain of the Ewa Plain provided few obstacles to the Japanese attackers.	Key terrain/target; cover and concealment; obstacles.	

1.1.4: EWA FIELD BATTLEFIELD BOUNDARY

Based on the battlefield defining features identified through military terrain analysis above, the core area of the Ewa Field battlefield encompasses approximately 180 acres, including the extent of the installation’s aviation and camp areas in 1941. This boundary is shown in Figure 1 (p. 25), and includes all the areas known to have been directly involved in combat. This is the area addressed in the integrity evaluation that follows.

1.2: Evaluation of Battlefield Integrity

Significance and integrity are the two main considerations in determining National Register eligibility. **Integrity** is defined by the National Park Service as “the authenticity of a landscape’s historic identity, seen through the survival of physical characteristics that existed during its period of significance” (National Register Bulletin 15). Historical integrity is evaluated to determine if the characteristics that defined the landscape during the historic period—in this case, December 7, 1941—are present today. The seven qualities of historic integrity defined by the National Register program are **location, setting, feeling, association, design, workmanship, and materials.**

1.2.1 INTEGRITY CONSIDERATIONS FOR BATTLEFIELDS

National Register Bulletin 40, *Guidelines for Identifying, Evaluating, and Registering America’s Historic Battlefields* (Bulletin 40), provides guidance to assess battlefield integrity. The scale at which battlefield integrity is evaluated is often very large, covering many acres or even square miles of land. As a result of this scale, a battlefield may retain historical integrity despite the loss of individual buildings or groups of buildings. The larger patterns of the battlefield landscape that remain intact bolster its integrity. These can include defining features such as the spatial arrangements of features, road alignments, groups of buildings, aviation features, and distinctive topographic features. Individual features of battlefield sites need not retain

material integrity, as their legible traces can still tell the story of the battle. Also based on National Register guidance, it should be noted that sites where events occurred may retain integrity for their association with the events, even if they are in poor or ruinous condition.

National Register Bulletin 40 notes that of the seven qualities of integrity, four are essential for historic landscapes such as battlefields: location, setting, feeling, and association. Design, workmanship, and materials are not always applicable to the integrity of battlefields.

- **Location** is an essential and immovable aspect of historic sites such as battlefields. The physical location of battle events must be confirmed to retain integrity of location.
- **Setting** defines the relationship of the combat areas to surrounding features and open space. The physical features of a battlefield that make up its setting can include topographic features, vegetation, and patterns of building. Setting is an essential part of a battlefield's integrity.
- **Feeling** for a battlefield site can be evoked by features directly surviving from the battle event that convey a sense of the dramatic, heroic, and/or tragic nature of the engagement; or a sense of "hallowed ground," where the current landscape, though not necessarily retaining relics from the battle, may evoke a feeling of contemplation and remembrance in visitors.
- **Association** can be established by confirming that the battle events did indeed occur in the location through research, and through identification of surviving features that convey its association with battle events.
- **Design** is not always important to the integrity of an event site; if aspects of design are related to how the event unfolded, they could be considered relevant. Military installations, for example, encompass some elements of design. They are planned in a deliberate fashion, developed in phases and using particular aesthetic choices that reflect an era, a style, a region, or a planner/designer.
- **Workmanship** is related to design, and is not usually an important aspect of integrity for an event site such as a battlefield.
- **Materials**, like design and workmanship, are not always important to the integrity of an event site such as a battlefield. An exception may be when the condition of surviving original materials reveals something about the battle event: for instance, strafing-damaged original paving contributes integrity of materials.

1.2.2: INTEGRITY OF EWA FIELD BATTLEFIELD

Ewa Field retains minimal integrity as a battlefield site. While many features are no longer present, some key features and sites associated with combat survive and retain enough legibility to support a minimal level of integrity. Integrity of Ewa Field is supported by physical evidence of damage to the concrete warm-up platform that occurred during the attack; the surviving, although ruinous, 1941 aviation areas; and the confirmed locations of a few other battlefield defining features, such as the swimming pool. Integrity is diminished by the loss of other features and the poor condition of the surviving features, as well as other changes to the installation and its surroundings in the years since the attack.

Today, the flat and open character of the topography upon which Ewa Field was built remains legible, and the consequences of the site's openness and lack of cover during the attack are easily understood. The assemblage of surviving aviation features, although many are in poor condition, together support an understanding of Ewa Field's past use and strategic importance. Precise locations of battle events can be identified based on historical accounts, as can surviving features connected to the attack, including the parking apron and warm-up platform where planes were destroyed; the swimming pool defensive site; and known locations of missing features such as the mooring mast and enlisted parking lot.

These battlefield defining features collectively retain enough character to convey a sense of the site as a battlefield. While some individual features retain integrity, most are diminished. However, as a baseline, the surviving character of the site is sufficient to communicate its association with the significant events of December 7, 1941. The individual features within the Ewa Field battlefield remaining today that are connected to the story of the attack include:

- The **warm-up platform** is characterized by a grid of 20-foot concrete squares with central metal tie-downs. It retains the open, level character central to its original function. The surface is scarred in several locations with damage identified as strafing marks from the 1941 attack (MAI 2011). The concrete platform is also defined by its proximity to the runways, parking apron, and hangar foundation. It supports integrity of the battlefield, and is the location in which the history of the event is most evident.
- The **parking apron** survives beneath vegetative growth, its edges defined by changes in vegetation and remnant paving. The apron is defined as a space in proximity to the warm-up platform and runways, and is seen in its level character, the remains of macadam paving, regularly spaced metal tie-downs. It minimally supports integrity of the battlefield.
- The **hangar's** foundation survives, but the structure is no longer present. At the time of the attack, the hangar roof and framing was extant, as it was under construction; today, the footprint of hangar remains visible, aiding in the spatial understanding of the aviation areas that were the focus of the attack.
- The **swimming pool site** survives today; it was under construction during attack, and its excavation served as an important defensive position. Today, the pool, which was subsequently completed, is filled with soil. It supports integrity through its proximity and orientation to the aviation areas, showing its relationship to lines of attack. The existing structure marks the use of the former excavation by Marines as cover.
- The **runways** survive in a ruinous state. The area of the 1941 runway paving is more overgrown with woody vegetation than the later World War II-era runway extensions. The macadam paving survives in ruinous condition. While views are currently blocked by vegetation, this may be considered removable; the vegetation differs on the 1941 and later paved areas, rendering the edges of the 1941 paving legible. The evident spatial area of the runways supports the integrity of the battlefield.

Many features are missing, mostly within the **camp area**. This was the developed support, administration and housing area of the installation, including buildings, tents, and other features. The camp area was under construction in December 1941, and continued to change and evolve throughout World War II. Today, no 1941 buildings survive, and parts of this area have been

disturbed by later activity. The entrance road remains partially extant. Some sites of the missing features have been identified: for example, the location of the mooring mast; the sites of the mess halls and the gate; and possibly the enlisted parking lot, are evident on historic photos and plans from 1941. Locations of other missing features, such as specific tents mentioned in eyewitness accounts, are undetermined.

The deteriorated conditions of most of the surviving features has a negative impact on the integrity of the Ewa Field battlefield. Refer to MAI's Inventory Survey Report (2011) for additional detailed documentation of conditions of these features. The airfield has been disused for many years, and is overgrown in kiawe-koa haole scrub and ruderal (grass) vegetation. Natural changes in vegetation on a battlefield site may diminish integrity, but are considered reversible, as they generally are a sign of lack of disturbance (see National Register Bulletin 40). This is true at Ewa Field, where outlines and edges of the historic airfield areas remain partially visible through the vegetation, rendering the spatial arrangement of these battlefield defining features intact. Since materials such as paving have been damaged by the roots of woody vegetation, however, these features have lost integrity of materials.

Ewa Field on December 7, 1941 was an installation in transition, with many of its facilities actively under construction (Hollingshead, 3). Features such as the swimming pool and large hangar were partially-constructed at the time, and were subsequently completed and used after the attack. The scores of temporary and permanent buildings that were present in 1941 in a cluster to the north of the aviation areas are missing today, although a few of their specific locations are known. The landscape of Ewa Field continued to evolve through and after the war years. After the attack, during the war, many more facilities were added, although now most of these are missing as well.

Summary of Integrity by Aspect for Ewa Field

Ewa Field retains integrity of **location**. Location is critical to understanding the place of Ewa Field within the sweep of significant events that together compose the battle on December 7, 1941. Both in relation to the overall events and also within the former installation boundary, specific locations are known for key events and actions of December 7, 1941 at Ewa Field due to evidence in aerial photos, eyewitness accounts and other historic information. Locations are confirmed such as the concrete and macadam aircraft aprons and swimming pool defensive site (Figures 9, 10, and 11- pgs. 30 & 31).

Integrity of **setting** at Ewa Field is diminished. The broad setting characteristics of the installation that are important to understanding the events of December 7, 1941, remain present and clearly defined, such as Ewa Field's relationship to the Waianae Mountains, Pearl Harbor, and the Ewa Plain (Figure 7, p. 29). Integrity of setting in the immediate vicinity of Ewa Field is diminished by encroaching development with different character, such as the golf course and new housing areas. The existing overlay of surviving World War II features built to support continuation of its airfield use are generally coherent and compatible with the attack-related features, where they are still present (such as the nearby revetments). However, later condition changes and the loss of pre-1945 features has diminished integrity of setting for the battlefield.

Integrity of **association** at Ewa Field is diminished. The strafing scars on the concrete warm-up platform support association with the attack events, as does the swimming pool (Figures 9, 11, and 12 – pgs. 30, 31 & 32).

Integrity of **feeling** at Ewa Field is diminished. Remaining features such as the scars on the concrete platform, continue to convey feeling – evoking the violence, immediacy, and drama of the attack (Figure 12, p. 32). But while Ewa Field was a busy, bustling airfield on December 7, 1941, today it is quiet, empty, and overgrown (Figures 9 and 10 – pgs. 30 & 31). Many features that provided the character of the installation in 1941 are missing today, diminishing integrity of feeling. Vegetation growth has obscured the broad, open character of most of the aviation areas (although the outlines of these features remain visible within the overgrowth, so this condition may be considered reversible to some degree).

Design, workmanship, and materials are not relevant to the significance of the Ewa Field battlefield, although they may relate to other aspects of integrity not explored here (such as World War II-period designed military facilities). Integrity of materials, design and workmanship at Ewa Field are retained by the concrete warm-up platform showing the scars from the battle. It is not known whether other features retain these aspects of integrity.

1.2.3: INTEGRITY RELATED TO OTHER ASPECTS OF SIGNIFICANCE

This evaluation did not assess the design integrity of Ewa Field. However, due to the long period of disuse and the vast amount of missing features, it is likely that the former Ewa Field installation does not retain integrity as a designed installation associated with World War II development. It is possible that smaller surviving buildings, building groups, or aviation features within it may be eligible on their own. For more information about evaluating designed military installations and aviation features, see USACERL's *Guidelines for Documenting and Evaluating Historic Military Landscapes*, which discusses the continuing military use of historic designed military installations as an important factor in the retention of their character and historic integrity; and National Register Bulletin 43, "Guidelines for Evaluating and Registering Historic Aviation Properties."

Table 2. Integrity Assessment Table

Name	Comments	Integrity Assessment
Aviation areas	Aviation features are still extant - described below.	Aviation features retain partial integrity - described below.
Parking apron (or parking mat)	The macadam parking apron is still evident, though overgrown and the paving degraded. Mooring eyes are still in place. Accounts do not differentiate between the macadam and concrete parking (warm-up) areas and planes are visibly parked on both in the 12/2/41 aerial photograph.	Parking apron retains integrity of location. Integrity of feeling, association, and setting are diminished. Materials, workmanship, and design are lost.
Warm-up platform (or parking mat)	The concrete warm-up platform is still in place and has little vegetation growth. Damage from attack is evident. Accounts do not differentiate between the macadam and concrete parking areas (warm-up) and planes are visibly parked on both in the 12/2/41 aerial photograph.	Warm-up platform retains integrity of location, association, materials. Integrity of feeling is slightly diminished. Integrity of setting, workmanship, and design are diminished.
Runways	This is specific to the 1941 extent of the runways, not the expanded runways developed during WWII after the attack (see inventory for illustration). Condition of paving on all runways is ruinous, and vegetation growth has largely obscured them; however, spatial area and grading of runways is still evident. Edge of 1941 paving is still clear in differentiated vegetation and paving composition of the two phases of construction, visible on the ground and in aerial photographs.	Retain integrity of location, association. Integrity of feeling, setting are diminished due to vegetation growth, which is a reversible condition (vegetation removal). Integrity of materials, workmanship, design are undetermined (may have been repaved); they are either diminished or lost.

Name	Comments	Integrity Assessment
Hangar	It was later completed and used, but was demolished ca. 1970. Today the concrete foundation and metal door tracks are still present.	Integrity of location is retained, but all other aspects are lost.
Enlisted parking lot	A cluster of vehicles in an unpaved parking lot is visible north of center of aviation area on 1941 aerial photo.	Not evident today; general area can be seen on historic aerial, no remaining evidence on ground. Integrity lost.
Swimming pool site	Construction was completed after the attack; pool has since gone out of use and is filled in, but still identifiable.	Pool retains integrity of location and association. Integrity of feeling is diminished. Integrity of setting, materials, workmanship, and design are lost.
Mooring mast	The Mooring Mast is no longer extant.	Missing. Approximate location can be determined using historic maps and photos. Integrity lost.
Camp area	While the general area of the camp is known, and the entrance road remains partly evident, no 1941 camp buildings remain standing today.	Missing - integrity lost. Although approximate locations of former buildings and other features can be identified on maps and aerials, none remain standing - see below.
Mess hall	This and other buildings are no longer present.	Missing. Approximate location can be identified using historic maps and photos. Integrity lost.
VMSB tents	The location of these specific tents are not known, although they were likely among those that were adjacent to the parking apron. They are no longer present.	Missing. Location undetermined. Integrity lost.
Dispensary and sick bay	The dispensary and other medical facilities were housed in tents along the main entrance road, as shown on the June 30, 1941 plan. Tents were subsequently replaced with a hospital building in later years. None of these facilities survive today.	Missing. Approximate location can be determined on historic maps and photos. Integrity lost.

Name	Comments	Integrity Assessment
Temporary guard posts and gun positions	These temporary locations were not mapped or described in detail in available sources, and are not identified.	Missing. Location undetermined. Integrity lost.
Open, level terrain (Ewa Plain)	The terrain remains generally the same as it was historically.	Terrain retains integrity.

1.3: Sources for Part 1

**Please refer to the accompanying Inventory Report (MAI, 2011) for additional source citations.*

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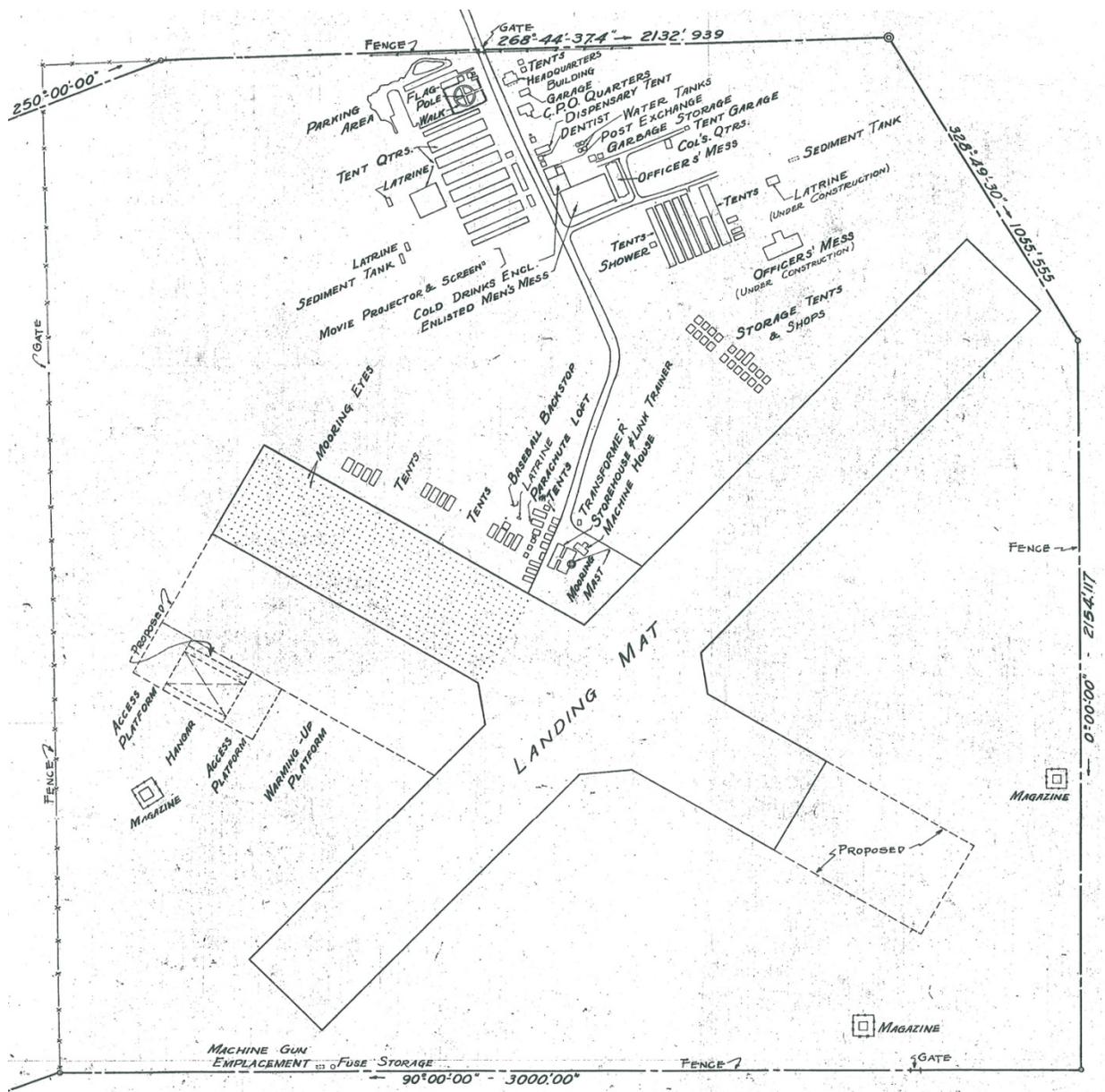


Figure 2. Portion of June 30, 1941 plan of Ewa Field. (MAI)



Figure 3. December 2, 1941 aerial photo of Ewa Field. (MAI)

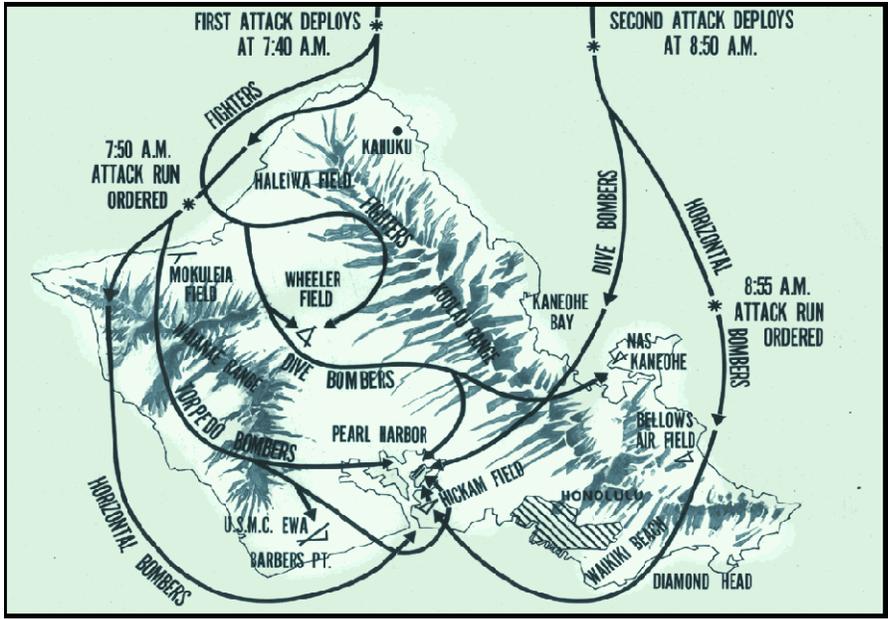


Figure 4. Diagram showing 1st and 2nd waves of Japanese attack on Oahu. Ewa Field is at lower left, though the airfield outline shown represents the post-attack appearance of NAS Barbers Point. (Goldstein et al)



Figure 5. Photo showing hangar under construction (at right) taken within a few days after December 7, 1941. (Goldstein et al)



Figure 6. Marines in swimming pool excavation at Ewa Field during attack. (MAI)



Figure 7. Historic USGS topographic map of Ewa Plain, 1938. (MAI) Approximate location of Ewa Field has been added.



Figure 8. Plane burning at Ewa Field, December 7, 1941. (Goldstein et al)



Figure 9. Concrete warm-up platform, 2010. (AECOM)



Figure 10. Macadam parking apron conditions, 2010 (note tiedown in foreground).



Figure 11. The swimming pool site, 2010. (AECOM)



Figure 12. Concrete damage of the concrete warm-up platform caused by the attack, identified by MAI in 2010. (AECOM)

Part 2: Ewa Field Inventory and Evaluation

by Mason Architects, Inc.

Purpose of Project

This report was undertaken in advance of a project proposed by Hunt Development Group that would place solar collectors on a portion of the land at Ewa Field leased by Hunt from the Navy.

Mason Architects, Inc. (MAI) developed this inventory and evaluation of Ewa Field, and AECOM, Charlottesville VA, prepared an evaluation of Ewa Field as a historic battlefield site, which is Part 1.

Methodology

Field work at Ewa Field was conducted by MAI in October 2010 to record and evaluate current conditions. In December 2010 AECOM and MAI visited the property as part of the historic battlefield evaluation.

The history of Marine Corps Air Station Ewa Field, including an analysis of buildings, structures and other features that were extant there at the time of the Japanese air attack on December 7, 1941, and that were later developed during the war, was accomplished using a number of primary sources dating to 1940-1941 and shortly after including historic aerial photos and maps, and after action reports of the December 7, 1941 Japanese attack. An important history of Ewa Field that includes the after action report of the station commander, Col. C. Larkin, is the 1944 "History of the Marine Corps Air Station, Ewa, Oahu" that was compiled by the 14th Naval District. Other documents and manuscripts from the period such as Marine Corps histories and published compilations of accounts of the attack were used.

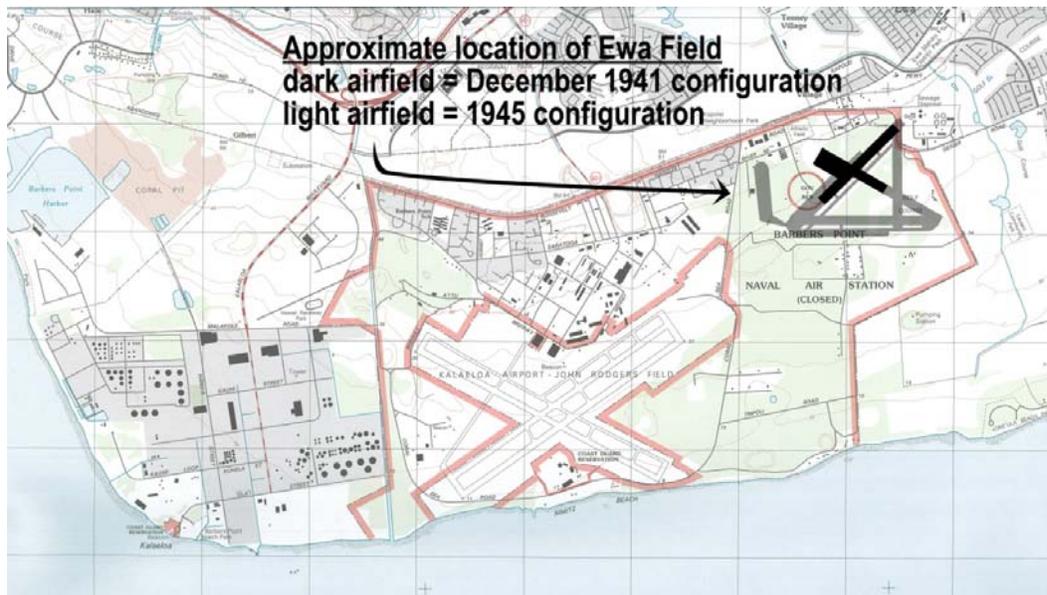


Figure 1. Historic location of Ewa Field.

2.1: Ewa Field Physical History Chronology & December 7, 1941

Historic Contexts

2.1.1: EWA FIELD PRE-1941 DEVELOPMENT

Military development in the Ewa Field area began about 1925 with the construction of a mooring mast and limited facilities by the Navy. Although intended to provide an air station for lighter-than-air craft, none ever visited the station. Previous to the Navy facilities, the area was used for ranching and sisal cultivation. Ewa Field's war-time configuration was begun in January 1941 when Marines arrived to begin expanding the station from the short landing mat and airship mooring mast into an installation that could house a Marine aircraft group. By January 29 of that year it was pronounced "available for use...for carrier landing practice" (14th ND 1944, 16). Additional construction on the station commenced that month, men were quartered in tents for several months until housing could be finished in late 1941. In the interim, runways and permanent operations and support facilities were built. A control tower ("crow's nest") for the emerging runways was built in the mooring mast (14th ND 1944, 19).

"Marines sawed, hammered, nailed, riveted, threaded pipe, climbed poles, and spliced wires as the bush moved back. Runways lengthened, and one pile of material after another assumed the shape of a water tank, a tower, a mess hall, or some other building" (14th ND 1944, 21). By December 1941 the station had macadam runways in the form of a large X, a concrete aircraft warm-up platform, and many support and operational buildings.

Aviation Features

In 1940 the station consisted of a circular area about 1500' in diameter that was cleared of most tall vegetation. This area was centered on the 1925 mooring mast. A short airstrip, several hundred feet wide and about 1250' long was oriented northeast/ southwest just south of the mooring mast. This airstrip appears to be unpaved dirt in a January 1940 aerial photo (Hawaii State Archives 1940, PPA60-2, M62.5).

Buildings and Structures

The only structures that appear to have been associated with early Ewa Field are the mooring mast itself and perhaps one or two very small buildings near it. The nearest grouping of buildings was about 40 small buildings that were located about 2500' northeast of the mooring mast, along an east/ west oriented road and within the forest. These appear not to have been associated with the mooring mast station, and are probably a residential camp for Ewa Plantation workers.

Circulation Features

The mooring mast was accessed via a roadway that extended south, through the forest, from the road along the OR&L right of way. This roadway appeared to be on a similar alignment to Philippine Sea Road. About 500' north from the point where the roadway met the circular cleared area, it intersected an east/ west road that ran to the group of 40 small buildings (Hawaii State Archives 1940, PPA60-2, M62.5).

Vegetation

The area surrounding the circular cleared portion of the station was a fairly dense forest of low trees and brush. This extended north to the OR&L tracks and east almost to Kaloi Stream. To the north and east of this forest was cultivated sugar cane.

2.1.2: EWA FIELD ON DECEMBER 7, 1941

At the time of the Japanese attack on Ewa Field on December 7, 1941, the installation consisted of numerous buildings and structures plus the X-shaped airfield and several groups of tents. A major construction program was underway during 1941 that transformed the station from a small landing strip with tents to a base for the Twenty-First Marine Aircraft Group, with over 800 men. On December 7, many buildings were still under construction or were yet to be built.

Aviation Features

The largest feature at Ewa Field on the day of the attack was the X-shaped airfield. Each runway arm of the X-shaped airfield was 300' wide, but they varied in length; a 1600' long runway extended to the northeast, 1050' runways reached northwest and southwest, and an approximate 900' runway extended southeast. The northwest runway has aircraft tie downs on 20' spacing and was used as a parking apron. A 300' wide concrete aircraft warm-up platform was along the south edge of the macadam parking apron. Most of the buildings were sited just north of the X-shaped airfield between the northeast and northwest arms, but several were located elsewhere around the installation, including a large hangar and 3 magazines.

An aerial photo taken several days before the attack shows that at least 44 fighter and scout/attack-type aircraft were operating out of Ewa Field. Also appearing in the photo are two twin-engine bomber-type aircraft, indicating that the airfield also had the capability to land this variety of aircraft. On the day of the attack, over 30 aircraft were either destroyed or rendered inoperable by the Japanese.

Buildings and Structures

Most of the installation's facilities were composed of buildings and tents that stood in a cluster along the main entrance road north of the airstrip. Most of this area was treeless, and appears in aerials to be bare earth, which is consistent with the construction that was occurring at the time. The open terrain of the 1941 airstrip is visible on a historic photograph taken on the day of the Japanese attack that shows Marine Sgt. John Hughes and others crouched close to the enlisted men's swimming pool (Fac. S152, under construction) preparing to fire rifles at the attacking aircraft. On December 7 the concrete of the swimming pool was not yet poured, only the forming boards were set up in the excavated hole (14th ND 1944, 48).

A prominent feature of Ewa Field at the time of the Japanese attack was the tall, former airship mooring mast that was located just north of the junction of the northeast and northwest arms of the airfield. This mast, built ca. 1925, was supported by numerous guy wires and contained the

control tower for the airfield, which was set up in the crow's nest in 1941. The mast/ control tower at the edge of the runway was adjacent to a small cluster of buildings that contained machinery, a transformer, and a link trainer. The approximate 75' high mast/ control tower was the tallest structure at the installation, over twice as high as the nearby parachute loft or the 28' high Hangar 123 and would have been an important visual landmark on December 7, 1941.

Another prominent visual landmark at the time of the attack was Facility 123 (1941), an aircraft hangar building under construction at the south edge of the concrete warm up platform that was adjacent to the northwest arm. The 200' long hangar was the largest building at Ewa Field, and would have loomed over the apron and the surrounding level and sparsely planted terrain. A ground-level photograph taken shortly after the attack shows that the hangar building was under construction at the time, with only its roof finished. The hangar's sidewalls are open framing, still to be covered with sheathing (Goldstein 1991, 89).

The majority of buildings at the installation were clustered in the northern portion, around the area of present day Vinson and Philippine Sea Roads. Fourteen large barracks buildings, each 120' long, were located to the northwest of that intersection and 5 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.

The buildings and structures present and under construction on December 7, 1941 provided some measure of protection to the men on the ground at Ewa Field that day. Their cover was sought by parties of Marine Corps riflemen as they returned fire upon the three waves of aircraft that strafed the installation. After first targeting and quickly shooting up the tactical aircraft at Ewa Field, the Japanese then turned their attack upon other targets of opportunity at the installation. The station's ambulance and fire truck were both riddled with bullets. "The crowded enlisted parking lot was reduced to a junkyard" (Shettle 2001, 3). Although the Japanese expended much ammunition on the station, the runways were relatively undamaged allowing an Army Air Corp fighter squadron to be transferred to Ewa Field on December 8 while they awaited repairs to Wheeler Field. Off the margins of the airfield to the west, south and east, the three magazine buildings are clearly visible in a September 4, 1941 aerial photograph.

Circulation Features

The main roadway into Ewa Field was Philippine Sea Road, extending south from the roadway that ran along the OR&L right of way. A second roadway into the station was located to the west, approximately at the alignment of Bober Road, east of the current baseball diamonds. This roadway ran near the OR&L railroad spur that serviced Ewa Field. The railroad spur was installed ca. 1941. It appears on aerial photos dated that year, and was not present in January 1940. The roadway along this spur extended south from the OR&L main line to the north corner of the macadam parking apron. A grid of roads provided access to the north portion of the station, through the administrative and support areas. Closer to the airstrip, in the area between

the northeast and northwest runways, many roads were curvilinear and defined irregular open spaces and a parking area (south of the excavation for the enlisted swimming pool) as they joined the edges of the runways to the grid pattern streets.

Vegetation

Prior to construction of the airfield, the area of Ewa Field was overgrown in kiawe-koa haole scrub vegetation. As construction progressed, vegetation was cleared. This was especially evident in the large area immediately to the south, east, and west of the airfield where a grubbed (bulldozed) area was cleared of vegetation within a square perimeter that was defined by a fence line (NAVFAC Archives 1941, photo Box TI 1/4 #19383 and 14th ND 1941, map Ewa Mooring Mast). The perimeter extended about 2200' south from the end of the northeast arm of the airfield, then west about 3000' before turning north. A cleared perimeter around aviation areas was typically established for security and safety reasons, and to establish clear aviation sightlines to aid in takeoff and landing.

In the area north of the airfield, sections of trees remain in some areas. Trees remained just north of the end of the northeast arm of the airfield, scattered trees were present at the north end of the installation, near the headquarters building and officer's mess, and a stand of trees remained to the west of the enlisted men's recreation hall. Kiawe-koa haole vegetation and cultivated sugarcane can be seen outside the installation fence line in aerial photos.

2.1.3: HISTORIC CONTEXT: DECEMBER 7, 1941 JAPANESE ATTACK

The December 7, 1941 Japanese attack on Pearl Harbor and other installations on Oahu is recognized as an important event in American history that brought the United States into World War II. This attack had a profound effect on the country by beginning America's involvement in WW II and it set in motion other significant events that occurred during the course of the war. Several installations on Oahu associated with the attack are listed on the National Register as National Historic Landmarks: Pearl Harbor, Hickam Field, Kaneohe, and Wheeler Field.

Ewa Field

The portion of the Japanese attack on Pearl Harbor of December 7, 1941 that was experienced by the persons on the ground at Ewa Field began at 7:55 am and lasted for about 1 hour and 20 minutes, ending about 9:15. At Ewa Field, the action was perceived as coming in three "separate and distinct attacks" and was undertaken by a large number of aircraft (Larkin 1941, 5 & 1).

The first attack at Ewa was undertaken by 36 to 48 aircraft that approached Ewa from the northwest. These were Zero fighters, strafing with their 7.7mm machine guns and 20mm cannon (Larkin 1941, 1). These Zeros were escorting the level bombers (Kates) of the first attack wave off the Japanese carriers. The Kates of the first attack wave carried either torpedoes or 800kg bombs and flew south along the Waianae Coast on their approach before turning east near Barber's Point and heading for the harbor. Some 18 of the Kate bombers carrying torpedoes came onto Pearl Harbor from the direction of Barber's Point at an altitude of

about 1,000' (Larkin 1941, 3, and Carroll 1941). As the attack on Ewa was launched, a flight of about 18 torpedo bombers flew past the station from the northwest at an altitude of about 1,000'. A group of about 21 fighters accompanied them at the same altitude. These fighters passed north of Ewa Field, then turned right and attacked "in a string formation" (Hollingshead 1945, 8). The Zeros escorting the torpedo-laden Kates would have seen the US planes on the ground at Ewa and moved to neutralize them before they could get airborne.

The Zeros concentrated their fire on the "dispersed tactical aircraft" at Ewa during the first portion of this attack there, approaching as low as 20' to 25' (Larkin 1941, 1). Firing short bursts, the Zeros pulled up and reversed course for repeated passes at their targets. Ground crews worked to attempt to get planes airborne or to drag planes off the open runways to save them (Hollingshead 1945, 9). Aircraft on the ground that were damaged by Zeros spewed gasoline "and soon the area flamed with blazing puddles" (Prange 1981, 524). After about 10 to 15 minutes these aircraft were "well shot up" and the Zeros engaged other targets on the ground; personnel, utility aircraft, and aircraft under repair. Because the Zeros targeted grounded aircraft during this first 20 to 25 minute attack, initial casualties were light. One US aircraft on the ground, an SBD, was dragged to "behind the VMSB [scout bombing] tents" so that its machine gun could be used in defense (Hollingshead 1945, 9). Some of the attacking aircraft were Vals and Zeros that previously "had cleaned up at Hickam and Wheeler and swooped in" on Ewa to do whatever additional damage they could (Prange 1981, 524).

After the first strafing attacks at Ewa Field the station broke out weapons (rifles & .30 caliber machine guns from ordnance storage and damaged aircraft), put out fires, and moved trucks and autos onto the runways to prevent enemy aircraft from landing.

The second attack at Ewa Field came about 10 to 15 minutes later, according to the station commander, Col. Larkin. This consisted of an attack by Kate bombers using light bombs and "very heavy strafing" (Larkin 1941, 2). The Kates of the second attack wave from the carriers were fitted with 60kg bombs and had Ewa Field as one target area (Yarnall 2010). The aircraft in the second attack on Ewa came from the direction of Pearl Harbor in a "straggling column just off the tree tops surrounding [the] field" (Larkin 1941, 2). The bombers during this heavy and prolonged attack initially targeted aircraft until it became apparent that all had been put out of action. Then the attackers turned to "the camp area, buildings, installations, and personnel whenever observed" (Larkin 1941, 2).

The third air attack on Ewa Field occurred after an interval that was used to reorder defenses, tend to wounded, and put out fires. The third attack was made by about 15 Val dive bombers. Larkin describes these as "'fairly fast fighters with fixed landing gear and very maneuverable" (Larkin 1941, 2). The Aichi D3A Val was the only type of Japanese aircraft used that day that had fixed landing gear. The Vals attacked "in column and from very low altitude, just off the tree tops" (Larkin 1941, 2). This attack was relatively light and was not especially effective, possibly due to the defensive gunfire sent up. Larkin makes no mention of any bombs used during this third attack. The Vals sent out by the Japanese with their second attack wave were to target ships in the harbor with their 250kg bombs. Their attack on Ewa was made after they had released the bombs on ships there.

After the main body of the third group of attacking planes left Ewa Field, several Japanese aircraft loitered above, making a few strafing attacks before finally leaving. During this time a contingent of about 25 Japanese aircraft were observed hovering about 5 miles west of Barber's Point at an altitude of about 8,000'.

After the attack it was found that the runways were only slightly damaged, and other damaged facilities were intact enough to keep Ewa Field operational for routine operation. Ewa Field was able to provide an airstrip and facilities for Army and Navy units after the attack (Hollingshead 1945, 18).

Air Combat Over Ewa Field

US Army pilots taking off from Haleiwa Auxiliary Airfield were the first defenders to become airborne. Second Lieutenants George S. Welch and Kenneth M. Taylor were part of a squadron deployed from Wheeler to Haleiwa the previous week. About 8:20 am the two aviators took off in their P-40 aircraft and were dispatched to south Oahu where the Japanese were strafing Ewa Field. Finding about a dozen Japanese aircraft above Ewa Field, Welch and Taylor attacked, each shooting down two Val dive bombers. Both pilots then sped to Wheeler to rearm. Taking off from Wheeler under the second wave of the attack, Welch was able to shoot down another Val dive bomber there before returning to Ewa Field where he scored his fourth kill of the day.

Kenneth Taylor's account of the aerial events over Ewa:

As George [2nd Lt. George S. Welch] and I approached the Marine Field [Ewa at Barber's 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 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. From: Kenneth Taylor. "Sad Sunday (Ken Taylor's Story)" in Col. Robert L. Scott, *Damned to Glory*. New York: Scribners. 1944.

George Welch's account:

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 had disappeared. We didn't know where - so Lieutenant Taylor and I went back to Wheeler Field and landed. From: James Lansdale, "George Welch interview." Webpage j-aircraft.com.

A Val pilot related:

After bombing the battleship we looked down on Ford Island and strafed the airfield (at Ewa) as instructed. After that we evacuated toward the sea off Honolulu. There we circled and waited for the others to show up. Just then we were followed and attacked by a P-40 enemy fighter plane. On Hawaii there were several airfields such as Hickam and Wheeler, and there were many fighter planes there. These planes were the first to be attacked by the First Wave so that no fighters could fly up to intercept us. The carrier bombers from the Shokaku

and Zuikaku participated in the First Wave attack and bombed the airfields. The carrier bombers of the Akagi, Kaga, Soryu and Hiryu of the First Air Fleet had received top level training, and so they were instructed to attack the vessels in the harbor.

The training level of the other above-mentioned two carriers, Shokaku and Zuikaku, was somewhat lower than the above four and so they were assigned the airfields as targets. It turned out that another airfield, a small one, next to Wheeler (Haleiwa), was left untouched. So, when the Second Wave arrived these P-40s, about 10 undamaged ones, came up to intercept us.

Pilot Gotoh of the No.1 plane of (an) Akagi carrier bomber (shotai), which had participated in the attack with us, engaged one of these P-40s in an air duel. Both ended up shooting each other down off Honolulu. The enemy plane went down and so did ours. Because we had observed the air duel both were credited with a plane shot down. From: James Lansdale "Tokuji Iizuka, interview of 2005." Webpage j-aircraft.com.

Far off shore of Oahu to the west, the aircraft carrier USS *Enterprise* was returning to Pearl Harbor from transporting F4F fighters to the Marine garrison at Wake Island. The *Enterprise* sent out 18 SBD dive bombers to Ford Island that arrived shortly after the Japanese had opened the attack. Several were shot down by US fire, several landed or ditched at various locations, and at least two engaged enemy aircraft near Ewa Field.

The commander of the SBD air group that morning, Commander Howard .L. Young, passed Barber's Point at 8:20 am and noticed "approximately a squadron of planes circling Ewa Field in column" (Young 1941). Thinking them to be US Army aircraft he flew around them and headed to land at Ford Island. Before he was able to land, he came under attack both from Japanese Zeros and fire from ground-based anti-aircraft guns.

An SBD piloted by Ensign John Vogt entered a low altitude dogfight with at least two Japanese Zeros. The SBD trailed the tight flying Zero as best it could until the Zero pulled up sharply and stalled, causing the SBD to collide in an explosion that brought both planes down (Tillman 1976, 21; NARA photo SC 126996, Dec. 7, 1941). A second SBD piloted by Lieutenant Clarence Dickinson was attacked by a number of Zeros at about 4,000' altitude near Barber's Point. Dickinson's wingman in another SBD, Ensign Bud McCarthy, was shot down trying to support the Lieutenant. Dickinson, and his gunner Roger Miller, were able to knock out one Zero before being shot down.



Figure 2. Ewa Field on December 2, 1941. This photo shows the configuration of the airfield and the buildings located near it at the time of the Japanese attack. Note Hangar 123 (lower left) at the south edge of the concrete aircraft warm-up platform. North at top. NARA II photo #71-CB-33B-2. The original photo is oversize and the light colored crease lines that quarter it are present on the original.

2.1.4: HISTORIC CONTEXTS OF SELECTED MILITARY STATIONS ON OAHU, DECEMBER 7, 1941

The following historic contexts are included to provide a wider view of the Japanese attack than would be encountered if the action that occurred at Ewa Field were examined in isolation. The significance of the battlefield at Ewa Field cannot be fully or properly understood without this larger contextual picture, which includes the many other installations that were affected by the attack and the events of that day. The background on the various aircraft on the battlefield, Japanese and American, is also needed to understand the action in the air.

A Japanese account of the organization, commanders, aircraft used, armaments, and targets of the two waves of Japanese aircraft that attacked Pearl Harbor and other sites on Oahu, including Ewa Field, on December 7, 1941 is found in *Army Forces Far East 1953*. This same information is also listed in *Yarnall 2010*. The original 1953 document is the translation of accounts of former Japanese officers that were on duty in command and staff units during the Pearl Harbor operation. This reconstruction was compiled by the Military History Section, Headquarters, Army Far East under the supervision of the Demobilization Bureau. The reconstruction of original orders and plans from former officers' personal notes and memory was necessary due to the destruction of the original records in Japan prior to the end of World War II.

"The enemy [Japanese] attack plan was simple. Dive bombers and fighter planes would strafe and bomb the major Army and Navy airfields in an attempt to catch defending aircraft on the ground. Simultaneously, the battleships moored to pilings along the shore of Ford Island would be hit by high- and low-level bombing attacks" (Hough, Ludwig, Shaw n.d., 70).

Japanese Aircraft and Armament

Each of the two waves of Japanese air attacks on Pearl Harbor and Oahu consisted of three types of aircraft: fighters, dive bombers, and level bombers. The armament and the mission of each type of aircraft was different. The 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 and also 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.

- The fighter aircraft were Mitsubishi A6M, named "Zero" or "Zeke" by the US. These aircraft were armed with two, forward firing 7.7mm machine guns in the fuselage and two, 20mm cannon in the wings firing a 20 x 72rb round. This was an early type of 20mm cartridge, of relatively lower power than later 20mm rounds, firing its projectile at about 1900 feet/ second velocity. Zeros were capable of carrying 60kg bombs, but were not armed with bombs that day. These fast and nimble aircraft would have been able to strafe ground targets at Ewa Field.

- The dive bomber aircraft were Aichi D3A, named "Val" by the US. These aircraft were each armed with a single 250kg bomb for use against ships and ground targets. Vals were capable of carrying additional 60kg bombs under the wings, but there are no records that show they were armed with 60kg bombs for the attack that day (Arakaki 1991, 61). The Vals carried two, forward firing 7.7mm machine guns and one, flexible mounted 7.7mm machine gun in the rear. These aircraft would also have been able to strafe ground targets at Ewa Field.
- The level bomber aircraft were Nakajima B5N, named "Kate." These aircraft were armed for attacking capital ships either with an 800kg armor piercing bomb for high altitude bombing or with a Mk 91 aerial torpedo. During the second wave of the attack the Kates were armed for high altitude bombing of targets at Ford Island, Hickam Field, Ewa Field, and Kaneohe with a single 250kg general purpose bomb and/ or six, 60kg bombs. The Kates carried two, forward firing 7.7mm machine guns and two, flexible mounted 7.7mm machine guns in the rear. These aircraft were significantly slower than the Zero fighters, and much less nimble than either the Zeros or the Vals.

During the first wave of the attack, the Kates carried either 800kg bombs or torpedoes and targeted the large ships in the harbor. The Zeros flew cover, making sure no US aircraft threatened the mission. Aircraft on the ground at Ewa Field and elsewhere were neutralized as quickly as possible by the Zeros, which strafed while monitoring the bombers to ensure their safety. The Vals, dive bombing with their 250kg bombs, hit Pearl Harbor (Ford Island) and Wheeler. Compared with the US fighter and pursuit planes on Oahu (Army P-36 & P-40, and Navy SBD, F2A & F4F), the Val was a nimble aircraft, able to engage US fighter aircraft in aerial combat. Aircraft in action over Ewa Field during the first wave of the attack would have been Zeros and Vals firing 7.7mm machine guns and 20mm cannon. The Vals that attacked Ewa would have had previously expended their bombs on their assigned targets at Pearl Harbor (Ford Island) and Wheeler.

The second wave of attacking Japanese aircraft was similar in assignment and armament to the first. One main difference is that a group of high-level Kate bombers targeted Ford Island, Hickam Field, Ewa Field, and Kaneohe. These bombers each carried a single 250kg bomb and six, 60kg bombs. They would have been responsible for any bomb damage at Ewa Field during the attack. The Val dive bombers (with 250kg bombs) of both waves would have released their bombs on their assigned targets (Pearl Harbor, Wheeler, & ships in the harbor) before proceeding on to Ewa Field to strafe. A ground account of the action at Ewa Field relates that Kate bombers formed the second of three attacks there. These planes, and the Vals that made up the third of three attacks at Ewa (Larkin 1941, 232), would have been part of the second wave of Japanese planes off the carriers.

After the attack, Marines at Ewa Field noted that there were "five small craters on the field" (Cressman and Wenger 1992, 20). These would have been created by the 60kg bombs carried by the Kate bombers.

Attack Waves of Japanese Aircraft from the Carriers

"1500!" yelled PO2 Takano. At around this altitude, machine gun fire from enemy AA positions as well as the target ship swarmed into my sight like red ice candies.

"Altitude 1000". AA fire is more intense and my sight was filled with the battleship and the ice candies. I could even hear the close ones fly past my plane.

"800!" I aimed at the bridge. The battleship was ever so large.

"600" "Get ready"

"450!" "Bombs away!" I yanked the ejection cable with my left hand. My #25 (250kg bomb) was released without a sound. At the same time, I pulled back at the stick with all my might in the midst of black smoke and AAfire. I banked slightly to the left and charged on. I almost blacked out from the G. As I recovered my sight, I heard PO2 Takano scream "A direct hit! Banzai!" --Kunio Kosemoto, Val dive bomber pilot in the second wave of the Japanese attack from the carrier Soryu, above battleship row on December 7, 1941. From: website j-aircraft.com.

The first wave of the attack consisted of;

Kates with either torpedos or with high altitude 800kg bombs fashioned from naval artillery shells that were to target ships in the harbor.

Vals with 250kg bombs that were to target the airfields at Wheeler and Ford Island.

Zeros to cover the bombers and strafe ground targets.

The second wave of the attack consisted of;

Kates with 250kg bombs and/ or 60kg bombs that were to target airfields at Ford Island, Hickam, Ewa, and Kaneohe.

Vals with 250kg bombs that were to target ships in the harbor.

Zeros to cover the bombers and strafe ground targets.

The first wave of Japanese attackers divided into two groups at a point near the north coast of Oahu. The Kates approached Pearl Harbor along the west coast of the island before turning east towards Pearl Harbor. The Vals and Zeros went south through the saddle between the two mountain ranges, some striking at Wheeler Field in the center of the island and some continuing south to Pearl Harbor. Before reaching Pearl Harbor, some fighters from this group divided off to the east to target Kaneohe NAS and Bellows Field. All torpedo bombers were sent in this first wave. This is when the chances for success were best for their necessary low and slow approaches (Slackman 1990, 23). The Japanese aircraft from this first wave which attacked Ewa Field were Zero fighters that escorted Kate torpedo bombers on their way to Pearl Harbor.

The second wave avenue of approach was more complicated, ranging southward along the east side of Oahu. One group of Kates approached Kaneohe NAS first, while another headed westward to strike Hickam, Pearl Harbor, and Ewa. Vals also flew past Kaneohe to Pearl

Harbor. Some Zeros hit Kaneohe and then Wheeler, others went to Bellows, and others to Hickam and Pearl Harbor. The Vals in this second wave were to hit any carriers left afloat (Slackman 1990, 23). With the carriers out of the harbor, the Vals would be free to unload on targets of opportunity, both ships and shore targets. The Japanese aircraft from this second wave that attacked Ewa Field were Kates dropping bombs and Vals strafing after they had bombed their other designated targets.

Not all accounts of the attack agree on the planned use of the airspace over Ewa Field by the Japanese. Anecdotal accounts relate that the area above Ewa Field was a marshalling area for aircraft to form up for the flight back to the carriers. Other histories of the Pearl Harbor attack place Kaena Point as the rendezvous point (Slackman 1990, 141).

Pearl Harbor

The primary targets of the Japanese attack were the ships in Pearl Harbor. Among those damaged were vessels in dry dock One and on the floating dry dock (which was itself sunk) at the shipyard. On December 7, 1941, Ford Island operated as a base for naval PBY scout aircraft and as a basing area for the naval aircraft attached to the carrier squadrons, Navy fighters and bombers. Because of these activities, the naval air installations (seaplane areas and Luke Field) at Ford Island were targeted with high priority by the Japanese attacking Pearl Harbor on December 7, 1941. For the safety of their attacking force, it was vital for them to neutralize any fighters there. In addition, naval bombers present as part of carrier forces, and scout aircraft would have to be knocked out of action to allow the attacking force to depart Hawaiian waters safely. Unknown to the Japanese, the carriers and their attached aircraft squadrons were at sea on December 7, so virtually all of the defending aircraft anticipated to rise up from Ford Island were absent from the battle. Although Ford Island was effectively neutralized by the US carriers being out of the harbor, the Japanese went ahead with their battle plan which tasked a group of 54 Vals to divide their attention between it and Wheeler Field (Yarnall 2010). The toll at Ford Island was primarily PBY scout planes and other utility aircraft. "Damage and casualties on Ford Island were surprisingly light, considering the concentrated attention given the air station by the Japanese. The great majority of the 130 casualties treated at the Ford Island dispensary were burned and wounded who swam or were brought ashore from nearby ships" (Slackman 1990, 127). Twenty-six aircraft were destroyed. Hangar 6 was the only building seriously damaged.

Some of the first Japanese fire at Pearl Harbor was directed at the seaplane area at the south end of Ford Island, destroying many scout aircraft. Val dive bombers dropped their ordnance there at about 7:58 am (Nimitz 1942, 12). 27 Vals were assigned to target Ford Island (AFFE 1953, 11). In concert with the dive bombing attacks to Ford Island (at the seaplane area and elsewhere), there was a lot of strafing fire that made it difficult for ground personnel to move about. Amidst the strafing there was some inability to differentiate fighter aircraft (Zeros) from the dive bombers (Nimitz 1942, 13), both types were likely strafing. The Zeros, armed with forward firing 7.7mm machine guns and 20mm cannon, were tasked with protecting the rest of the attacking planes, by 1) engaging any airborne US aircraft and by 2) strafing aircraft on the ground (Yarnall 2010). Some specific accounts of the action at Ford Island relate that rear-seat

aviators strafed from their aircraft, indicating that the Vals, which have rear flexible mounted machine guns, were involved in the strafing (Slackman 1990, 126).

Defense against the attackers was mostly machine gun fire, accomplished by training the guns in parked aircraft skyward or, in several cases, by fixing aircraft guns in improvised mounts, such as machinists vises (Slackman 1990, 126). Ford Island received 11 bomb hits, 6 of them either near or in Hangar 6 at the seaplane area on the south end.

Almost immediately after the start of the attack on Ford Island, "planes were everywhere. There was smoke, explosions and strafing going on (LaForte 1991, 95). At Ford Island, the first wave of the attacking force encountered "practically no resistance" from ground stations because of the time it took to get guns manned and ammunition out of locked storage (Laforte 1991, 96). A large portion of the carrier planes left on Ford Island were destroyed by dive bombers in the opening minutes of the attack (Prange 1981, 518). During the second wave of the attack, resistance was considerable from antiaircraft positions at the seaplane ramps and from ships in the harbor. Personnel on the ground near the south end of battleship row had also been supplied with small arms and ammunition and fired at Japanese aircraft with rifles. At least one plane got airborne from Ford Island and was dispatched to search for the Japanese fleet (Bellinger 1941, 3).

Fire fighting on Ford Island was practically impossible for the larger fires, due to a lack of water caused by the *Arizona* settling on a main water line. Some water was apparently available even with this line severed; men at the gasoline wharf near the oiler *Neosho* were able to activate the sprinklers of the aboveground fuel storage tanks. Trenches that were dug before the attack to lay utility lines provided shelter for ground personnel who dove into them when they became targets of strafing attacks. When a strafing airplane came in and it was obvious that a group of men on the ground was not the target, curiosity would often impel them to stand and watch the strafing pass. Automobiles sped about the island carrying men, casualties, and ammunition. On one occasion, an ambulance sped through a turn on an inclined seaplane ramp and overturned. It was pushed back upright by a men who were nearby and it continued on to an aid station (Slackman 1991, 127).

Casualties from the burning ships on battleship row came ashore on Ford Island. Many of these men remained on the shore through the attack, too weak and injured to help fight. One bomb struck in the central courtyard of the Ford Island dispensary. Detonating underground, it severed utilities to the building but caused no injuries. Today, Ford Island is part of Pearl Harbor National Historic Landmark.

Hickam Field

The Army Air Corps (Hawaiian Air Force) installation at Hickam Field had the potential of being extremely damaging to the Japanese attacking force. Hickam was dangerous to the Japanese, not as being especially effective in countering the attacking aircraft, but as a major factor in hunting down and sinking the six Japanese aircraft carriers that brought them. Hickam was home to the 18th Bombardment Wing, which had: 12 B-17 bombers, 32 B-18 bombers, and 13 A-20 attack bombers that performed patrol and alert missions. These aircraft "were potentially

the most threatening retaliatory force the Americans could launch against [Japanese Admiral] Nagumo's carriers" (Slackman 1990, 128). The Japanese could not afford to have their carriers attacked by the Hickam bombers. The US forces at Hickam were a very important target to the Japanese, and the airstrikes there were begun simultaneously with the strikes at Ford Island and against the capital ships.

The Japanese attack at Hickam was effective. Over half the bombers there were rendered unusable and the 158 dead and 336 wounded accounted for about three-quarters of the Army's casualties that day. This left few resources to locate or pursue the Japanese carriers. Antiaircraft fire from Hickam was primarily machine guns, often fired from parked, damaged aircraft. Despite this fire, strafing aircraft were not impeded and ground movement around the installation during the attack was treacherous. At Hickam, "the first targets were those in and around the hangar area" (Arakaki 1991, 66). Within a few minutes, this pool of targets was widened to include supply and support buildings, and large areas of the base were destroyed and burning. "The Americans lost any chance of launching aircraft to attack or quickly locate the attacking carriers" (Arakaki 1991, 67.)

Some dive bombers were observed to launch their ordnance on Pearl Harbor and Ford Island and then head for Hickam, firing their guns and setting parked aircraft there on fire. Other attacking planes flew in, dropping bombs and firing guns (Arakaki 1991, 82).

Japanese level bombers and fighters from the second wave of the attack approached Hickam from the south after looping around from the east side of Oahu. This created rumors that the Japanese carriers lay south of the island (Arakaki 1991, 67). The level bombers attacked from very low altitudes (approximately 150') and high altitudes (about 1000') with 250kg and 60kg bombs, targeting buildings near the flight line, the barracks building, and also hitting the baseball diamond. (Arakaki 1991, 83 and Slackman 1991, 130).

At the opening of the attack, Hickam's operations officer tried to notify the US B-17 bombers that were incoming from California. Unable to broadcast over the radio, he raced to the airfield, passing an "appalling spectacle of burning buildings, shattered bodies, and the destruction of more than half [of Hickam's] bombers caught defenseless on the ground" (Slackman 1991, 129). Numerous casualties were sustained from strafing as men fled from a bombed hangar. Airmen fired the machine guns of grounded aircraft at the Japanese, but "on the whole, Hickam's antiaircraft fire was as inadequate as Pearl Harbor's" (Slackman 1991, 130). The huge consolidated barracks building (Facility 1102) was hit by a level bomber and suffered severe losses. "The casualties at Hickam Field were the greatest of any army post on December 7. With 158 dead and missing and 336 wounded" (Slackman 1990, 132). The attack left at least half of Hickam's 45 bombers "out of commission" (Slackman 1990, 132). Although there was serious damage to ground facilities, the base was still able to function. Although some structures (administration, drafting, engine overhaul and assembly) were near or total write-offs, important buildings such as shop and repair facilities and the steam plant were only lightly hit.

Many fires burned at Hickam, fire trucks were called there from Bellows Field and from Honolulu's Kalihi and South Beretania Street stations. Besides the firefighters, other civilians

fought fires in the hangars and on the flight line. One civilian started and taxied an OA4 amphibian observation aircraft to a far corner of the runway to protect it. Heavy casualties overwhelmed the hospital, which was filled with the wounded and dying brought in by ambulances, carts, and improvised stretchers. Some ambulances arrived with men stacked inside.

Observers present at Hickam agreed that the attacking Japanese aviators flew their aircraft at dangerously low altitudes, often feet from the ground. Further accounts of the action there are often in conflict with each other. Several witnesses recall that one aircraft skimmed the airfield so low that it scraped propeller tips and dislodged its belly tank by contact with the pavement. One witness said this aircraft crashed in hills beyond the airfield, one said it crashed into the sea, and one said it flew away unhindered (Arakaki 1991, 105). Today, Hickam Field is a National Historic Landmark.

Wheeler Field

The fighter base for the Army Air Forces in Hawaii was Wheeler Field, near the center of Oahu. Wheeler housed the 14th Pursuit Wing that operated P-40, and P-36 aircraft and was responsible for the security of the skies over Oahu. The success of the Japanese attack was dependant on their ability to remove any opposition from US interceptors, a major contingent of which was the 14th at Wheeler. Most of the pursuit aircraft on the ground at Wheeler that morning were unarmed on routine alert status and requiring about 4 hours of preparation before they could be combat ready (Slackman 1990, 135).

In the first wave of the attack, 27 Val dive bombers, each with a 250kg bomb, were assigned to target Wheeler. Aircraft and hangars were the primary targets (AFFE 1953, 11). Wheeler Field "had little protection against aerial attack, with no antiaircraft guns...only five machine guns" (Arakaki 1991, 111). A weapons shop was broken into and guns were distributed, including a .50 cal machine gun (Arakaki 1991, 125). Groups of six or seven dive bombers stood by at altitude, taking turns making swooping attacks. Bombs hit hangars and other buildings. On their runs the Vals "released their bombs from one end of the hangar line to the other" (Arakaki 1991, 113). "After expending their bombs, the enemy planes dropped down to a very low altitude and machine-gunned aircraft parked in front of the hangars and also fired incendiary bullets through the windows of buildings , attempting to set them afire" (Arakaki 1991, 111). Fighters also strafed from a low altitude of 50' to 75'.

The attack on Wheeler Field during the second wave was machine gun and cannon fire from fighters and level bombers that had completed their assignments at Kaneohe Naval Air Station, their primary target.

Although the airstrip at Wheeler Field was strewn with damaged aircraft, several planes were able to get airborne from it (Slackman 1990, 140). First Lieutenants Lewis Sanders, John Thacker, Phillip Rasmussen, and Gordon Sterling took off in P-36s at about 8:50 am. These aircraft were sent to Kaneohe and Bellows to defend against an ongoing attack there. Another aviator, Lieutenant Fred Shifflet took off in a P-40, returning shortly after receiving numerous

hits from Japanese gunfire. About ½ hour later, Lieutenant Malcolm Moore was airborne from Wheeler in a P-36, headed for Kaena Point (Slackman 1990, 141).

Four US airmen in P-36s met at Kaena Point, the Japanese-designated rendezvous point for return flights to the carriers (Slackman 1990, 141). The US attack on the Japanese loitering there left one Japanese plane trailing smoke and damaged two P-36s. The US aircraft landed at Haleiwa.

Of the four aircraft that took off from Wheeler bound for Kaneohe, Sterling was shot down and killed there after taking out one Japanese plane. Sanders and Rasmussen each scored one Japanese kill. Thacker's guns jammed and he was reduced to making threatening passes until hit by cannon fire and forced to return to Wheeler (Slackman 1990, 143).

During the height of the attack some soldiers fled the strafed aircraft area for the relative safety of nearby residential area (Arakaki 1991, 115). After expending their bombs, Vals strafed, concentrating on pursuit aircraft lined up in tight formations on the tarmac to prevent ground-based sabotage. Low, dense smoke from the fires concealed a group of P-36s parked at the far west end of the flight line and spared them from destruction by the Japanese (Arakaki 1991, 115).

After the first wave of the attack had passed, numerous casualties and dead were found in the wreckage of the enlisted tent area near the flight line. Soldiers at Wheeler moved about the burning aircraft wreckage, attempting to pull planes out of burning hangars and to separate relatively undamaged aircraft from burning ones. This was made difficult because many otherwise intact aircraft had flat tires from the strafing and bomb fragments. Preparing a defense was hampered because most of the ready ammunition was in a flaming hangar and began exploding. At least one .50 caliber machine gun was set up to defend the airfield near the armament shop (Arakaki 1991, 125).

A P-40 aircraft was observed in a dogfight with a Japanese plane above Wheeler. When the enemy plane crashed to the ground in a pillar of smoke, a cheer went up from soldiers all around the base. This was likely one of the aircraft downed by Army aviator Welch, who had initially taken off from Haleiwa Field about 8:20. Shortly after, another Japanese plane was shot down, crashing near the front gate to another round of cheers (Arakaki 1991, 125). Soon after the two Japanese planes came down, one of the US B-17 bombers arriving from California flew over in an attempt to land at Wheeler. It was fired upon by GIs, but made a successful landing among the wreckage strewn about the runway.

Some Japanese Zeros and Vals at Wheeler Field made four or five strafing runs, but no attacking aircraft was shot down there (Prange 1981, 523). Casualties at Wheeler Field were 33 dead and 75 wounded, many occurring in a tent housing area that was set up near the flight line between Hangars 1 & 2. Almost half of the 87 P-40 aircraft stationed at Wheeler were destroyed on the ground. Smoke rising from burning hangars partially concealed most of the 39 older P-36s from the attacking pilots, and few were destroyed. The flight line, including Hangar 3, was severely damaged. Today Wheeler Field is a National Historic Landmark.

Haleiwa Field

Haleiwa Field was only lightly damaged by the two waves of attacking Japanese and was able to put up several aircraft in defense. Perhaps because it was only an unpaved landing strip (Goldstien 1991, 30) and did not have air units permanently stationed there, Haleiwa received only a light strafing at 8:30 that damaged a P-36, despite the first group of Zeros and Vals flying almost directly over it on their way to Wheeler and Pearl Harbor. Haleiwa Field in 1941 was an unpaved strip. The week before the Japanese attack, the 47th pursuit squadron from Wheeler was temporarily posted there for training. On the morning of December 7, two P-40 pilots, Lieutenants George S. Welch and Kenneth M. Taylor were at Wheeler. They called Haleiwa to have their planes readied for take off and sped northward in an automobile, getting airborne at about 8:20 with only their .30 caliber machine guns operational. They flew to Wheeler first, but the first wave of attacking Japanese aircraft had already departed and they were sent to Ewa Field. About 8:50 three more pilots took off from Haleiwa. Lieutenant John Dains in a P-40 and Lieutenants Robert Rodgers and Harry Brown in P-36s. Shortly after that another pilot, Lieutenant John Webster, was airborne from Haleiwa in a P-36. Rodgers and Brown attacked a group of Japanese planes that were heading north and then flew to Kaena Point. Dains got in a fight, was hit, and returned to Haleiwa before taking off again. Webster flew to Kaena Point, met Rodgers and Brown and attacked loitering Japanese aircraft there. When the Japanese departed for the carriers, the airmen flew back to Haleiwa, Rogers and Brown in damaged aircraft.

Welch and Taylor each shot down two Japanese aircraft at Ewa before returning to Wheeler Field to rearm and refuel. Upon take off at about 9:00am Taylor was hit and forced back to Wheeler. Welch shot down two more Japanese planes before landing again at Wheeler. One of his kills was the plane that had attacked Taylor. It went down between Wheeler and Haleiwa. At about 9:30 am Welch, along with Dains, took off from Wheeler once again. They found no targets and were fired upon by US ground forces when they returned to Wheeler. Dains was killed when he crash landed at a nearby golf course.

Bellows Field

At the time of the December 7, 1941 Japanese attack on Pearl Harbor, an Army Air Corps pursuit squadron was on the ground at Bellows Field, sent there from Wheeler Field in order to participate in gunnery practice during the previous week. Despite the twelve P-40s at Bellows that morning, because the training exercise had ended, there were only three pilots there. At the time of the attack there did not appear to be any intention on the part of the Japanese to deploy any aircraft to attack Bellows Field. At about 8:10 a call came in from Hickam asking for a fire truck, which was quickly sent off. One Japanese fighter diverted from the attack of Kaneohe NAS and strafed Bellows around 8:30 am, about 35 minutes after the attack on Pearl Harbor had begun, injuring one man on the ground. This obviously alerted the squadron at Bellows, who began to draw personal weapons and get their aircraft ready to engage the Japanese.

In the meantime a flight of 12 United States B-17 bombers made landfall over Oahu after a long flight from the mainland. Finding Pearl Harbor and Hickam Air Field (their planned landing spot) under heavy attack, making landing there problematic, the bombers dispersed to land at various

fields around Oahu. Eight were able to land at Hickam, two landed at the airfield at Haleiwa, one landed on a golf course at the northern tip of Oahu, and one B-17 flew to Bellows Field to land.

The B-17 bomber flying toward Bellows probably attracted the attention of the second wave of Japanese attack aircraft descending upon Oahu. This wave of attackers was flying in from the north along the east side of Oahu to strike. Japanese fighters followed the B-17 to Bellows and at about 9:00 am opened fire on the bomber as well as the P-40 aircraft that were just taking off. One P-40 pilot was killed on the ground at Bellows Field as he was climbing into his fighter. Another pilot taxied his aircraft as it was still being loaded with ammunition and was immediately targeted by the Japanese and hit by their gunfire, crashing on takeoff. The third pilot at Bellows got airborne but was shot down about a half mile offshore.

The B-17 that approached Bellows had been the last in line to attempt a landing at Hickam Field under the guns of the Japanese. This B-17 received volumes of fire from the Zeros, with three crew members badly wounded and wing ailerons crippled. Without landing there, the bomber left Hickam at full speed heading east along the coast. On its approach at Bellows, a P-40 taxied by a crew chief went across the runway in its path and the bomber was forced to pull up for a second landing attempt. No one at Bellows knew of the arrival of the group of B-17s from the mainland and all on the ground were shocked to see the huge aircraft coming in trailing smoke. The runway at Bellows was too short to successfully land the B-17, so all were expecting a crash landing. The bomber, landing gear down, touched down near the midpoint of the runway. The pilot, aware that he would run out of strip, retracted the gear and slid the plane off the end of the runway.

On landing the B-17 crew removed the bombsight from the aircraft so that it would not be taken if the Japanese invaded. In 1941 the Norden bombsight was still considered a top secret and steps were taken to guard it. The sight was not loaded into aircraft until just before a mission and crews operating it were under oath to protect it with their lives if necessary.

After the attack of the Zeros that followed the B-17 in, at least one Bellows pilot got airborne in his O-47 observation aircraft. The pilot had no ammunition in the planes two .30 caliber machine guns, he was just instructed to get the plane airborne and fly at treetop level to attempt to save it from destruction by the Japanese (LaForte 1991, 285-86). During the fighter attack, an aerial gunner from another O-47 was able to get a flexible mount machine gun into action in the rear cockpit of the observation squadron commander's grounded O-47 and fire about 450 rounds at the attackers.

At Bellows, 2 airmen were killed. The post had few permanent buildings, but a gasoline truck and several of the 12 P-40s deployed there were destroyed.

Kaneohe

Kaneohe was a basing area for Navy scout aircraft. These would be capable of mounting a search for the Japanese aircraft carriers after the attack if they were not put out of action. For the safety of the carrier force, Kaneohe was a target location for the Japanese attack aircraft.

The Japanese attack on Kaneohe Naval Air Station began with Zeros strafing the airfield shortly after 7:45 am. Incendiary rounds in the fighters' machine guns and cannon set parked aircraft afire. Kaneohe was home to about 36 aircraft, mostly PBY (flying boat) patrol craft. Because of the fear of sabotage of the aircraft, many were parked together on the seaplane ramps. Four were moored in the harbor near the ramps, and four were in hangar 1. The first group of attackers destroyed the moored aircraft. A second group of Japanese planes arrived at about 8:15 and a third group at about 9:00 that dropped bombs. This third group was the Kate level bombers of the (second) Japanese attack wave. The Kates dropped their ordnance on the base, destroying Hangar 1. Thirty-three US aircraft were destroyed at Kaneohe, the station's remaining three PBYs that were out on patrol at the time of the attack survived. Eighteen Navy personnel were killed. The destruction of an aircraft hangar there and the majority of the station's aircraft put a halt to effective air operations from Kaneohe. "The Japanese attack on Kaneohe could hardly have been more successful" (Slackman 1009, 145). "Kaneohe was in even worse shape proportionately than Ford Island" (Prange 1981, 519).

Although no aircraft were able to take off from Kaneohe, dogfights occurred overhead with the four Army Air Corps pilots from Wheeler in P-36 aircraft. Arriving from Wheeler at a high altitude of about 11,000', the group spotted nine Japanese Zeros at about 5,500' above Kaneohe Bay and dove on them. The P-36s scored two quick kills on their surprise attack before the Zeros could retaliate. When they did, the outclassed US aircraft were no match. A Zero quickly got on the six of one P-36 and smoked it. One of the US pilot's guns jammed but a third Japanese plane was downed in the fracas before the surviving P-36s left the area for Wheeler, two of them damaged. Arriving at Wheeler, the three planes were targeted by antiaircraft fire, but somehow landed safely.

On the ground at Kaneohe, the initial fighter attacks were directed at "planes on the ground, in the water, and at the hangar. But there was some strafing of cars and quarters incident to the main attack" (McGinnis 1942, 2). Ground personnel began to put machine guns into action at the outset, managing to send up antiaircraft fire during the first wave of the attack. Sailors that tried to save parked planes came under heavy strafing fire and autos driving into the hangar area also took fire from the Japanese.

The Kates dropped bombs from about 1,000' to 1,500' altitude, hitting Hangar 1 with two bombs and narrowly missing with two. The Kates caused heavy casualties due to the number of men inside the hangar retrieving ammunition. Some bombs from the Kates detonated on the concrete aircraft parking area between the hangars and the bay (McGinnis 1942, 2).

Station personnel that had set up machine gun antiaircraft positions directly in line with the attackers and with little cover suffered casualties that could have been prevented if they had been more conservative. However this "reckless resistance" is credited with downing at least two Japanese planes and damaging several more. The two downed aircraft were part of a late strafing attack that descended on Kaneohe at about 10:00 am (McGinnis 1942, 2).

The after action report for Kaneohe Patrol wing One states "All bombsights have been accounted for and are in good condition because they were stored in the Bombsight Vault which was not attacked" (McGinnis 1942, 3)

Patrol Squadron Eleven at Kaneohe was evidently more conservative in its placement of anti-aircraft positions after the attack began. "A machine gun nest...was set up in a grove of scrub trees near the south end of the hangar and another nest of two guns was set up in a semi-protected spot near the south end of the hangar" (Jones n.d. [ca. 1941]). Today Kaneohe is a National Historic Landmark.

Anti-Aircraft Defenses on Oahu

"The Army's coastal artillery units assigned to anti-aircraft defense were for the most part unable to ready their equipment in time to respond to the attack"
(Slackman 1990, 143).

Anti-aircraft protection of Pearl Harbor was the responsibility of the Army, to be undertaken using fighter aircraft and anti-aircraft guns (Bloch 1940). The main focus of Coast Artillery on Oahu was protecting Pearl Harbor and a large portion of the Coast Artillery batteries on Oahu were sited on its south shore. Anti-aircraft guns were associated with many of these Coast Artillery batteries.

Anti-aircraft batteries manned by Coast Artillery units were set up to either defend the large (anti-ship) guns of Coast Artillery batteries (Gaines 2001, 40) or to defend an area of Oahu, such as Honolulu Harbor area of Pearl Harbor-Hickam Field-Fort Kamehameha area (Gaines 2001, 41-42). While anti-aircraft defense was recognized as important for Oahu, much of its planned strength was in mobile units that would be rolled out and emplaced in established positions when an attack was thought to be eminent. "While it became standard for the AA regiments to deploy into the field on a regular basis in the last half of 1941, they did so without ammunition and frequently had to remain on roads adjacent to their actual positions in the agricultural fields" (Gaines 2001, 42-43). On the morning of December 7, 1941 several mobile batteries (with 3" guns) were set up and ready to fire between 10 and 11 am. One mobile battery was ready at Fort Weaver at 11:45 am. .30 cal. machine gun units and fixed 3" guns at Fort Weaver were quickly readied and began engaging the attacking aircraft at 8:14 and 8:30 am (Gaines 2001, 46). Another cadre of men at a fixed battery at Fort Barrette opened fire with small arms before the battery was ready to fire (Gaines 2001, 46).

A regiment of Coast Artillery at Camp Malakole, near Barber's Point, had moved into their positions at West Loch and near Ewa and were ready to fire at 11:45 am. Guards at Camp Malakole had shot down a strafing Japanese plane at about 8:05 am with small arms fire (Gaines 2001, 47). The Navy's Fleet Machine Gun Training School at Fort Weaver began firing machine guns and 20mm cannon at 8:10 and are credited with downing four Japanese aircraft. A fixed 3" battery at Sand Island began firing at 8:15 and downed two planes. Fixed 3" positions at Fort Derussy, Fort Ruger, and Black Point were ready to fire during the attack, but no aircraft came within range (Gaines 2001, 48).

When the Japanese attack started, the Army Coast Artillery anti-aircraft gunners had problems similar to the Navy and Marine Corps personnel: most all ammunition was secured under lock, and the light guns (and mobile guns) were not mounted. It generally took from 30 minutes to

one hour to get light anti-aircraft guns ready. Most of these were at the Coast Artillery posts, which were not near enough to the Japanese target areas to be able to hit any attacking aircraft.

In early 1941 there were 26 fixed 3" anti-aircraft guns and 44 mobile 3" guns on Oahu, with an additional 24 more expected to be received during that year (Bloch 1940). The south shore of Oahu had a dense concentration of Coast Artillery batteries to protect Pearl Harbor and Honolulu Harbor. Several of these, including Battery Closson (Ahuia Point), Williston (Puuloa), and Hatch (Puu Kapolei, 1½ mi. northwest of Ewa Field) had associated 3" anti-aircraft gun positions. Some of these 3" guns were in action for the second wave of the Japanese attack, but they were too poorly located to hit the attacking aircraft. "Army anti-aircraft batteries ... failed to provide any meaningful protection to the naval fleet or airfields" (Williford 2003, 38).

There were also mobile 3" and 37mm anti-aircraft weapons available on Oahu at the time of the attack. These would have had the same problems getting into action as other weapons, and few were firing by the end of the Japanese attack.

After the attack, maps that were found on the bodies of downed Japanese aviators showed that the attackers had a very accurate picture of the location of US gun batteries on Oahu (Williford 2003, 40). This indicates that the Japanese would have planned their attack routes and their departure rendezvous point to avoid any areas with a high concentration of fixed guns, such as the south shore of Oahu from Puuloa to Diamond Head. Avoidance of anti-aircraft defenses might have been a Japanese strategy, but eliminating them certainly was not. The Japanese "made no attempt to knock out Army installations except those connected with air power" (Prange 1981, 526).

2.2: Ewa Field World War II Development

Aviation Features

This pre-attack airfield (as described above) was greatly enlarged by June 1942, primarily by extending the southeast (to later become runway 29) and southwest (runway 3) runways and by constructing 2 additional runways. The first of these added runways (runway 8/26) connected the two southern runways at their ends and the second (runway 35/17) was perpendicular to the first, extending north from the east end of the first added runway to join with the end of the northeast runway. A section of pavement extended south along most of the edge of runway 3 as a taxi strip. A short extension of the northeast runway (later named runway 21) was also added. These additions to the airfield were undertaken because it was decided that an expansion of Ewa Field to satisfy early wartime needs could be accomplished faster than the completion of the new airfield at Barbers Point that had been started in November 1941.

By about 1944 more pavement was added to the airstrip, including eastward extensions of runways 26 & 89, a long taxi strip along runway 3/21, and a taxi strip and warm up platform along the south edge of runway 8/26. See Figure 4. By the end of World War II another paved area had been laid to the west of the airfield that served a complex of hangars, shops, and storehouses. This paved area was oriented north-south and was connected to the southwest end of runway 3.

Buildings and Structures

During the war, Ewa Field underwent a huge building program that formed it into the largest installation for Marines in the Pacific, west of the US mainland. By January 1945, there were hundreds of buildings and structures at Ewa Field which supported its mission as a staging field for aircraft bound for the Pacific theater. These buildings and structures were sited around the expanded airfield. By the end of World War II the area of the installation north of the airfield that had been the focus of structures at the time of the Japanese attack had been filled in with additional barracks and other housing. Congestion in this area resulted in subsequent construction being carried out in dispersed areas south and east of the airfield (CPNAB n.d., A-980). By the end of the war, these areas were augmented by construction on the west side of the airfield. The mooring mast was removed after the attack; by June 1942 it had been taken down.

The area south of the airfield, between present day Bismark Sea Road (formerly Elrod Road) on the north and San Juacinto/ Essex Road (formerly South Hanson Road) on the south, was filled with buildings and structures to support the aircraft and crews visiting the installation as well as the resident staff. There were two large housing areas with laundry facilities, tennis courts, a driving range and a skeet range. Another large area contained 75 aircraft revetments, and an additional area held administrative and support buildings such as mess and galley buildings, ice cream plant, gas station, theater, and post office. By the end of the war, in the area south of the airfield, there were over 150 administration and support buildings and structures (including the revetments) and a large number of housing buildings.

The builders attempted to use an innovative construction technique when they built the 75 dome-shaped aircraft revetments, but the technique had to be abandoned after the first attempt.

"The first revetment was constructed with an inflated-bag-type form, made locally from materials available; it was hoped that this type of form would expedite construction. The form was found impractical; a sufficiently air-tight bag could not be made from the materials locally available. The remaining 74 revetments were poured over a rigid form so made that it could be easily collapsed, and moved from one location to another. It was found that these collapsible forms could be re-used from ten to twelve times" (CPNAB n.d., A-989).

The group of buildings (about 45 buildings) that were constructed west of the airfield appears to have as a primary function the storage and distribution of supplies. Constructed in this area were numerous storehouses for various types of equipment and supplies (aircraft parts, paint, cold storage, subsistence, furniture), an air freight office and inspection building, a hangar, link trainer building, paint shop, aircraft utility shop, and officers ready room. These buildings were centered around the large north/ south-oriented paved area for aircraft that was added west of the airstrip. The hangar (current Bldg. 1146), air freight office and inspection building (current Bldg. 1562), and a general storehouse (current Bldg. 1570) were sited on the edge of this paved area.

East of the airfield, North Hanson Road (current Roosevelt Ave.) and Geiger Road were re-aligned and a cluster of buildings and a station entry constructed there. These included barracks and housing, mess hall, administration, sentry house, post office, and dispensary. Inside the station entry, East Hanson Road was built and a short distance southward along this road another cluster of housing buildings (officer's housing) and an officer's club were built.

The buildup of Ewa Field during World War II was rushed immediately after the December 7 Japanese attack by workers brought from adjacent Barber's Point Naval Air Station, where construction had been started the previous month. "All civilian forces in that portion of the island concentrated on completing the authorized facilities [at Ewa Field]. One runway was brought to usable completion in less than two months; buildings were hastily erected, and splinter-proofing of power transformers and other vital installations was rushed" (US Navy Bureau of Yards and Docks Vol. II 1947, 144).

"Immediately following the 'blitz' [Japanese attack of December 7, 1941] it [was] reported that many buildings were erected without plans, on the verbal orders of the CinC." "At this station the chief criterion was emergency construction of the cheapest and quickest sort. The original plan before – and even immediately after – the 'blitz' 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" (CPNAB n.d., A-978).

"For some time after 7 Dec 41, all the contractors' forces at Ewa concentrated on completing the facilities authorized, and on making this field more useable, less vulnerable (CPNAB n.d., A-986).

On April 1, 1943 construction work was turned over to the Navy Seabees from civilian CPNAB contractors. The Seabees built gasoline pipelines, Quonset huts and wood frame housing, workshops, storage and administration buildings. They also built the large north/ south oriented paved aircraft area to the west of the airfield. On February 28, 1945, construction work was turned back over to civilian contractors.

Circulation Features

During the war, numerous roads were added to access the newly built-up areas. The re-alignment of Geiger Road at the east end of the station divided the west bound traffic there to either East Hanson Road or North Hanson Road (current Roosevelt Av.). East Hanson extended south to the administration buildings, revetments, and housing that was constructed south of the airstrip. North Hanson Road provided access to the main gate (at Philippine Sea Road, formerly Fleming Road) and to Barber's Point further west. The area of barracks and administration buildings north of the airstrip had streets in an irregular grid pattern that was oriented slightly west of north.

Vegetation

Cleared areas for the runway extensions and for additional wartime building thinned or removed large areas of trees and brush to the south, east, and west of the airfield. "Topsoil in which to cultivate grass and flowers was at a premium. Since it had to be hauled from other parts of the island, and spread over the coral, the station's earth pile became a zealously guarded institution (14th ND 1944, 78). By the end of the war, some landscaping had filled in the grubbed earth of the construction areas and replaced the "blasting and digging" of 1942-43 (14th ND 1944, 90). A "well grassed traffic oval near the main gate (where the West Loch-Barber's Point Road entered the station)" was present in 1944 (14th ND 1944, 93). This would have been at Geiger Road, at the east end of the station.



Figure 3. Photo dated May 26, 1945 showing WW II built-out configuration of Ewa Field. North at top. Photo in MAI archives, from Barbers Point Public Affairs Office.

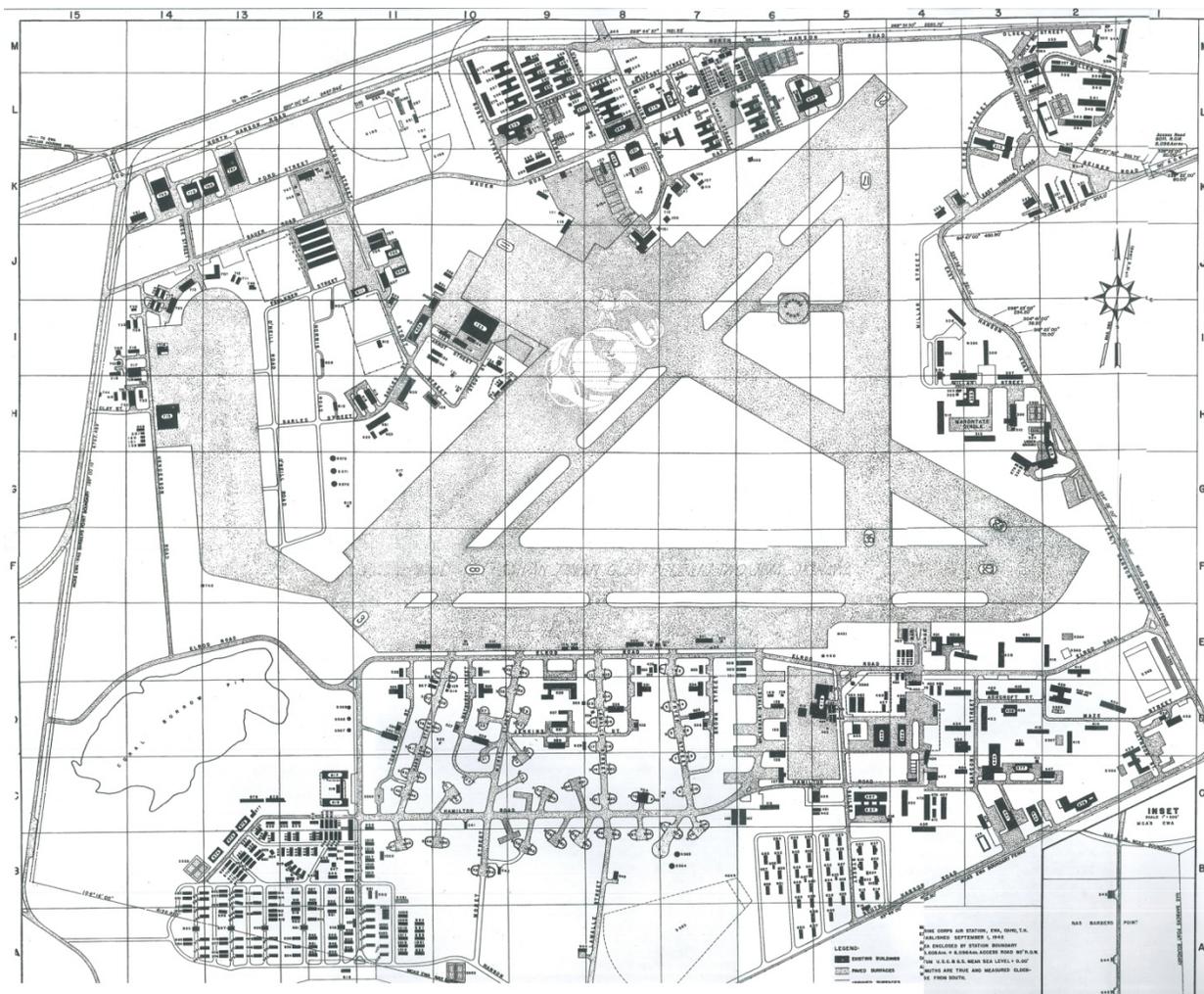


Figure 4. Map dated June 1948 showing the configuration of Ewa Field. Map OA-N1-1658 from MAI archives.

2.3: Ewa Field Post-WW II Development

After the war, Ewa Field was incorporated into NAS Barbers Point. The configuration of Ewa Field at the end of the war was relatively unchanged through 1951. By that year, the runways of Ewa Field were closed.

Aviation Features

No aviation features were added during the post WW II period.

Buildings and Structures

With the incorporation of Ewa Field into the Barber's Point NAS, some Cold War activities were carried out at Ewa in newly constructed facilities in the north area. From Facility 972 (1958) a portion of the DEW (Distant Early Warning) line was controlled. It also operated as the headquarters building for anti-submarine patrol flights taking off from Barber's Point airfield. Buildings 1768 and 1767 were associated with the SOSUS system of underwater listening posts, probably the ca. 1960s arrays off the coast of Japan.

By 1962, large areas of buildings were demolished, including the administration and housing areas south of the airfield, and the numerous H shaped barracks in the north area.

Circulation Features

Many roads at the south portion of Ewa Field appear to have been unused or abandoned by 1962. At the area north of the airfield, this appears to have occurred to a lesser degree, probably because of the limited use of this area as part of Barber's Point NAS.

Vegetation

As buildings and structures were vacated and demolished, vegetation grew between buildings and on the sites of former buildings. Trees and brush encroached onto the macadam runways, taxiways, and aprons and grew up in the open spaces between them.

2.4: Existing Conditions Inventory

(For a listing of structures, including photos, see the appendix)

Aviation Features

The concrete aircraft warm up platform, macadam runways and parking apron are the only surviving features identified during the inventory as being present at the time of the December 7 attack.

The airfield at Ewa Field was very lightly constructed with a relatively thin layer of macadam paving (typically between 2" to 3" thick) over a base of crushed coral. This light construction is visible in the numerous places where trees have grown up through the runways and taxi strips, fracturing the paving to reveal its thickness and the substrate below. In many of the areas where trees have densely overgrown the airstrip, the macadam paving is covered with a thin layer of soil and fine gravel that conceals any evidence of the macadam beneath it. The soil cover in these densely overgrown areas also conceals the fractured macadam at the base of the trees. In other areas of macadam runway the paving is visible between the underbrush and trees. Here the fractures are more evident and the thickness of the paving can be observed. At the southwest area of the airfield, the ghost remains of large numerals and markings were observed on areas macadam pavement during the fieldwork for this report. A large "3" and a large "8" are located at the ends of these runways. In addition a large "X" with the partial remains of smaller lettering that indicated "field closed" are still extant here.

An exception to the typical light macadam construction of the runways is the large aircraft warm-up platform that was constructed of poured concrete. This approximate 300' x 960' area was built in 1941 of 20' square slabs that have proven resistant to the vegetation that has degraded the macadam portions of the airfield. There is some ruderal (herbaceous and grass) vegetation growing in the joints between the slabs. At the center of each slab is a recessed aircraft tie-down ring (also called "mooring eyes" on some historic maps). Aircraft tie-downs at 20' square spacing are also located on runway 11 and also at the ca. 1944 paved aircraft area adjacent to hangar Facility 1146 at the west end of the installation.

The concrete slabs of the aircraft warm-up platform contain concentrations of what appear to be bullet marks from Japanese 7.7mm machine guns, fired from the attacking aircraft during

strafing runs on December 7. Typically these strafing marks are concentrated in tight groups, indicating that the Japanese pilots trained their guns on parked aircraft. Several of these strafing mark groups show a high degree of spalling of the concrete between bullet impact marks.

Several areas of strafing mark groups have craters in the concrete much larger than that made from the 7.7mm bullets of the Japanese machine guns. These craters are of variable width, from about 4" to about 12" across and about 2½" deep, and may have been made by the projectile of a 20mm cannon from a Japanese Mitsubishi A6M "Zero" fighter. This aircraft had 2- 20mm cannons (Oerlikon Type FF cannons firing 20x72rb cartridge) mounted in the wings along with 2- 7.7mm machine guns in the fuselage.

A record of this damage (possible bullet marks and spalling) to the concrete aircraft warm-up platform was made during the fieldwork for this report and is included in Appendix A of this report.

Also of note on the concrete surface of the warm up platform is a large concrete patch in the southwest portion. This irregularly shaped patched area, about 11' wide at its widest, may be a bomb strike. However, it does not have the radial scarring around it that is visible in some other known bomb strikes, such as one at Kaneohe NAS.

The aircraft area adjacent to hangar Facility 1146 is completely overgrown with trees and other vegetation. This area is either asphalt or macadam like the other airstrips and taxiways and has been heavily fractured by tree roots. Near the center of this aircraft area, a series of aircraft tie downs are located. These tie downs are similar to others in the macadam runways, on a 20' square spacing, but here each tie down is set in a 2' square concrete pad. Just past the south edge of this aircraft area a small concrete building (Facility 1151, electrical switch house, is extant). This building dates to the construction during World War II.

Buildings and Structures

There are a number of features remaining from wartime and later including buildings and structures. At the south end of Ewa Field are the 75 covered aircraft revetments, built in 1943 of reinforced concrete. Four large, wood-framed warehouses and one smaller concrete warehouse that were constructed during the war are located at the northwest end of the Ewa Field property. There are also eight Quonset huts in this area, five of which are doubled 40' x 100' type. The remaining three Quonsets are single 40' x 100'. An aircraft hangar is located southwest of the Quonsets. Two other small concrete buildings, a former communications building and an electrical switch building, are near the runways.

Along Roosevelt Avenue near Philippine Sea Road are a long section of CMU wall, and a lava rock and concrete sign base. West of these, extending south from Roosevelt Avenue, is a section of abandoned railroad grade (ca. 1942) with the remains of wooden ties. At the south end of Philippine Sea Road is a section of concrete curbing, ca. 1944. A circular asphalt or macadam feature, built in the 1960s and possibly associated with an antenna, is located north of the concrete warm up platform. Just off the northeast runway, near the edge of the golf course, is the concrete pad of the ca. 1944 compass rose.

Throughout the property are the remains of concrete building foundations and former roadways. As noted in the previous section, the two areas that contain concentrations of extant buildings and structures are the revetment area at the south and the warehouse area at the northwest. Building foundations are concentrated in the areas of the installation north of the airstrips, between the aviation areas and Roosevelt Avenue. The area which in 1941 was a cluster of buildings today encompasses numerous remains of concrete foundations in the area of Philippine Sea Road (Fleming Road) and its cross streets. Occasionally, when a building foundation is located near a prominent landmark, such as the extant intersection of streets, it can be matched to a former building. Because of the density of the buildings during the heyday of the site, it can be difficult to determine if a foundation today corresponds to a specific missing building.

Besides concrete building foundations in the area north of the intersection of the airstrips, several other features were noted during the field work. An enlisted men's swimming pool (1948 Facility # S152) south of the intersection of Philippine Sea Road and Vinson was under construction on December 7, 1941, its site excavated and forms for the concrete work were assembled. The concrete rim and swimming ladders of this pool remain and the pool basin has been filled in with rock and soil. Just southeast of the swimming pool, along the edge of Philippine Sea Road near where it formerly curved west to extend to the warm up platform, is a section of cast concrete roadway curbing about 30' long. This curbing is formed into an irregular U shape and is cast with coral aggregate. It appears that this section of curb was located near the driveway entrance to the former fire station (Facility 141, built in 1944, no longer extant). Another feature is a 7' long 32" high lava rock and concrete mortar sign base that lies along the south edge of Roosevelt Avenue north of extant Facility 972. This sign base appears to date from the post-WW II era and was likely associated with Facility 972, built in 1958 as a headquarters building for Barbers Point Naval Air Station.

Farther east along the south edge of Roosevelt Avenue is a section of undulating CMU wall that is located just east of Ticonderoga Avenue. The extant portion of this wall is 182' long and 9'6" high. Originally, it extended further east and was about 300' long. It is shown on a 1948 map of Ewa Field and was probably built in conjunction with the 1942-1943 officers housing (now demolished) that was built behind it.

A short section of railroad grade with the remains of railroad ties in situ is found near Roosevelt Avenue a short distance west of Kasaan Bay Street, between it and the baseball fields. This section is oriented north-south and is the remains of a spur off the OR&L line that served Ewa Field. It is composed of an approximate 120' long portion of the elevated grade, built up with crushed coral about 3' higher than the surrounding terrain and about 10' wide. The wood ties are each 8' long and still in their original positions. All metal components of rails, spikes, etc. have been removed and the ties themselves are each deeply gouged out by fire

Near the eastern edge of Ewa Field, between the remains of runway 21 and the neighboring golf course, is a large compass rose. This compass rose, built during the ca. 1944 WW II expansion of Ewa Field, is formed on a 200' square concrete pad. It was formerly accessed by aircraft via driveways at its east and west ends that connected to north-south runway 17 (east end) and the taxiway along northeast-southwest runway 21 (west end). At the center of the compass rose is a 10' diameter circular concrete pad flush with the surface of the compass

rose. At the center of this 10' pad is a small raised circular concrete pad, 18" in diameter and 4" high with the remains of a non-ferrous metal pipe (approximately 1" diameter) at its center that is broken off flush with the top surface of the raised pad. Radiating out from the 10' diameter pad are the ghosts of 24 painted lines that formed the compass points of the rose. At about 17' radius from the center pipe the compass rose has two shallow incised concentric circles that extend around the rose, one about 5" wide and the other about 1" wide. At about 24' radius and 47'6" radius along each of the 24 radial ghost lines there are sections of non-ferrous pipe imbedded in the concrete of the compass rose and broken off flush with the surface. At about 59'6" radius along the 24 radial lines there are small holes in the concrete, but those that were not filled with vegetation during the field work showed no pipe remains. The radial lines of the compass rose are aligned to the points of the compass and the rose was used to calibrate the magnetic compass of aircraft. The aircraft would be taxied to the center of the rose and with its engine running would be rotated through the compass points of the rose to confirm or correct the compass readings in the aircraft. This procedure is called a compass swing.

Just north of the midpoint of runway 11, between it and Vinson Road, is a roughly circular feature about 200' in diameter and paved with asphalt or macadam. This feature can be dated from aerial photos in the Hawaii State Archives to between December 1962 and October 1968. In December 1962 the air strips were already unused, trees can be seen growing on the macadam runways. This feature has the remains of 60, regularly spaced, radial lines that extend out from its center. These lines are now indicated by a growth of shrubbery that sprouts from each. At the center of the feature is a square concrete pad, about 3' across and raised about 6" above the pavement. A short section of steel bolt protrudes from the center of the pad. At a radius of about 25' is a series of evenly spaced holes in the pavement, about 20' apart. These are lined with concrete and appear to have once held vertical 4"x4" posts. Although this feature has the appearance of a compass rose used to perform calibrations (compass swing) on aircraft, it is not likely that this was its function. It was constructed (post 1962) at a time when the runways were unused. In addition the steel component of the central pad would not have been used in constructing a compass rose used for calibrating the magnetic compass of an aircraft. It is possible that this feature is the remains of an antenna installation associated with Facility 972, across Vinson Road to the north.

The northwest portion of Ewa Field that contains Quonset huts, frame buildings, and a steel-framed hangar building primarily retains the original configuration of the principal buildings, with little building infill or removal of the larger buildings from the wartime plan. The exceptions to this are groups of smaller buildings at the southeast and southwest sides of the existing group that had aircraft functions. A number of buildings (approximately 25) were grouped south of the extant 5-Quonset grouping of Facilities 1144-1153, between this group and the now demolished hangar 123 at the edge of the concrete aircraft warm-up platform. A second group of small buildings was clustered west of extant hangar Facility 1146, between Cabot and Coral Sea Roads. These two groups contained buildings for; electrical and machine shops, wing shop, wing storage, paint shop, aviation gear, lumber storehouse, floatation shop, as well as support facilities such as snack bar, barber shop, and dispensary. Although these groups of small buildings are demolished, the larger more prominent buildings with storage functions remain.

The five Quonset huts in a group (Facilities # 1144, 1149, 1150, 1152, 1153) are each built of two 40' x 100' Quonset huts that are joined at the ends to form one 200' long building. These 5 Quonsets were originally general storehouses. A sign on Facility 1149 indicates that during the period when they were part of Barbers Point NAS, at least one of these facilities was used as a maintenance facility. The remaining 3 Quonset huts (Facilities 1545, 1562, 1570) are each single 40' x 100' Quonsets. Four of the 5 extant storehouses along Roosevelt Avenue (Facilities 1141, 1142, 1143, 1145) are tall gable roofed, wood framed buildings covered in board and batten siding. The fifth building (Facility 1147) is concrete, with a very low slope gable, almost flat, concrete roof.

Among the domed revetments at the southern portion of Ewa Field, all show typical radial impressions from the forms used in their construction except for Facility 1227, the most northeastern of the revetments. This revetment, labeled S2 on a 1948 map, shows a different pattern of impressions on its inner surface. It is surmised that this revetment is the first of the 75 constructed that was described as being built with an inflatable form that did not prove useable for the subsequent revetments. While all other revetments inspected show radial impressions from the form panels, this revetment shows a double line of form panels that bisect its ceiling from front to back. This line is intersected by two lines of panels at an angle that extend to the floor of the revetment. This revetment (1227) along with a large number of revetments at the east portion of the group (approx 20-25) are being used for stabling horses. The remainder of the revetments surveyed are unused. A National Register photo (#80-G-271041) dated April 1942 shows USMC F2A aircraft at Ewa Field in open topped revetments constructed of sandbags covered with concrete. It is commonly believed these sandbag revetments were located at the site of the concrete domed revetments, before they were built. This is not the case. A map dated 1943 (CPNAB A-975) shows additional small revetments in the area west of the Ewa Field airstrips. During the field work for this report numerous concrete fragments that were cast over fabric sandbags were noted in this area, indicating that this was the location of the ca. 1942 sandbagged revetments, which probably remained until the 1944 construction of the paved airfield extension that served hangar Facility 1146.

Circulation Features

Street alignments have shifted over time since the 1940s, and many of the roads in 1941 were unpaved construction routes that were ephemeral and have since disappeared. Since it went out of regular use, numerous informal dirt tracks have appeared through the installation. Some of these run partially on the alignments of former streets.

Vegetation

Trees and brush have overgrown almost all portions of Ewa Field. Two notable exceptions are the concrete warm up platform and the concrete WW II-era compass rose. The macadam of the runways, taxiways, and apron is much easier for vegetation to penetrate, and these areas are typically dense with vegetation. An area of runway #3, at its south end, has younger vegetation than is typical elsewhere, possibly because it was kept clear by radio-controlled aircraft hobbyists who used it until fairly recently.

2.4.1: THE NATIONAL REGISTER OF HISTORIC PLACES AND ITS REQUIREMENTS

The excerpt below from the National Park Service NR Bulletin #15 *How to Apply the National Register Criteria for Evaluation* explains the standards for evaluating the historic significance of resources.

Criteria for Evaluation

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

Criterion A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

Criterion B. That are associated with the lives of persons significant in our past; or

Criterion C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

Criterion D. That have yielded or may be likely to yield, information important in prehistory or history.

Criteria Considerations

Ordinarily cemeteries, birthplaces, graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years shall not be considered eligible for the National Register. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories:

a. A religious property deriving primary significance from architectural or artistic distinction or historical importance; or

b. A building or structure removed from its original location but which is primarily significant for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or

c. A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with his or her productive life; or

- d. A cemetery which derives its primary importance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events; or
- e. A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived; or
- f. A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance; or
- g. A property achieving significance within the past 50 years if it is of exceptional importance.

2.4.2: SIGNIFICANCE

In addition to the potentially significant properties and sites described in the Dec. 7 battlefield evaluation portions of this report, there are a number of properties dating from WW II and later that have potential National Register significance. These properties would be associated with the historic context of Ewa Field's support of the United States' war efforts in the Pacific or with the Cold War.

The 75 extant vaulted concrete aircraft revetments south of the airfield (ca. 1942-43) were declared potentially eligible in 1997 (IARII 1997, 134). These revetments are considered eligible for the National Register as a district for their association with the development of Ewa Field during World War II and for their type of construction.

Up until only a few years ago, Quonset huts were not evaluated by historic preservation inventories, due to a 1986 Programmatic Agreement (PA – amended in 1990) between the US Department of Defense (DoD) and the Advisory Council on Historic Preservation. Quonset huts, as a temporary building type of WW II, were covered under this agreement, which preserved and documented selected WW II temporary buildings (including Quonsets) and allowed for the demolition of the remainder.

In recent years, the surviving Quonsets have come to be seen as valuable components of WW II installations, due partially to the great numbers of Quonsets that have been demolished in the last 20 years. Surviving Quonsets are now given more importance by local and national preservation organizations (public and private), such as the National Park Service, National Conference of State Historic Preservation Officers, and the Advisory Council on Historic Preservation.

The surviving Quonsets huts at Ewa Field are evaluated here in light of this recent change in how Quonsets are viewed and are considered potentially eligible for the National Register.

Other structures at Ewa Field can be considered potentially eligible. A cluster of former warehouses at the corner of Coral Sea Road and Roosevelt Avenue could be eligible as a district or thematic grouping, and an aircraft hangar and compass rose have direct ties to the core aviation function of Ewa Field and are also potentially NR eligible.

Extant buildings that date from the Cold War period with important mission-related functions, such as patrolling, surveillance, and early warning are potentially eligible.

Potentially eligible properties should be examined closely to determine their proper boundaries. This is important because of the large amount of land contained within the confines of former Ewa Field, not all of which can be considered eligible.

2.4.3: EWA FIELD AIRCRAFT REVETMENT HISTORIC DISTRICT

The approximately 75 extant vaulted concrete aircraft revetments south of the airfield that were constructed ca. 1942-43 have been evaluated in previous studies and are considered eligible for the National Register as a district for their association with the development of Ewa Field during World War II. Although some of the revetments are currently used as horse stables, all aspects of their integrity are retained (setting is partially retained due to infill horse corrals and vegetation growth).

Approximate position of revetments

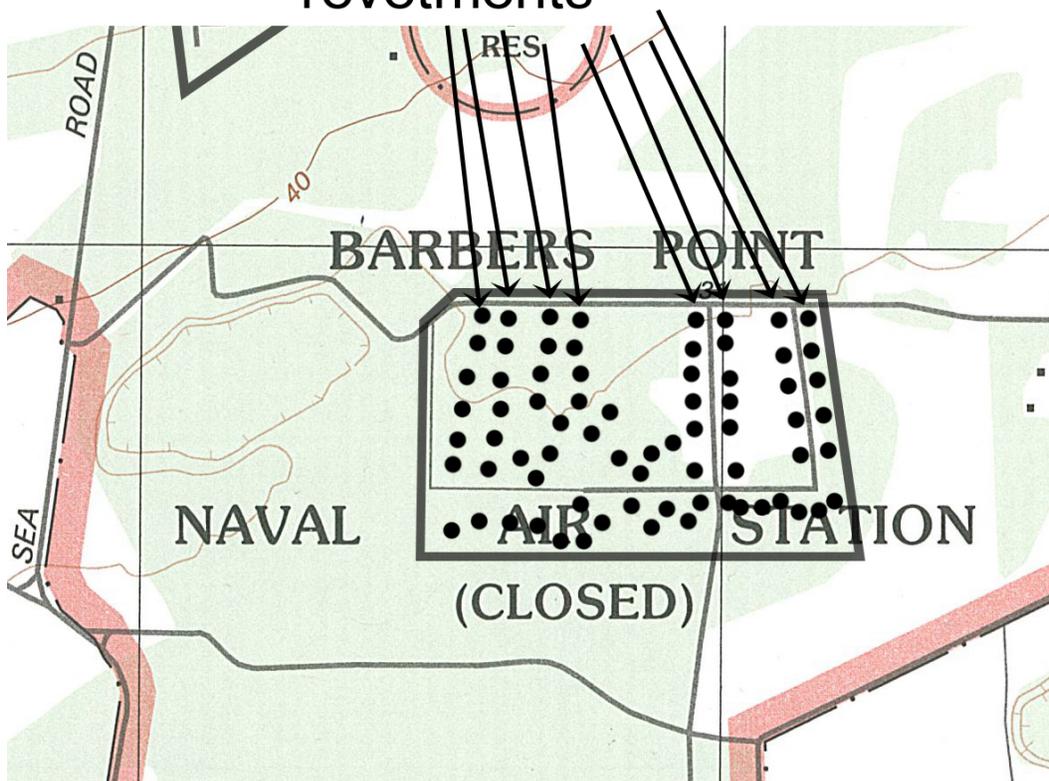


Figure 5. Location of proposed Ewa Field Aircraft Revetment Historic District. North at top.

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Photos and Maps (Ordered chronologically)

Photos M-62.5 & M-62.6, January 28, 1940. Aerial photos in the collection of the Hawaii State Archives, series Oahu USAAC 1939-41, in PPA-60-folder 2.

Map OA-N1-326, 14th Naval District Pearl Harbor , T.H., Ewa-Oahu-T.H. "Mooring Mast, Showing conditions on June 30, 1941." This map located in National Archives and Records Administration (NARA) file # RG71, 1404-3-89.

Photo September 4, 1941. This photo is located in NAVFAC Archives, Port Hueneme, CA, box TI 1/4, folder, "Pearl Harbor Oahu T.H. (Moanalua) aerial views.

Photo December 2, 1941. This aerial photo is located in NARA II RG71-CB "Oversize Box #146" it is photo #71-CB-33B-2.

Photo 38393 A.C., Apple Field, Oahu, T.H., 2 June 1942. This photo of Ewa Field is located in NARA 18-AA-214-1.

Map Southwest Quadrangle Oahu T.H. 1943, War Department U.S. Army Corps of Engineers War Department. This map available in the map collections at the University of Hawaii Manoa, and at the Hawaii State Library.

Map OA-N1-652, Marine Corps Air Station Ewa, Oahu, T.H., Warm Up Platform Runway Extension Taxi Ways & Taxi Strips, July 9, 1943. Available in the archives of Mason Architects, Inc., Honolulu.

Map OA-N1-1658, Marine Corps Air Station Ewa, Oahu, T.H. Showing conditions on June 30, 1948. Available in the archives of Mason Architects, Inc., Honolulu.

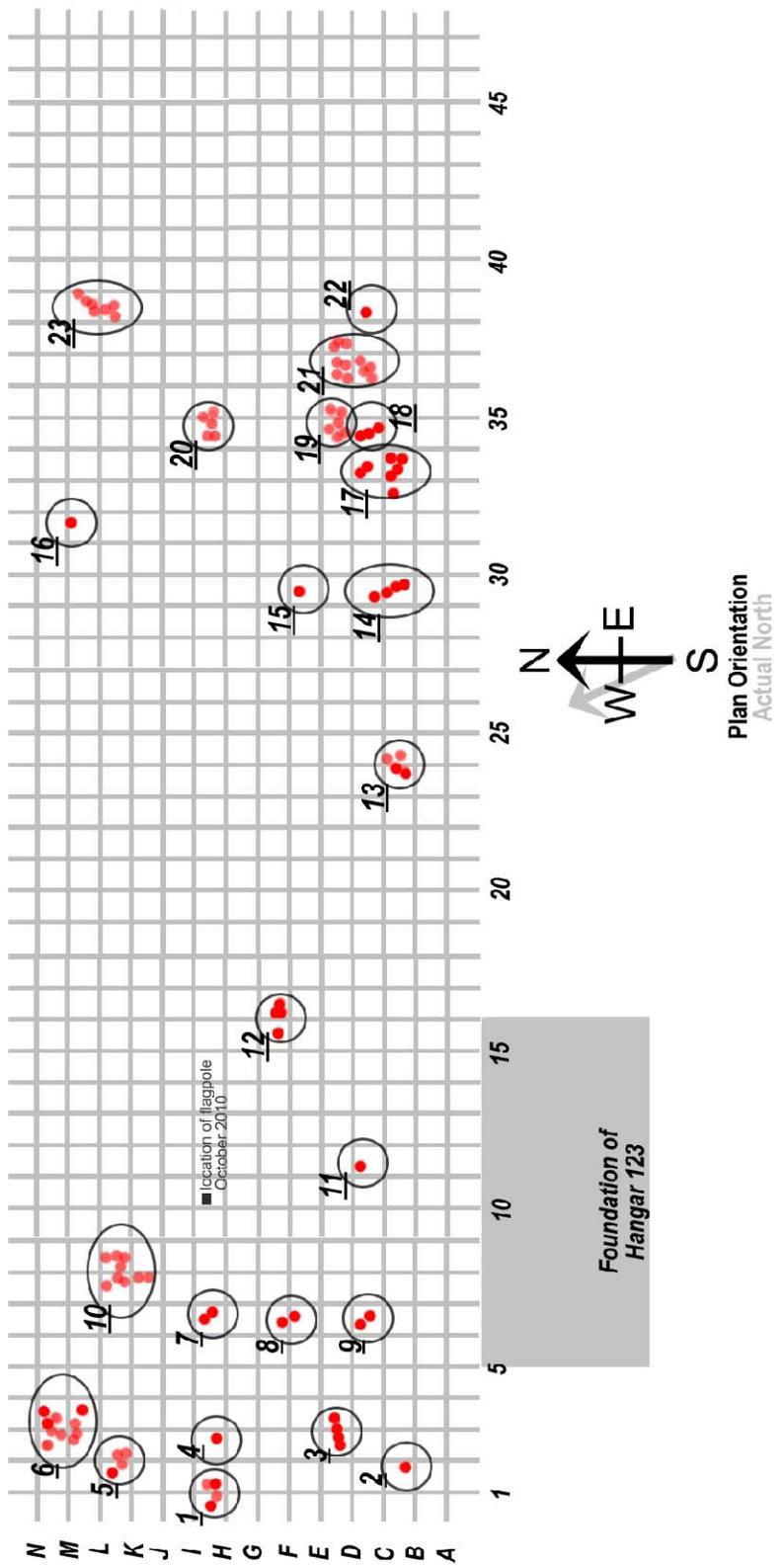
Appendix A: Catalog of damage to 300' x 960' concrete aircraft warm-up platform at Ewa Field.

There are at least 23 locations of damaged pavement on the 1941 aircraft warm-up platform that could have been caused by the guns of attacking Japanese aircraft during the December 7, 1941 attack. Most of these are single or grouped chips out of the concrete that appear to have been made by the 7.7mm machine guns or the 20mm cannon of the attacking aircraft. In many areas these marks are formed into tight groups that seem to indicate that the pilots firing the weapons were targeting parked aircraft on the concrete. Some of these groups have a heavy degree of spalling, much more than would be expected from the gunfire. This spalling is interpreted as being created from the extreme heat of a burning aircraft positioned above the area.

The 300' x 960' aircraft warm-up platform is composed of 20' square slabs of poured concrete with a recessed aircraft tie down in the center of each square slab.

The overview diagram of the damage shows a representation of the aircraft warm-up platform with its 20' square slabs numbered and lettered to form grid coordinates. The individual locations of the damage are indicated, circled, and numbered. The pages following the overview diagram show a more detailed sketch of each damaged area. All these individual sketches are oriented with plan north at the top of the sketch, and each represents one or more 20' square slabs and centered tie down, with damage shown in red. At the top of each individual sketch is the grid location nearest the damaged area and the orientation from the grid coordinate to the damage.

OVERVIEW DIAGRAM



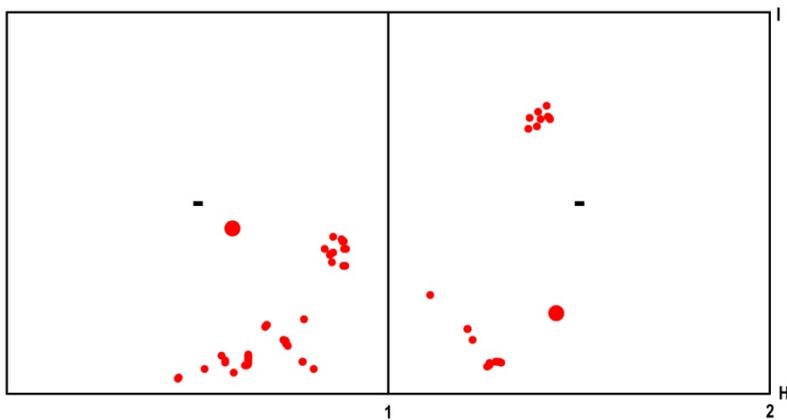
DAMAGE SKETCHES

Key for symbols used on numbered damage sketches

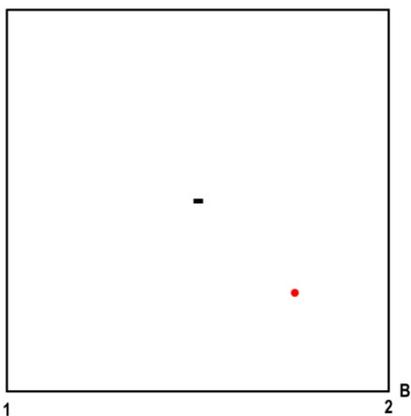
NOTE: All sketches have plan north at top.

-  = large impact mark
-  = small impact mark
-  = spalled area
-  = recessed aircraft tie down

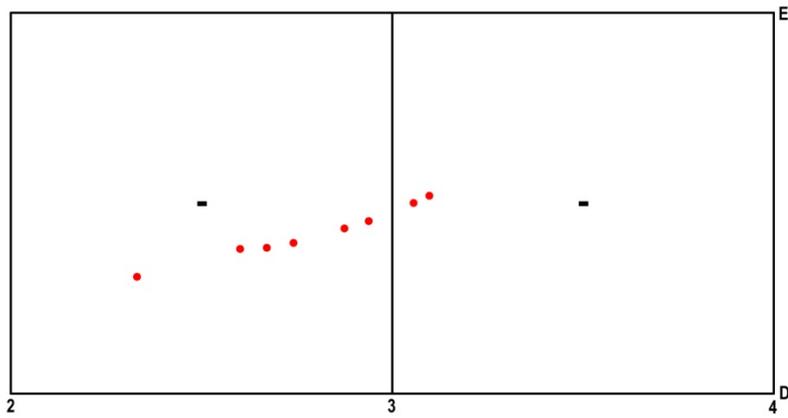
#1 - north of coordinate H1



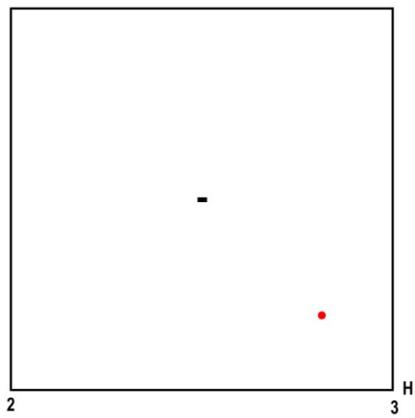
#2 - north of coordinate B2



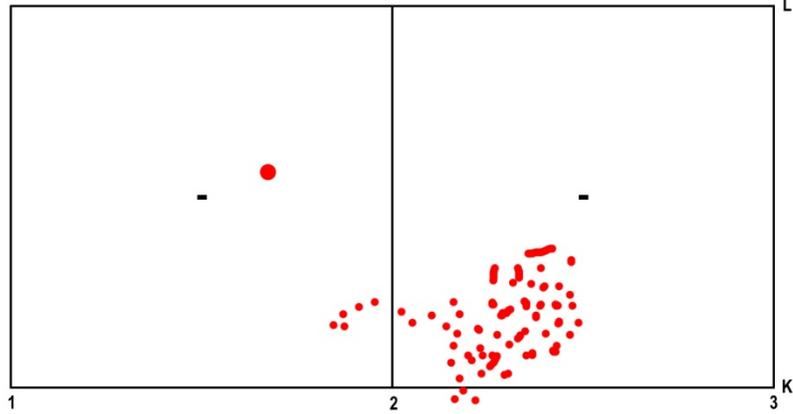
#3 - north of coordinate D3



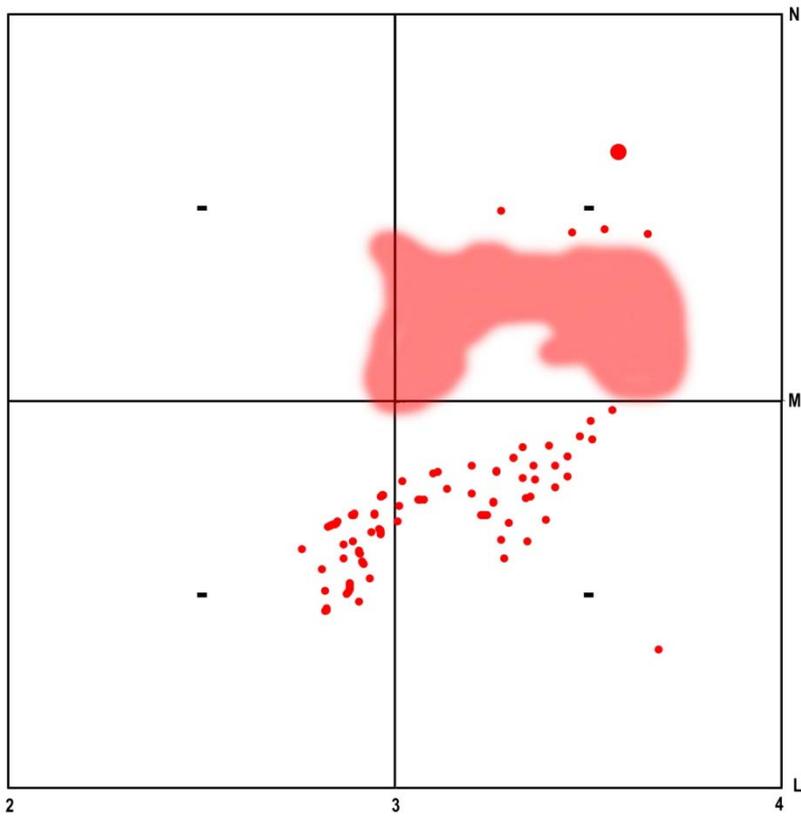
#4 - north of coordinate H3



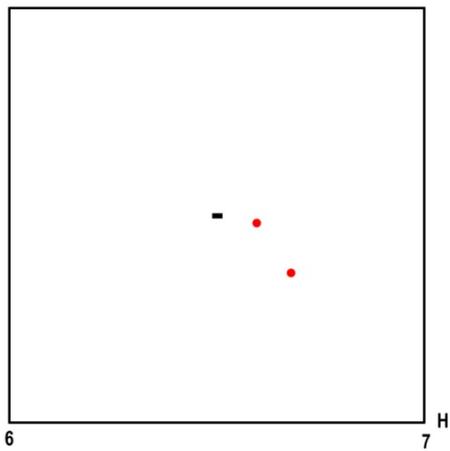
#5 - north of coordinate K2



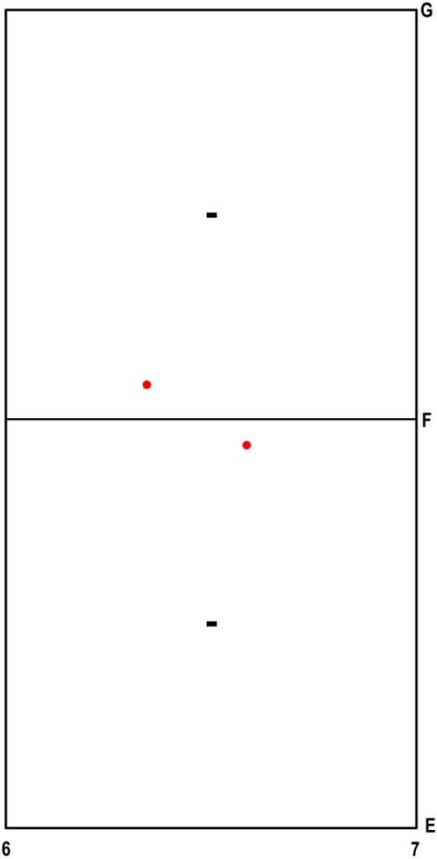
#6 - around coordinate M3



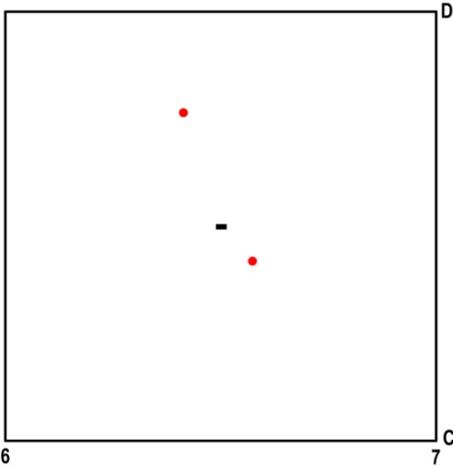
#7 - northwest of coordinate H7



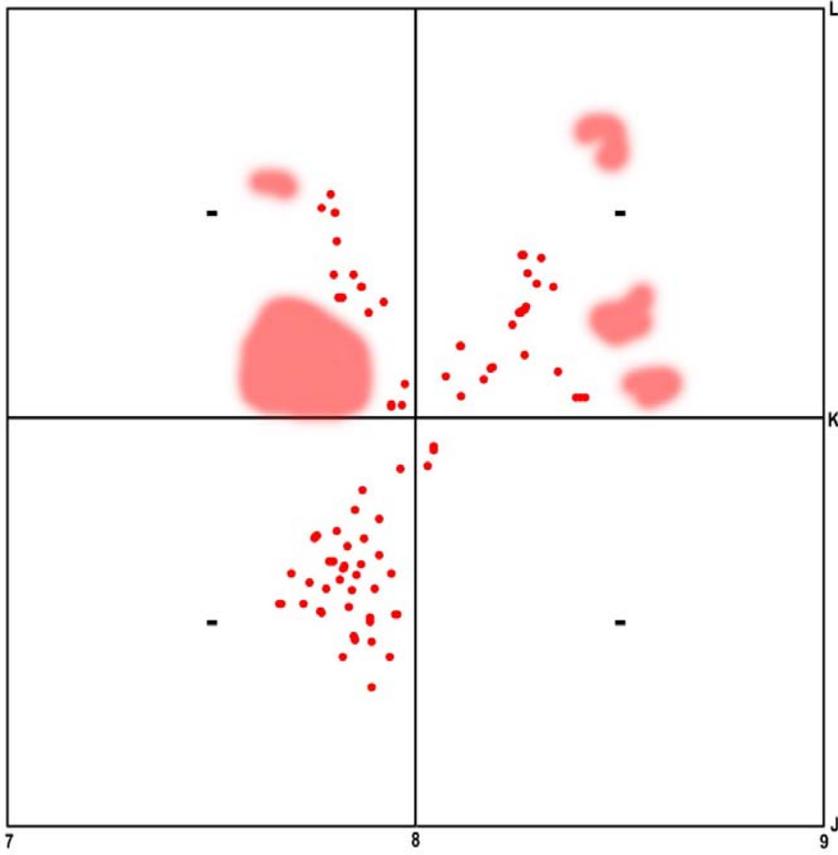
#8 - west of coordinate F7



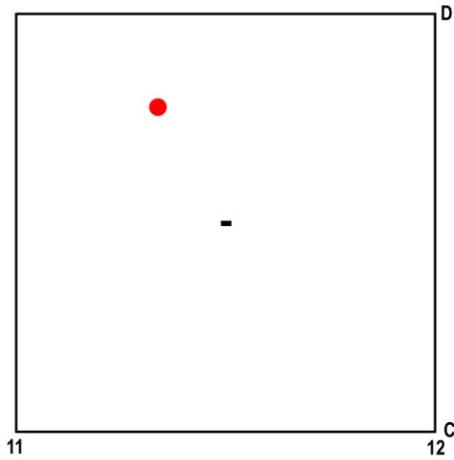
#9 - northwest of coordinate C7



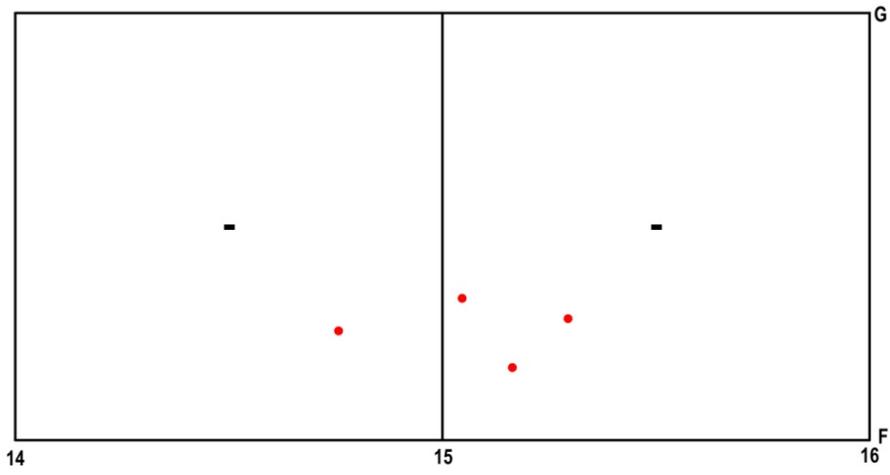
#10 - around coordinate K8



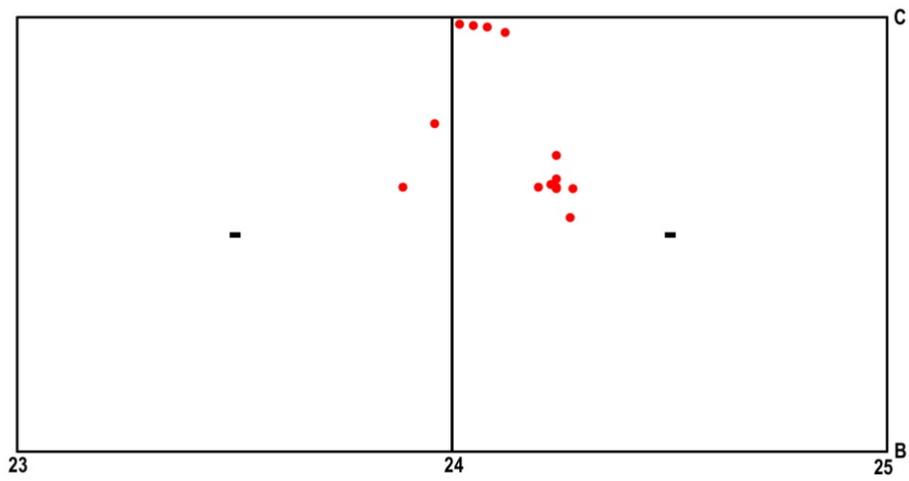
#11 - southeast of coordinate D11



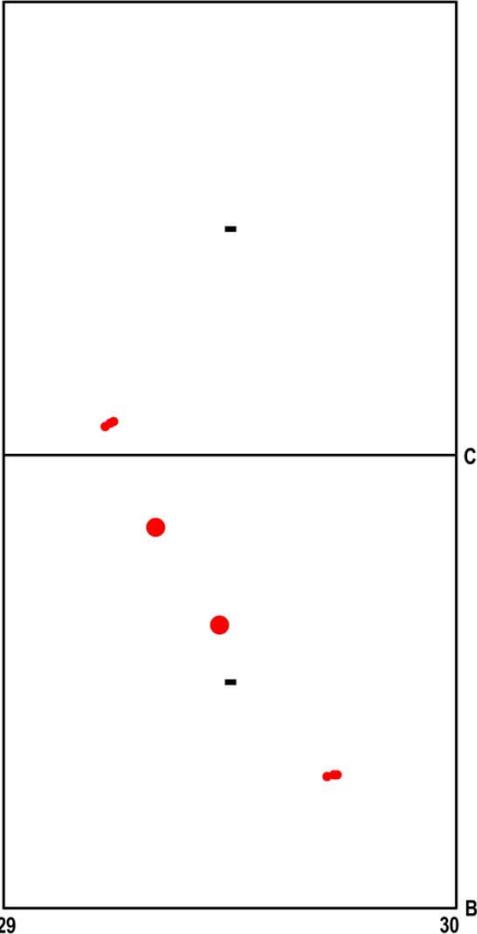
#12 - north of coordinate F15



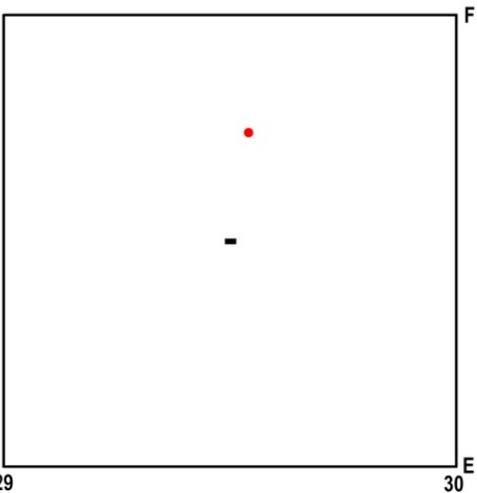
#13 - south of coordinate C24



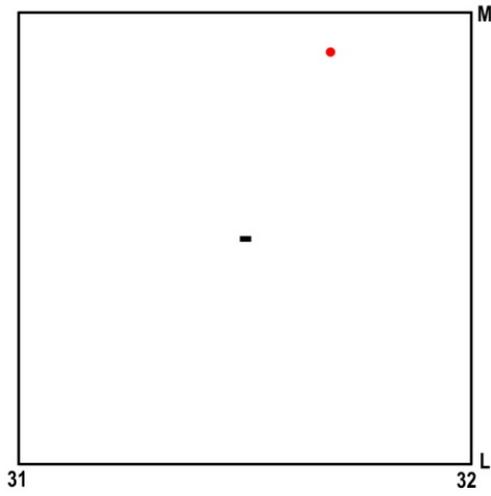
#14 - southeast of coordinate C29



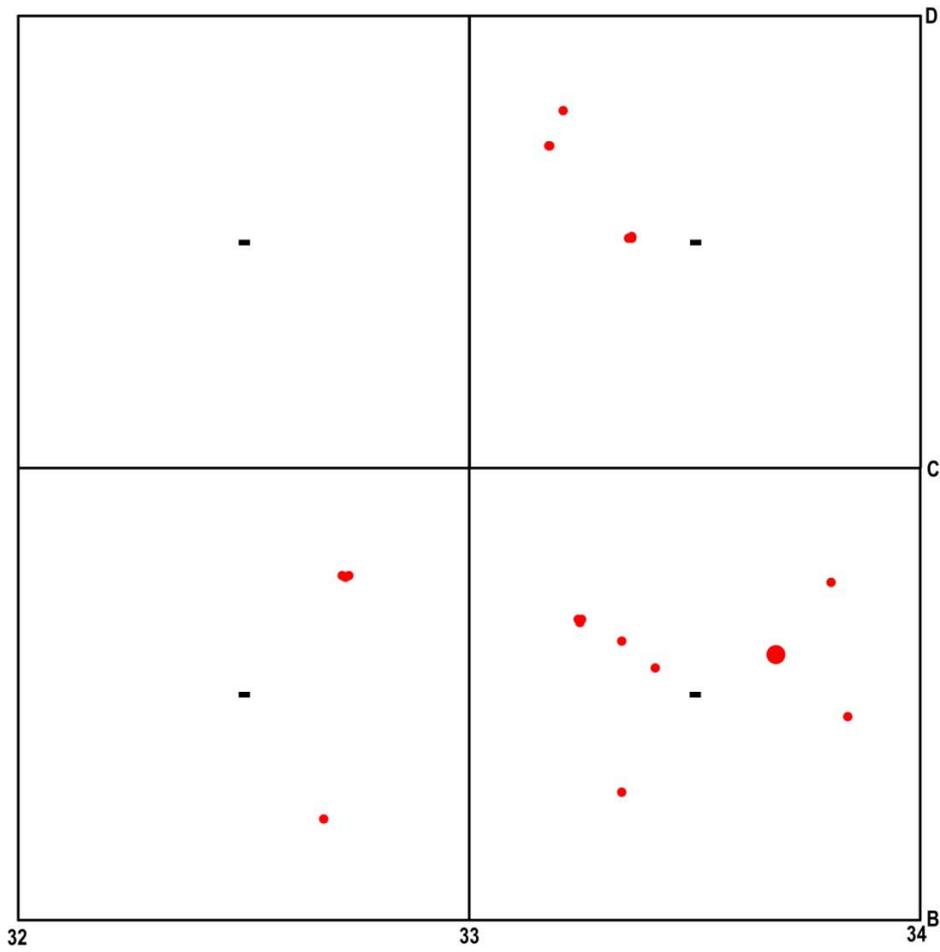
#15 - southeast of coordinate F29



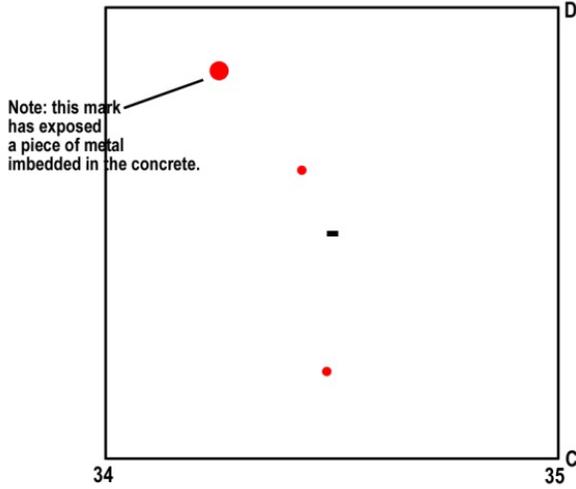
#16 - west of coordinate M32



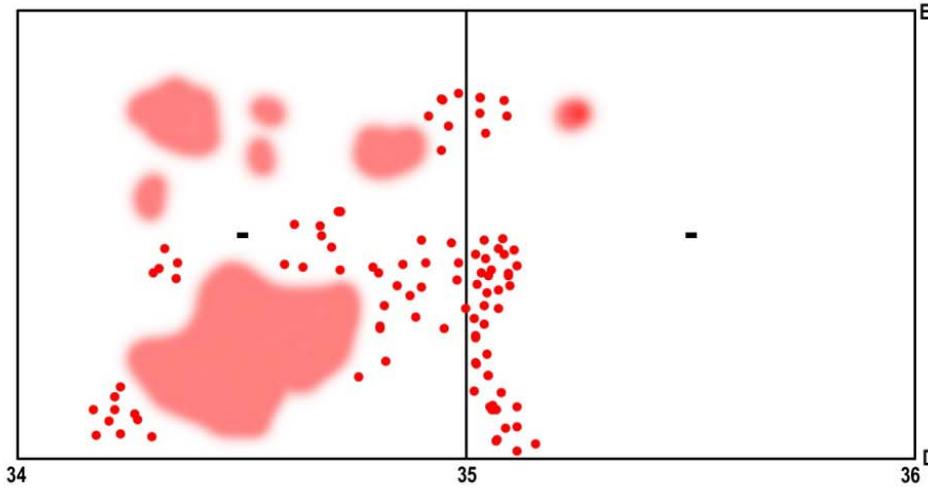
#17 - around coordinate C33



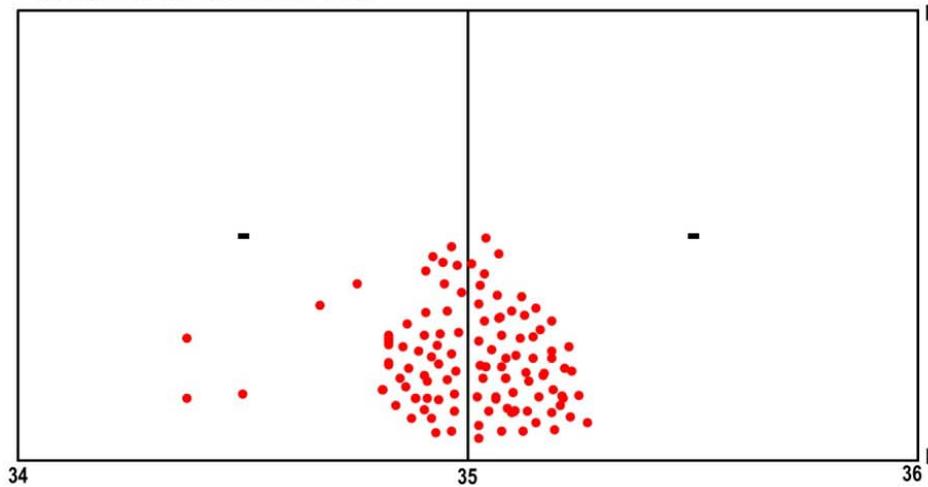
#18 - northeast of coordinate C34



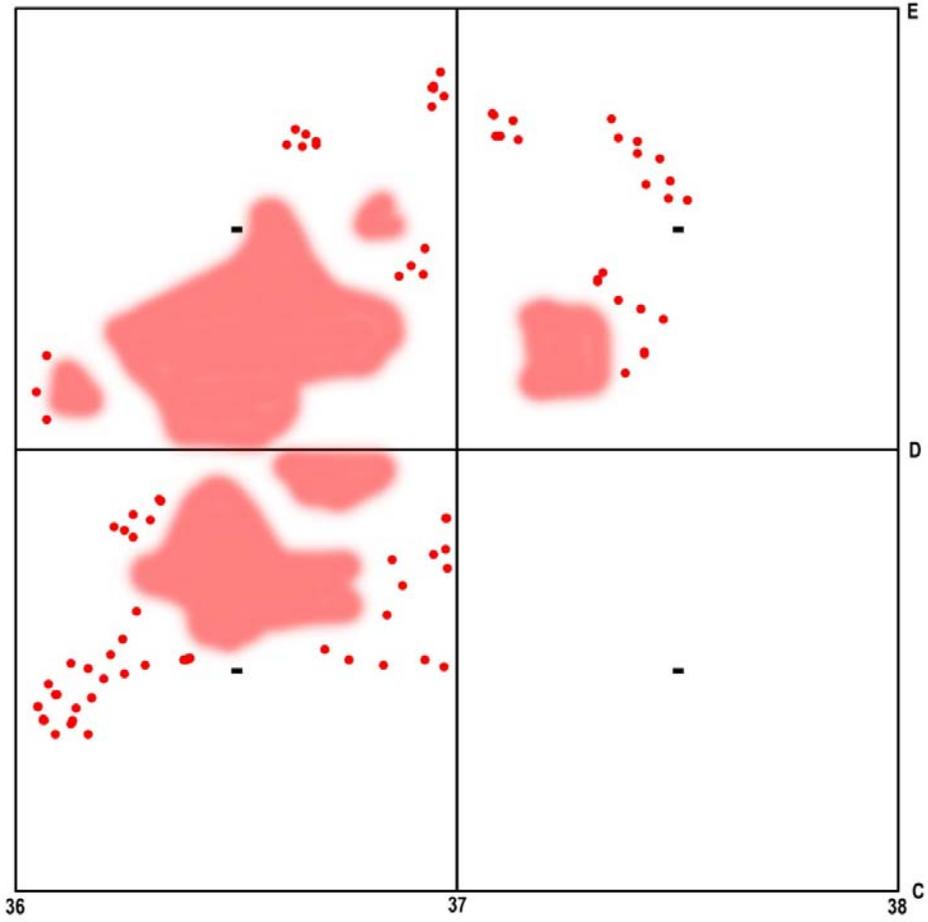
#19 - northwest of coordinate D35



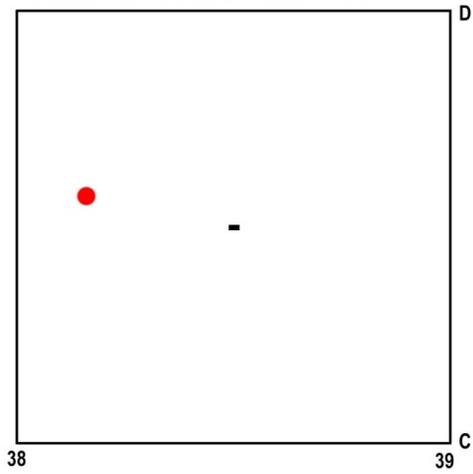
#20 - north of coordinate H35



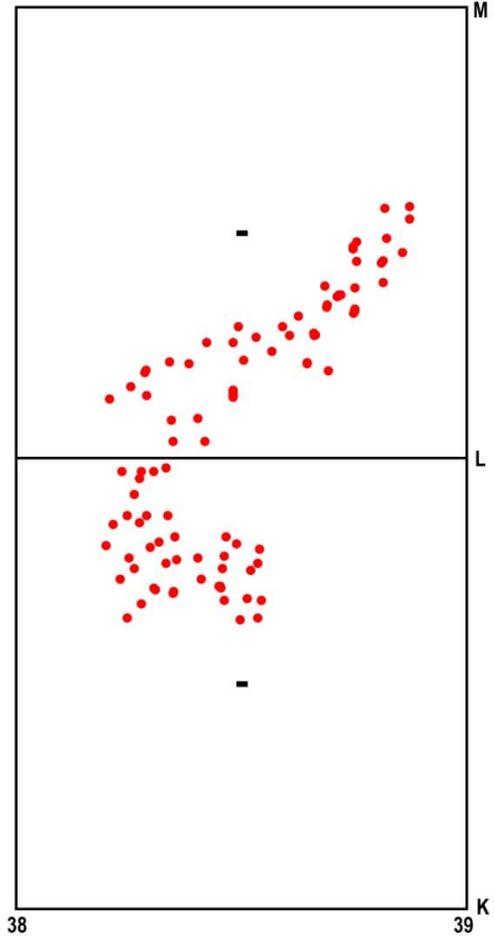
#21 - around coordinate D37



#22 - south of coordinate D38



#23 - east of coordinate L38



Resource Aircraft Revetments, concrete dome. (approx. 75 facilities # 1226-1300)

Historic Name/ Function S1 to S75/ Reinforced Concrete Revetments (1948 map)

Year Built 1943 (Feb) from CPNAB p A-968.

Location South of Bismark Sea Road

Description These approximate 18' high concrete structures are each in the shape of a half-dome with an entry 55' wide and a depth of 40'. The outer surface of most of the revetment domes are covered with rocks, soil, and vegetation. A number of revetments at the east end of the grouping have their exteriors covered with gunite. The interior of the domes show the radial impressions of the forming used in their construction. An exception to the above typical description is Facility 1227, formerly known as S-2. The interior of this revetment has a different pattern of forming impressions, with a centered, double circumferential line of panels that is intersected by angling lines of panels. Most of the revetments composing the eastern half of the grouping are used for stabling horses. The revetments in the western half of the grouping are unused.

Significance These revetments are associated with the aircraft support role of Ewa Field during WWII, an important part of the historic context of the installation. Considered potentially significant under Criteria A and C as contributing resources in the proposed Ewa Field Aircraft Revetment Historic District.

Integrity Location – retained. Setting – partially retained, growth of vegetation surrounding the revetments and on the adjacent airfields reduces integrity of setting. Design, Materials, Workmanship – retained, no apparent alterations. Feeling, Association – partially retained.



Aircraft Revetment (typical, Facility 1263)

Resource Compass Rose

Historic Name/ Function Compass Rose

Year Built ca. 1944

Location East of former runway 21

Description This approximate 200' square concrete pad has faint ghosts of radial (compass) lines extending out from a 10' diameter circular pad at its center. At the center of the circular pad is a raised concrete pad, 4" high and 18" in diameter that has the remnant of a non-ferrous metal pipe at its center. A series of two concentric ghost lines are present at about 17' radius, and at a radius of about 24' and 47'6" are a series of non-ferrous metal pipes imbedded in the concrete that are broken off flush with the surface of the slab.

Significance This compass rose was used for the calibration of aircraft magnetic compasses. It is associated with the core aviation function of Ewa Field during WW II.

Integrity Location – retained. Setting – partially retained, growth of vegetation surrounding the compass rose and on the adjacent airstrips reduces integrity of setting. Design, Materials, Workmanship – partially retained, removal of compass and concentric lines reduces integrity. Feeling, Association – partially retained.



Compass Rose

Resource Facility 972

Historic Name/ Function HQ for anti-submarine patrols. DEW line control.

Year Built 1958

Location Vinson Rd. west of Philippine Sea Rd.

Description Two story concrete International Style building.

Significance Functioned as a control station for a portion of the Distant Early Warning (DEW) line, and as headquarters for anti-submarine patrol flights from Barber's Point. Considered potentially eligible under Criterion A for its association with Cold War activities at Ewa Field/ Barber's Point.

Integrity Location – retained. Setting – partially retained. Design, Materials, Workmanship – partially retained, some windows & doors replaced/ removed. Feeling, Association – partially retained.



Facility 972

Resource Facility 1141

Historic Name/ Function Bldg 703/ Storage Bldg (1945 P-164), Storehouse & Supply Office (1948 map)

Year Built 1943

Location Roosevelt Avenue between Coral Sea and Corregidor

Description Wood frame warehouse with gable roof and board and batten siding on a raised concrete platform foundation. Approximate footprint is 100' x 200'. Wide overhanging eaves with cut rafter tails and purlins and a wide screen vent at the roof/sidewall junction. Loading platforms with ramps on three sides of the building at the rear (south) end.

Significance This building was one of a number of large warehouse buildings in this section of Ewa Field at the end of World War II. Considered potentially significant under Criterion A as a contributing resource in the proposed Ewa Field Warehouse Historic District.

Integrity Location – retained. Setting – partially retained, the removal of former buildings in the area has reduced integrity of setting. Design – partially reduced, metal roll up doors and storefront doors added. Materials – partially retained, some doors changed. Workmanship – partially retained, some doors changed. Feeling – partially retained, changed doors have reduced the expression of historic sense. Association – partially retained, conveyance of historic character is somewhat reduced by the replacement doors.



Facility 1141

Resource Facility 1142

Historic Name/ Function Building 704/ Storage Building (1945 P-164)

Year Built 1943

Location Roosevelt Avenue between Coral Sea and Corregidor

Description Wood frame warehouse with gable roof and board and batten siding on a concrete slab foundation. Approximate footprint is 100' x 200'. Wide overhanging eaves with cut rafter tails and purlins and a wide screen vent at roof/sidewall junction. Currently Oahu SPCA.

Significance This building was one of a number of large warehouse buildings in this section of Ewa Field at the end of World War II. Considered potentially significant under Criterion A as a contributing resource in the proposed Ewa Field Warehouse Historic District.

Integrity Location – retained. Setting – partially retained, the removal of former buildings in the area has reduced integrity of setting. Design – partially retained, doors and windows replaced. Materials – partially retained, doors and windows replaced. Workmanship – partially retained, doors and windows replaced. Feeling – partially retained, alterations have reduced the expression of historic sense. Association – partially retained, conveyance of historic character is somewhat reduced by the replacement doors and windows.



Facility 1142

Resource Facility 1143

Historic Name/ Function Building 705/ Storage Building (from 1945 P-164)

Year Built 1943

Location Roosevelt Avenue between Coral Sea and Corregidor

Description Wood frame warehouse with gable roof and board and batten siding on a concrete slab foundation. Approximate footprint is 100' x 100'. Wide overhanging eaves with cut rafter tails and purlins and as wide screen vent at roof/ sidewall junction. Currently American Machinery.

Significance This building was one of a number of large warehouse buildings in this section of Ewa Field at the end of World War II. Considered potentially significant under Criterion A as a contributing resource in the proposed Ewa Field Warehouse Historic District.

Integrity Location – retained. Setting – partially retained, the removal of former buildings in the area has reduced the integrity of setting. Design – partially retained, doors and windows replaced and a storefront addition at the east side. Materials – partially retained, replacement doors and windows and storefront addition. Workmanship – partially retained, replacement doors and windows and storefront addition. Feeling – partially retained, alterations have reduced the expression of historic sense. Association – partially retained, conveyance of historic character is reduced by the alterations.



Facility 1143

Resource Facility 1144

Historic Name/ Function Bldg 706/ Storage Building (1945 P-164)

Year Built ca. 1944

Location Corregidor Street south of Vinson

Description This building is two 40' x 100' Quonset huts joined at the ends to form one building. Currently used for auto repair.

Significance This double Quonset hut was one of a number of large warehouse buildings in this section of Ewa Field at the end of World War II. Considered potentially significant under Criterion A as a contributing resource in the proposed Ewa Field Warehouse Historic District.

Integrity Location – retained. Setting – partially retained, the removal of former buildings in the area has reduced integrity of setting. Design – partially retained, doors replaced. Materials – partially retained, doors replaced. Workmanship – partially retained, doors replaced. Feeling – partially retained, expression of historic sense is reduced by replacement doors. Association – partially retained, replacement doors somewhat reduce the conveyance of historic character.



Facility 1144

Resource Facility 1145

Historic Name/ Function Bldg 710/ Storage Bldg (1945 P-164), Aircraft Parts Storehouse (1948 map)

Year Built 1943

Location Roosevelt Avenue between Coral Sea and Corregidor

Description Wood frame warehouse with gable roof and board and batten siding on a concrete slab foundation. Approximate footprint is 100' x 100'. Wide overhanging eaves with cut rafter tails and purlins and as wide screen vent at roof/ sidewall junction.

Significance This building was one of a number of large warehouse buildings in this section of Ewa Field at the end of World War II. Considered potentially significant under Criterion A as a contributing resource in the proposed Ewa Field Warehouse Historic District.

Integrity Location – retained. Setting – partially retained, the removal of former buildings in the area has reduced integrity of setting. Design – partially retained, replacement doors and a small single story addition at the west side. Materials – partially retained, replacement doors and addition. Workmanship – partially retained, replacement doors and addition. Feeling – partially retained, alterations have reduced the expression of historic sense. Association – partially retained, historic character is reduced by the alterations.



Facility 1145

Resource Facility 1146

Historic Name/ Function Building 715/ Hangar (1948 map)

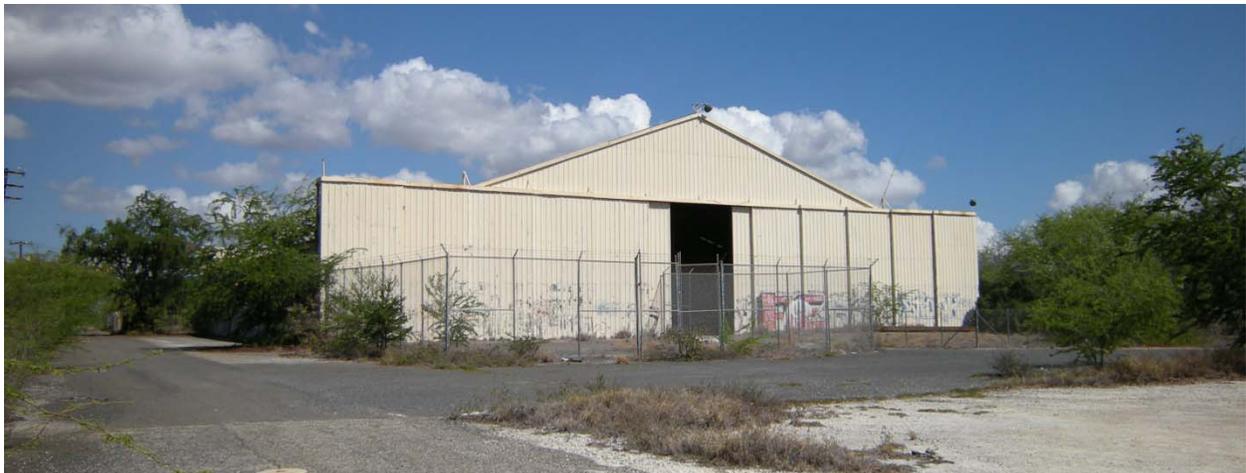
Year Built ca. 1944

Location Cabot Road

Description Metal frame covered with metal panel construction aircraft hangar with a gable roof on a concrete slab foundation. Pylons at building corners that each contain five sections of 12' wide, 28' high sliding doors. Ten door sections at each gable end, each door section on its own track. A concrete foundation of a small single story wing off the east side that contained a latrine remains, the sidewalls and roof of the wing are demolished.

Significance This aircraft hangar served the adjacent aircraft area at Ewa Field and was likely associated with the nearby air freight & inspection office (Fac 1562) and storehouse (Fac 1570) as well as the other numerous large warehouse buildings in the area. Considered potentially significant under Criterion A as a contributing resource in the proposed Ewa Field Warehouse Historic District or for its association with the WW II Marine Corps aviation history of Ewa Field.

Integrity Location – retained. Setting – partially retained, the removal of former buildings and growth of vegetation in the area and on the airfield has reduced integrity of setting. Design- partially retained, metal roll up door added at north end and original east side wing is demolished. Materials – partially retained, added door and demolished wing. Workmanship – partially retained, added door and demolished wing. Feeling – partially retained, alterations and setting changes have reduced the expression of historic sense. Association – partially retained, conveyance of historic character is reduced.



Facility 1146

Resource Facility 1147

Historic Name/ Function Bldg 721/ Paint Storehouse (from 1948 map)

Year Built ca. 1944

Location Roosevelt Avenue and Coral Sea Road

Description Concrete construction with a low slope gable roof and close eaves on a raised concrete platform foundation. Approximate footprint is 40' x 100'. Window openings have fixed wood louver vents covered with expanded metal mesh. Wide loading platform with ramp at rear (south) side. Tropical Garden Accents.

Significance This building was one of a number of large warehouse buildings in this section of Ewa Field at the end of World War II. Considered potentially significant under Criterion A as a contributing resource in the proposed Ewa Field Warehouse Historic District.

Integrity Location – retained. Setting – not retained, the addition of metal- framed canopies on three sides of the building have changed the physical environment in proximity to the structure. Design. Retained, the building itself appears to have no alterations. Materials – retained, the building appears to have no alterations. Workmanship – retained, the building appears to have no alterations. Feeling – partially retained, the addition of canopies reduced the expression of the building's historic sense. Association – partially retained, canopies reduce the conveyance of historic character.



Facility 1147

Resource Facility 1149

Historic Name/ Function Building 734/ General Storehouse (from 1948 map). Old sign above door reads "NAS Barbers Point Maintenance Facility"

Year Built ca. 1944

Location Corregidor Street south of Vinson

Description This building is two 40' x 100' Quonset huts joined at the ends to form one building.

Significance This double Quonset hut was one of a number of large warehouse buildings in this section of Ewa Field at the end of World War II. Considered potentially significant under Criterion A as a contributing resource in the proposed Ewa Field Warehouse Historic District.

Integrity Location – retained. Setting – partially retained, the removal of former buildings in the area has reduced the integrity of setting. Design – partially retained, doors replaced. Materials – partially retained, doors replaced. Workmanship – partially retained, doors replaced. Feeling- partially retained, expression of historic sense is reduced by replacement doors. Association – partially retained, conveyance of historic character is somewhat reduced by the replacement doors.



Facility 1149

Resource Facility 1150

Historic Name/ Function Bldg 735/ General Storehouse (from 1948 map)

Year Built ca. 1944

Location Corregidor Street south of Vinson

Description This building is two 40' x 100' Quonset huts joined at the ends to form one building.

Significance This double Quonset hut was one of a number of large warehouse buildings in this section of Ewa Field at the end of World War II. Considered potentially significant under Criterion A as a contributing resource in the proposed Ewa Field Warehouse Historic District.

Integrity Location – retained. Setting – partially retained, the removal of former buildings in the area has reduced integrity of setting. Design- partially retained, doors replaced and windows altered. Materials – partially retained, doors replaced and windows altered. Workmanship – partially retained – doors replaced and windows altered. Feeling – partially retained, expression of historic sense is lessened by alterations and changed setting. Association – partially retained, conveyance of historic character is somewhat impeded by alterations.



Facility 1150

Resource Facility 1152

Historic Name/ Function Building 741/ General Storehouse (from 1948 map)

Year Built ca. 1944

Location Corregidor Street south of Vinson

Description This building is two 40' x 100' Quonset huts joined at the ends to form one building.

Significance This double Quonset hut was one of a number of large warehouse buildings in this section of Ewa Field at the end of World War II. Considered potentially significant under Criterion A as a contributing resource in the proposed Ewa Field Warehouse Historic District.

Integrity Location – retained. Setting – partially retained, the removal of former buildings in the area has reduced integrity of setting. Design – partially retained, doors and windows replaced. Materials – partially retained, doors and windows replaced. Workmanship – partially retained, doors and windows replaced. Feeling – partially retained, expression of historic sense is reduced by replacement doors and windows. Association – partially retained, replacement doors and windows reduce the conveyance of historic character.



Facility 1152

Resource Facility 1153

Historic Name/ Function Building 742/ General Storehouse (from 1948 map)

Year Built ca. 1944

Location Corregidor Street south of Vinson

Description This building is two 40' x 100' Quonset huts joined at the ends to form one building.

Significance This double Quonset hut was one of a number of large warehouse buildings in this section of Ewa Field at the end of World War II. Considered potentially significant under Criterion A as a contributing resource in the proposed Ewa Field Warehouse Historic District.

Integrity Location – retained. Setting – partially retained, the removal of former buildings in the area has reduced integrity of setting. Design – partially retained, windows and doors replaced. Materials – partially retained, windows and doors replaced. Workmanship – partially retained, windows and doors replaced. Feeling – partially retained, replacement windows and doors reduce the historic sense of the building. Association – partially retained, historic character is reduced by replacement windows and doors.



Facility 1153

Resource Facility 1545.

Historic Name/ Function on the site of Fac 607/ Ready magazine

Year Built ca. 1944

Location Corregidor Street south of Vinson

Description 40' x 100' Quonset hut.

Significance This Quonset hut was erected on the site of a 1941 wood-framed ready magazine (Bldg. 607). Its continued listed use as a ready magazine (until at least 1951) is questionable, the other magazines it was associated with (Fac 605, 608, 610) measured 20' x 45' and were sited along Norris Road with apparent ESQD separation. It was probably used as a storehouse, and by 1963 it was listed as such in P-164 property records. It is currently vacant. Considered potentially significant under Criterion A as a contributing resource in the proposed Ewa Field Warehouse Historic District or for its association with the WW II Marine Corps aviation history of Ewa Field.

Integrity Location- retained. Setting – partially retained, the removal of former bldgs to the south has reduced integrity of setting. Design – retained. Materials- retained. Workmanship –retained. Feeling – partially retained, expression of historic sense is lessened by altered setting. Association – partially retained, reduced by altered setting.



Facility 1545

Resource Facility 1562

Historic Name/ Function Bldg 713/ Freight Stg (1945 P-164), Air Freight & Inspection Office (1948 map)

Year Built ca. 1944

Location Cabot Road and Vinson

Description 40' x 100' Quonset hut.

Significance This Quonset hut was one of a number of large warehouse buildings in this section of Ewa Field at the end of World War II. Considered potentially significant under Criterion A as a contributing resource in the proposed Ewa Field Warehouse Historic District or for its association with the WW II aviation history of Ewa Field.

Integrity Location – retained. Setting – partially retained, the removal of former buildings and growth of vegetation in the area and on the airfield has reduced integrity of setting. Design- partially retained, doors replaced, end windows replaced with louver vents. Materials – partially retained, replacement doors and windows. Workmanship – partially retained, replacement doors and windows. Feeling – partially retained, alterations and setting changes have reduced the expression of historic sense. Association – partially retained, conveyance of historic character is reduced.



Facility 1562

Resource Facility 1570

Historic Name/ Function Building 725/ General Storehouse (1948 map)

Year Built ca. 1944

Location Cabot Road and Vinson

Description 40' x 100' Quonset hut.

Significance This Quonset hut was one of a number of large warehouse buildings in this section of Ewa Field at the end of World War II. Considered potentially significant under Criterion A as a contributing resource in the proposed Ewa Field Warehouse Historic District or for its association with the WW II aviation history of Ewa Field.

Integrity Location – retained. Setting – partially retained, the removal of former buildings and growth of vegetation in the area and on the airfield has reduced integrity of setting. Design- partially retained, doors replaced, end windows (window openings only found at east end) replaced with louver vents. Materials – partially retained, replacement doors and windows. Workmanship – partially retained, replacement doors and windows. Feeling – partially retained, alterations and setting changes have reduced the expression of historic sense. Association – partially retained, conveyance of historic character is reduced.



Facility 1570

Resource Facility 1767

Historic Name/ Function Power station for SOSUS

Year Built ca. 1960

Location Philippine Sea Rd. south of Roosevelt Avenue

Description Single story concrete building.

Significance Associated with the SOSUS (Sound Surveillance System) of underwater listening posts. Considered potentially eligible under Criterion A for its association with Cold War activities at Ewa Field/ Barber's Point.

Integrity Location – retained. Setting – partially retained. Design, Materials, Workmanship – partially retained, some windows & doors replaced/ removed. Feeling, Association – partially retained.



Facility 1767

Resource Facility 1768

Historic Name/ Function SOSUS

Year Built ca. 1960

Location Philippine Sea Rd. south of Roosevelt Avenue

Description Single story concrete building.

Significance Associated with the SOSUS (Sound Surveillance System) of underwater listening posts. Considered potentially eligible under Criterion A for its association with Cold War activities at Ewa Field/ Barber's Point.

Integrity Location – retained. Setting – partially retained. Design, Materials, Workmanship – partially retained, some windows & doors replaced/ removed. Feeling, Association – partially retained.



Facility 1768

Resource Circular feature

Historic Name/ Function unknown

Year Built ca. 1960s

Location South of Vinson Road across from Facility 972

Description 200' diameter circular area with 60 radial lines extending out from small concrete pad at center.

Significance Unknown significance, Cold War-era feature. Possibly an antenna site associated with Facility 972.

Integrity Appears to have retained integrity of location. Other aspects of integrity appear not retained due to partial nature of this feature.



Circular feature

Resource CMU wall

Historic Name/ Function unknown/ barrier wall between Roosevelt Av. and officers housing.

Year Built ca. 1943

Location Roosevelt Avenue east of Ticonderoga

Description Undulating CMU wall, 182' long and 9'6" high

Significance This wall is not known to possess an important association with the context of Ewa Field's support of WWII.

Integrity Location – retained. Setting - not retained, vegetation growth and demolition of surrounding buildings. Design, Materials, Workmanship – partially retained, the wall originally extended about 120' further eastward. Feeling, Association – partially retained, reduced expression of historic sense and the conveyance of historic character.



CMU wall

Resource Concrete curb

Historic Name/ Function Roadway curb

Year Built ca. 1944

Location Philippine Sea Road

Description Cast concrete roadway curbing with coral aggregate. Approximately 30' linear feet. Curb is about 5" wide and 3" -4" high

Significance This roadway curbing is not known to possess an important association with the context of Ewa Field's support of WWII.

Integrity Location – retained. Setting - not retained, vegetation growth and demolition of surrounding buildings. Design, Materials, Workmanship – retained, the curb appears intact. Feeling, Association – partially retained, degraded setting has interfered with the expression of historic sense and the conveyance of historic character.



Concrete curb

Resource Facility 1151

Historic Name/ Function Building 740/ Electrical Switch Building (1948 map)

Year Built ca. 1943

Location East of Cabot Road, near junction with Bismark Sea

Description Small CMU building with flat concrete roof on a concrete slab foundation. Screened window openings at eaves.

Significance This former electrical equipment building is not known to possess an important association with the context of Ewa Field's support of WWII.

Integrity Location – retained. Setting – partially retained, growth of vegetation reduces integrity of setting. Design, Materials, Workmanship – retained. Feeling, Association – partially retained.



Facility 1151

Resource Facility 1327

Historic Name/ Function Building 137/ Communications Building (from 1945 P-164)

Year Built 1943

Location South of aircraft warm-up platform

Description Two story board-formed cast concrete building with a flat roof with overhanging eaves. Window openings in second floor only. Added CMU at one entry appears historic.

Significance This former communication building is not known to possess an important association with the context of Ewa Field's support of WWII.

Integrity Location – retained. Setting – partially retained, removal of buildings and growth of vegetation reduce integrity of setting. Design, Materials, Workmanship – retained. Feeling, Association – partially retained.



Facility 1327

Resource Facility S152

Historic Name/ Function S152/ Enlisted Men's Swimming Pool

Year Built 1942

Location Intersection of Philippine Sea Road and Vinson.

Description Concrete in-ground swimming pool. Filled in .

Significance This swimming pool is not known to possess an important association with the context of Ewa Field's support of WWII. Note: at the time of the Japanese attack the swimming pool was not yet constructed, only the forms for its subsequent concrete work were erected in the excavation.

Integrity Location – retained. Setting - not retained, vegetation growth and demolition of surrounding buildings. Design, Materials, Workmanship – retained, the swimming pool structure appears intact. Feeling, Association – partially retained, degraded setting has interfered with the expression of historic sense and the conveyance of historic character.



Facility S152

Resource Railroad grade & tie remains

Historic Name/ Function Railroad

Year Built ca. 1942 (CPNAB p. A-985)

Location South of Roosevelt Avenue between Kasan Bay Street and the baseball fields.

Description An approximate 120' section of railroad grade elevated about 3' above the surrounding terrain with the remains of wood rail road ties that have been heavily damaged by fire. No metal portions (track, spikes, etc.) are present.

Significance Railroad spur from the OR&L main line to serve Ewa Field, built between June 1941 and March 1943.

Integrity Location – retained. Other aspects of integrity appear not retained due to partial nature of this feature, no metal portions remain.



Railroad grade & tie remains

Resource Sign Base

Historic Name/ Function Sign Base

Year Built ca 1958

Location Roosevelt Avenue west of Philippine Sea Road

Description Lava rock rubble and concrete mortar sign base with battered sides. 7' long, 3' wide, 32" high. With the remains of 2 steel brackets imbedded in the top surface.

Significance This sign base is not known to possess an important association with the context of Ewa Field.

Integrity Location – retained. Setting - not retained, removed signage, vegetation growth and demolition of surrounding buildings. Design, Materials, Workmanship – partially retained, the removal of signage lowers integrity. Feeling, Association – partially retained, removed signage and degraded setting has interfered with the expression of historic sense and the conveyance of historic character.



Sign Base

AECOM resumes of authors:

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