

U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-  
STEEL HANGAR  
(U.S. Naval Base, Pearl Harbor, Naval Station Ford Island)  
(General Warehouse)  
(Facility No. 174)  
Wasp Boulevard between Kingfisher Street and Ranger Loop  
Pearl Harbor  
Honolulu County  
Hawaii

HABS HI-399

HI-399

HABS

HI-399

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN BUILDINGS SURVEY  
PACIFIC WEST REGIONAL OFFICE  
National Park Service  
U.S. Department of the Interior  
1111 Jackson Street, Suite 700  
Oakland, CA 94607

## HISTORIC AMERICAN BUILDINGS SURVEY

### U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-STEEL HANGAR (U.S. Naval Base, Pearl Harbor, Naval Station Ford Island) (U.S. Naval Base, Pearl Harbor, General Warehouse) (Facility No. 174)

HABS No. HI-399

**Location:** Wasp Boulevard between Kingfisher Street and Ranger Loop  
Ford Island  
Pearl Harbor Naval Base  
City and County of Honolulu, Hawaii

U.S.G.S. Pearl Harbor Quadrangle, Hawaii, 1999  
7.5 Minute Series (Topographic) (Scale - 1:24,000)  
Universal Transverse Mercator Coordinates 4.607230.2362780

**Significance:** Facility No. 174 was part of the early expansion of the Army Air Field on Ford Island. It is one of the oldest hangars in Pearl Harbor and is associated with both Army and Navy aviation history on Ford Island. It was built as a hangar for the Army's Luke Field and converted to a storehouse for practice bombs when the Naval Air Station took over the Army portion of the island during World War II. Facility No. 174 is a rare extant example of the "United States All-steel Hangar" developed in 1918 as a standard hangar design for World War I airfields and aviation training stations. Facility No. 174 is a contributing element to the Pearl Harbor National Historic Landmark.

**Description:** Facility No. 174 is located on the northwest side of Ford Island within the triangle formed by Ranger Loop and Wasp Boulevard. It is one of only two metal-sided buildings (with Facility No. 184) in this group of mostly concrete structures (Facility Nos. 166 to S172). Across Wasp Boulevard from this grouping are two larger historic hangars, Facility Nos. 133 and 130, which also have metal siding. Directly across Wasp Boulevard from Facility No. 174 is Station TD-1, a small 1940s electrical building, and another unnumbered very recent one, that is slightly larger. Beyond both of those is Facility No. 459, a 1989 building erected for training and support of Navy SEAL teams. To the west of the hangar, across Ranger Loop, is Facility No. 221, a 1943 Fire and Rescue Station. To the southwest, across San Jacinto Street, is the 1991 Navy Brig, Facility No. 462. There are grassy areas on the east and west sides of Facility No. 174, along Wasp Boulevard and in the triangle between Kingfisher Street and Ranger Loop. Asphalt driveways edged with concrete curbs, lead to the hangar doors at the north and south ends of the building.

The design and construction of the building is relatively simple. It is a one-story, rectangular-plan, steel-frame hangar with corrugated metal walls and roof. The most distinctive aspect of this facility is the shape of its roof, as described below. Its footprint measures approximately 140' x

**U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-STEEL HANGAR**  
**(U.S. Naval Base, Pearl Harbor, Naval Station Ford Island)**  
**(U.S. Naval Base, Pearl Harbor, General Warehouse)**  
**(Facility No. 174)**  
**HABS No. HI-399 (Page 2)**

68', and the height is about 25' to the peak of the roof. The building is seven structural bays long, each about 20', and is one bay wide. The concrete slab floor wraps around the 1'-6" x 1'-9" concrete footings under the structural columns.

Facility No. 174 has a steel-frame structural system. The roof trusses are riveted, but other connections are bolted. The columns defining the bays are I-beams, which have 5" flanges and 10½" webs. The names of manufacturers, Illinois USA and Carnegie USA, are seen on the columns. Other structural pieces include angles and channels. Another manufacturer's name, Bethlehem, was seen on one angle. Between the windows crossed tie rods add lateral stability. There are similar crossed tie rods with turnbuckles between the trusses.

The roof, following the form of the trusses, has a double-pitch arch-like shape, similar to a gambrel roof. Both pitches of this roof are shallow, while the definition of a gambrel roof is "shallow pitch slopes above ... steeply pitched slope[s]" (Bucher 1996: 203). The roof eaves only overhang the walls slightly. There are no gutters on the building.

Six hangar doors, each measuring 13'-6" tall x 11'-1" wide, are located at the north and south ends of Facility No. 174. They have corrugated metal cladding over steel frames made of welded steel angles. They slide in an overhead metal frame and on wheels that run in three metal tracks set in a narrow concrete strip. The upper door framework is connected to the end trusses with tie rods that run through the corrugated metal cladding. The braced support structure for the doors, also made from welded angles, extends approximately 10' beyond the side walls so that both ends can be entirely opened. On each end one of the hangar doors has a small steel-framed hinged door cut into it. The door on the north end is also clad with corrugated metal, and measures 3'-0" x 6'-6". The door on the south end is made of plate metal, measuring only 2'-2" x 6'-4". It has been welded shut and is not used. Some of the doors' corrugated metal panels, especially the lower sheets, have been replaced.

Original operable steel-sash windows are located in every other bay on both side elevations. These are in groups of five 9-light windows, three groups on each side. In five of the window groups, each window has a pivoting section consisting of the top six lights and three fixed lights on the bottom. In the northernmost window group on the west side, all nine lights in each window form a pivoting sash. The lights are wired glass, except for replacements of clear glass or sheet metal.

The interior of Facility No. 174 has no free-standing columns and no finish materials. It is a large open space without a ceiling. The height from the floor to the bottom chord of the trusses is about 14'. The steel framing, including the roof trusses, and the inner faces of the roof's and walls' corrugated metal panels are exposed.

**U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-STEEL HANGAR**  
**(U.S. Naval Base, Pearl Harbor, Naval Station Ford Island)**  
**(U.S. Naval Base, Pearl Harbor, General Warehouse)**  
**(Facility No. 174)**  
**HABS No. HI-399 (Page 3)**

This rare example of a once-numerous hangar type has high integrity of design, setting, materials, workmanship, feeling and association. The building was relocated, as discussed in the following section.

**Historical Context:** Refer to HABS No. HI-382 for an overview of the history of Ford Island, and HABS No. HI-394 for information on the Aircraft Carrier Support Facilities in this area of Ford Island. See also HABS No. HI-366 which documents Facility No. 130, a 1934 Army hangar, and HABS No. HI-361, for information on Facility No. S214, a wood-framed Practice Bomb Storehouse built in 1942. Facility No. 174 was originally an early Army hangar at Luke Field, and it was one of the few buildings, besides houses, left on the west side of Ford Island when the Army aviation activities were transferred to Hickam Air Base about 1940.

This hangar's exact date of construction is not known. It was located in a row of hangars on the airfield side of the Luke Field's main road (now Wasp Boulevard). Historic photos from the 1920s show three buildings in the Army's hangar row with the same smaller width. Two of them had similar window placement in every other bay, as Facility No. 174 does. The third had a band of windows along the side, and was a longer building. These were located where there is now simply open pavement, south of the intersection of what is now called Ranger Loop and Wasp Boulevard. These hangars were constructed on Ford Island sometime between 1920 and 1922 (History Office n.d.: 9). Still, the design of Facility No. 174 is tied to the World War I (WWI) history of this hangar type. It is representative "of the critical two years when American air power made its first great strides and established a network of ground facilities that would support its development over the following decades of peace" (Pedrotty et al. 2001: 2-12).

Buildings like Facility No. 174 "were the first-ever mass produced hangars, developed under the direction of the Department of Military Aeronautics" in 1918 (Yatsko 1997: 8). That Department's name and "Supply Division" are noted on the standard drawings for this hangar type, which is labeled United States All-Steel Hangar. However, the comprehensive report on the history of hangars credits the Construction Division of the Signal Corps; the Department of Military Aeronautics was apparently a short-lived organizational name in the "bureaucratic melee" that characterized the Army during WWI (Pedrotty et al. 2001: 2-5).

Despite the bureaucratic competition for credit and control, this standard design was a successful response to the sudden need in WWI for numerous hangars at new and existing airfields. The construction of hangars of this type could be done rapidly, "using prefabricated, mass-produced components manufactured by various steel fabricators" (Yatsko 1997: 2). The steel hangar design was based on a timber-framed temporary hangar "designed by Albert Kahn, the well-known and

**U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-STEEL HANGAR**  
**(U.S. Naval Base, Pearl Harbor, Naval Station Ford Island)**  
**(U.S. Naval Base, Pearl Harbor, General Warehouse)**  
**(Facility No. 174)**  
**HABS No. HI-399 (Page 4)**

respected Detroit architect responsible for large-scale industrial plants" (Garner 1993: 30).

The three hangars of this type at Luke Field were possibly constructed from Army stockpiles of parts ordered during WWI. "Hundreds of these hangars were erected at Air Service fields all over the country – almost every active installation received a few of them" (Pedrotty et al. 2001: 3-2). Another possibility is that they were re-erected "from surplus sent back . . . from airbases in Ireland or France" (Dodge 2002). Either scenario is reasonable, since there was little money for new military facilities in the post WWI years; "the Air Service weathered a sharp demobilization and lean funding years" in the early 1920s (Pedrotty et al. 2001: 3-1). Whether built from Army stockpiles or from recycled hangars, modifications were made to the standard design as needed. For instance, the Department of Military Aeronautics' drawings show curtains on one end of the building and a closed wall at the other end; however, the hangars of this type at Luke Field had steel-framed sliding doors at both ends.

On the "General Drawing" for the United States All-Steel Hangar there is a list of details sheets that includes: foundations, truss unit, steel joists, corrugated iron, bolts, steel sash, curtain, assembled truss, curtain hardware, and erecting diagram. It is not known if these detail sheets have been saved in any drawings archives.

On a November 1928 chart, three of the Army's hangars at Ford Island (with a 66' width) were listed as Expeditionary hangars, and five others (with a 110' width) were called "New type hangars" (Pedrotty et al. 2001: Figure 3-6). It appears that the standard U.S. All-Steel Hangars were classified as Expeditionary on that chart, based on the dimensions listed. The term "expeditionary" is defined in the American Heritage dictionary as "designed for military operations abroad;" and the term implies that speedy erection was a major goal of the design. The prefabricated structural elements and the flexibility of using various cladding materials meant that these hangars could be built quickly (Pedrotty et al. 2001: 2-7).

After the Hawaiian Air Depot (HAD) moved to Ford Island from Honolulu in 1931 and was consolidated with the Repair Section of Luke Field, all the hangars to the south of Ranger Loop became part of that organization. The HAD was the last portion of the Army to be relocated from Ford Island. A June 1940 Navy map shows the southwest corner of the island that HAD occupied, with the note "to be relinquished to the Navy by Nov. 1, 1940" (Fourteenth Naval District 1940). The HAD was gone before that date and the Navy inherited their three Army hangars with gambrel-like roofs, the United States All-Steel Hangar type seen in 1920s photos of Ford Island (U.S. Army Museum Hawaii 1920s). The Navy moved the Army hangars and mostly just paved the former HAD

**U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-STEEL HANGAR  
(U.S. Naval Base, Pearl Harbor, Naval Station Ford Island)  
(U.S. Naval Base, Pearl Harbor, General Warehouse)  
(Facility No. 174)  
HABS No. HI-399 (Page 5)**

area, constructing more airfield pavement, a large seaplane parking area, and more seaplane ramps (Facility Nos. S364, S366, S367, and S368, see HAER No. HI-59). An October 10, 1941 aerial of Ford Island shows that the buildings had been moved and the area paved by that date (National Archives II 1940s).

An October 2, 1941 photo of one United States All-Steel Hangar shows it became Navy Facility No. 94 (National Archives II 1940s). Navy maps from 1942 and later show this building had been relocated to the middle of the southeast side of Ford Island. It was almost identical to Facility No. 174, including its dimensions and the pattern of windows in every other bay on the side walls. However, in Facility No. 94 there were only three in each window grouping while Facility No. 174 had groupings of five windows; also, the number of lights differed. However, comparing that 1941 photo to a 1930 photo (U.S. Army Museum Hawaii 1930), it appears that replacement windows were inserted in the relocated building. Facility No. 94 was used as a storehouse until it was demolished about the mid 1980s.

The Army hangar #77 is shown in November 5, 1941 and January 17, 1942 photos after it had been re-erected (National Archives II 1940s). It became Navy Facility No. 177, which was at the north end of the seaplane parking area, and was used as a hangar until it was demolished sometime before 1978. Facility No. 177 differed from Facility No. 174 in several ways. It was longer (200'), had a lean-to addition on at least one side, and had a band of windows along the side, rather than window groupings in every other bay.

The Navy did not move Facility No. 174 very far, as it was relocated just across Wasp Boulevard and a little north of its original site. A central swath of Ford Island, including all the buildings within the Ranger Loop / Wasp Boulevard triangle, were painted in camouflage patterns, as shown in 1940s aerials (National Archives II 1940s). Small additions on the west side of this building are evident in some of the 1940s aerials.

Facility No. 174 was used by the Navy as a practice bomb storehouse during World War II. This building was associated with the training function of the Naval Air Station on Ford Island during World War II. Practice bombs were often filled with water, gravel or sand, and usually had a spotting dye or signal cartridge, which is "a pyrotechnic charge for spotting purposes" (U.S. Army Corps of Engineers 1995).

A consortium of construction companies, named Contractors Pacific Naval Air Bases (CPNAB), was awarded the contract to build or enlarge naval aviation facilities in the Pacific between 1939 and 1943. CPNAB's work on Ford Island included the relocation and re-erection of the three hangars of this type at Luke Field (Contractors Pacific Naval Air Bases n.d.: A-563).

**U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-STEEL HANGAR**  
**(U.S. Naval Base, Pearl Harbor, Naval Station Ford Island)**  
**(U.S. Naval Base, Pearl Harbor, General Warehouse)**  
**(Facility No. 174)**  
**HABS No. HI-399 (Page 6)**

Since 1951 this building has been listed simply as a storehouse or general warehouse. Very few alterations appear to have been made to it over the years, except for the removal of the small additions on the west side and the insertion of a small door in one of the large south-end hangar doors.

Although this building was moved, it still retains a high level of historic integrity. It is a significant building because of its historic associations with both WWI and WWII and because it is one of the few remaining examples of this once-common type of early hangar, perhaps the only one in Hawaii. A statewide study of military buildings in California concluded that "World War I-era Air Corps hangars appear to be one of the rarest property types associated with the history of the military" (Mikesell 2000: 5-4).

**Sources:**

The Plan Files of the Naval Facilities Engineering Command, Pacific do not include any drawings for this building. The original drawings, if there were any site-specific ones, were apparently lost in the transfer of the hangar from the Army. The only Navy drawings (nos. 7463060 and 7463384) found for this building were in the Plan Files of the Public Works Center, Hawaii; they were prepared in 1982 for repair and repainting projects involving the building. An isometric drawing for this hangar was located in documentation of a similar building by Yatsko (1997: 20) and is reproduced in this report.

Bucher, Ward (ed.)

1996 *Dictionary of Building Preservation*. Preservation Press, John Wiley & Sons, Inc.: New York.

Contractors Pacific Naval Air Bases

n.d. *Technical Report and Project History, Contracts NOy-3550 and NOy-4173*. On microfiche at library of Naval Facilities Engineering Command, Pacific.

Dodge, Jeffrey

2002 E-mail dated July 18, 2002 to Lt. Joshua Powell from Jeffrey Dodge, Pacific Division, Naval Facilities Engineering Command.

Fourteenth Naval District

1940 Naval Air Station, Pearl Harbor, Ford Island, Conditions as of June 30, 1940. Map no. V-N1-120. Filed under RG 71 1405-3-33 at Cartographic Section, National Archives II, College Park, Maryland.

**U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-STEEL HANGAR**  
**(U.S. Naval Base, Pearl Harbor, Naval Station Ford Island)**  
**(U.S. Naval Base, Pearl Harbor, General Warehouse)**  
**(Facility No. 174)**  
**HABS No. HI-399 (Page 7)**

Garner, John S.

- 1993 *World War II Temporary Military Buildings: A Brief History of the Architecture and Planning of Cantonments and Training Stations in the United States*, USACERL Technical Report CRC-93/01. Champaign, IL: U.S. Army Construction Engineering Research Laboratories.

History Office

- n.d. History of the U.S. Army Air Corps in the Hawaiian Department. Anonymous typescript in binder titled "Early Aviation History" at 15<sup>th</sup> Air Base Wing History Office, Hickam Air Force Base, Hawaii.

Martin, Bravo & Chock, Inc.

- 1999 Structural cross section drawing prepared as the part of work for *Economic Analysis and Reuse Option Case Studies Report* by Mason Architects Inc.

Mikesell, Stephen D.

- 2000 *California Historic Military Buildings and Structures Inventory, Vol. III: Historic Context: Themes, Property Types, and Registration Requirements*. Prepared for United States Army Corps of Engineers, Sacramento District. JRP Historical Consulting Services: Davis, California.

National Archives II

- 1940s Historic photos of Facility No. 174 ("re-erected Army hangar") dated 11/5/1941 and 1/17/1942 in RG 71 CA, Folder 153B, of Facility No. 94 dated 10/2/1941 in RG 71 CA, Folder 154D, and historic aerials of Ford Island, dated 10/10/1941 - # 80-G-279375, dated 6/7/1942 - # 80-G-411232, dated 7/12/1942 - # 80-G-451154, dated 1/15/1943 - # 80-G-4151260, and dated 4/14/1944 - # 80-G-229787, in Still Photo section of National Archives II, College Park, Maryland.

Pedrotty, Michael A., et al.

- 2001 *Historical and Architectural Overview of Military Aircraft Hangars: A General History, Thematic Typology, and Inventory of Aircraft Hangars Constructed on Department of Defense Installations*. Prepared for United States Air Force Headquarters, Air Combat Command. United States Army Construction Engineering Research Laboratory: Champaign, Illinois.

U.S. Army Corps of Engineers

- 1995 Procedures for Conducting Preliminary Assessments at Potential Ordnance Response Sites, Chapter 2, Historical Records. Interim Guidance report on web site of Ordnance

**U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-STEEL HANGAR**  
**(U.S. Naval Base, Pearl Harbor, Naval Station Ford Island)**  
**(U.S. Naval Base, Pearl Harbor, General Warehouse)**  
**(Facility No. 174)**  
**HABS No. HI-399 (Page 8)**

and Explosives Center of Expertise at <http://w2.hnd.usace.army.mil/oew/policy/pressmt>.

United States Army Museum Hawaii

1920s Aerial views of Luke Field, Ford Island in the 1920s, showing United States All-Steel Hangars and other types, including photos #4601, #2737, and #6721.

1930 Aerial view of four hangars at Luke Field in 1930, photo #2749.

Yatsko, Andrew

1997 Rockwell Field Historic District, Naval Air Station, North Island, Naval Base Coronado, San Diego, California, Building 830. Historic American Buildings Survey, draft report. Provided by Jeffrey Dodge, Naval Facilities Engineering Command, Hawaii.

**Project Information:** Commander Navy Region (COMNAVREG) Hawaii has embarked on a program of documentation of historic properties within its area of responsibility, with the goal of recording historic information about each property and establishing its context of significance. This information will assist COMNAVREG Hawaii in the appropriate management of these properties, be it routine repair and maintenance for continuing use, rehabilitation for continuing use / adaptive reuse, or demolition. At this time, specific action that may affect this facility has not been determined. This report was prepared under a Historic Preservation Services contract (N62742-97-D-3502) awarded to AMEC Earth and Environmental, the prime contractor, by the U.S. Navy, Naval Facilities Engineering Command. The contract was funded through the Cultural Resources Program of COMNAVREG Hawaii. The photographic documentation was undertaken by David Franzen, of Franzen Photography. Location maps were made by Nestor Beltran of NAB Graphics. Between 1999 and 2001, the field work was done and the draft of this report was written by Dot Dye, AMEC Earth & Environmental, Inc. The report was rewritten in 2006 by Mason Architects, Inc.

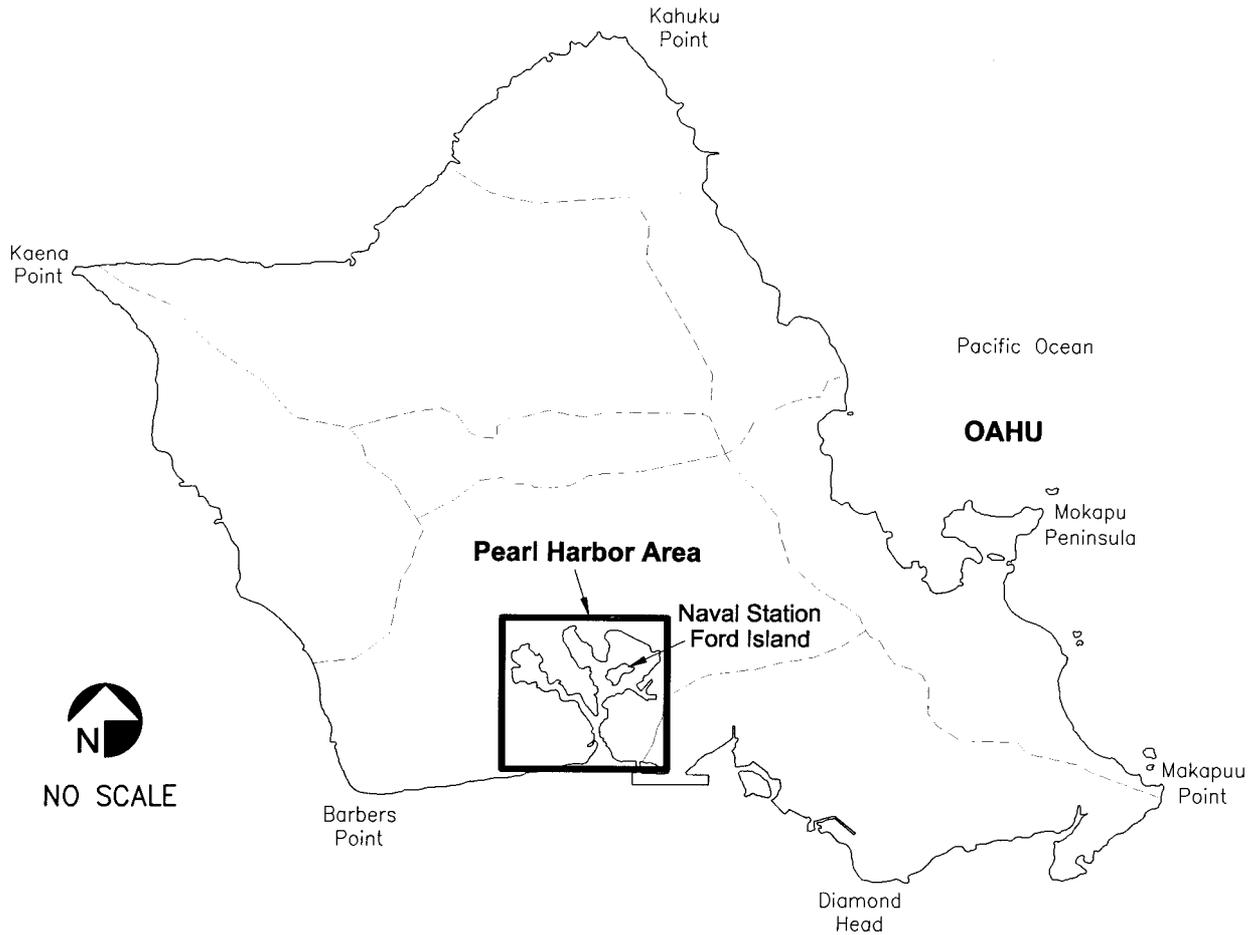
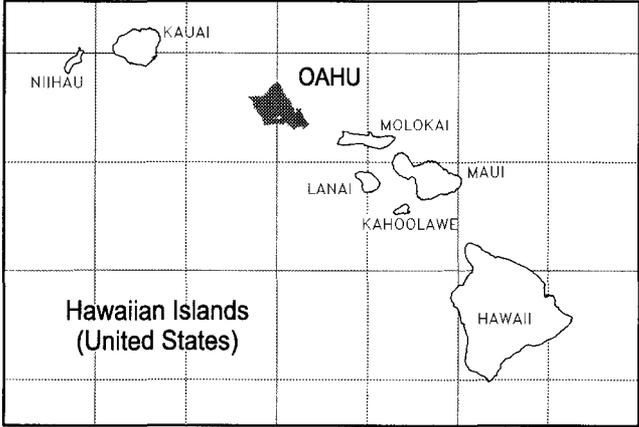
**Prepared by:**

Mason Architects, Inc.  
119 Merchant St., Suite 501  
Honolulu, HI 96813

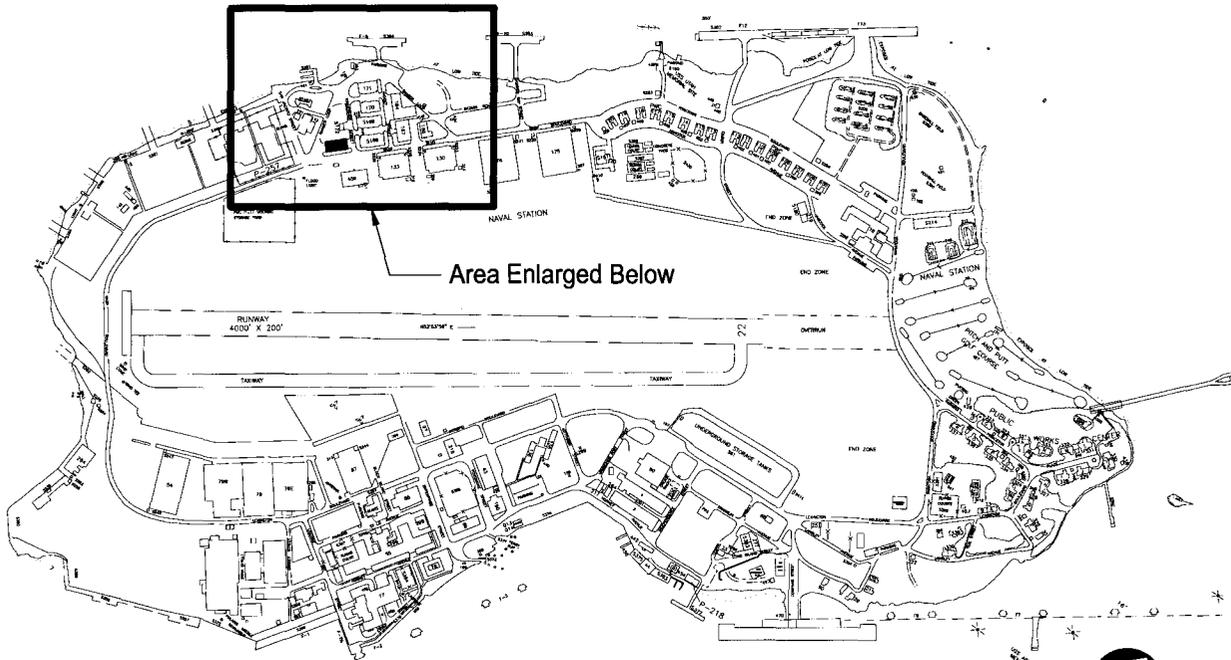
AMEC Earth & Environmental, Inc.  
3375 Koapaka Street, Suite F251  
Honolulu, HI 96819

Date of Final Report: March 2006

**U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-STEEL HANGAR**  
**(U.S. Naval Base, Pearl Harbor, Naval Station Ford Island)**  
**(U.S. Naval Base, Pearl Harbor, General Warehouse)**  
**(Facility No. 174)**  
**HABS No. HI-399 (Page 9)**

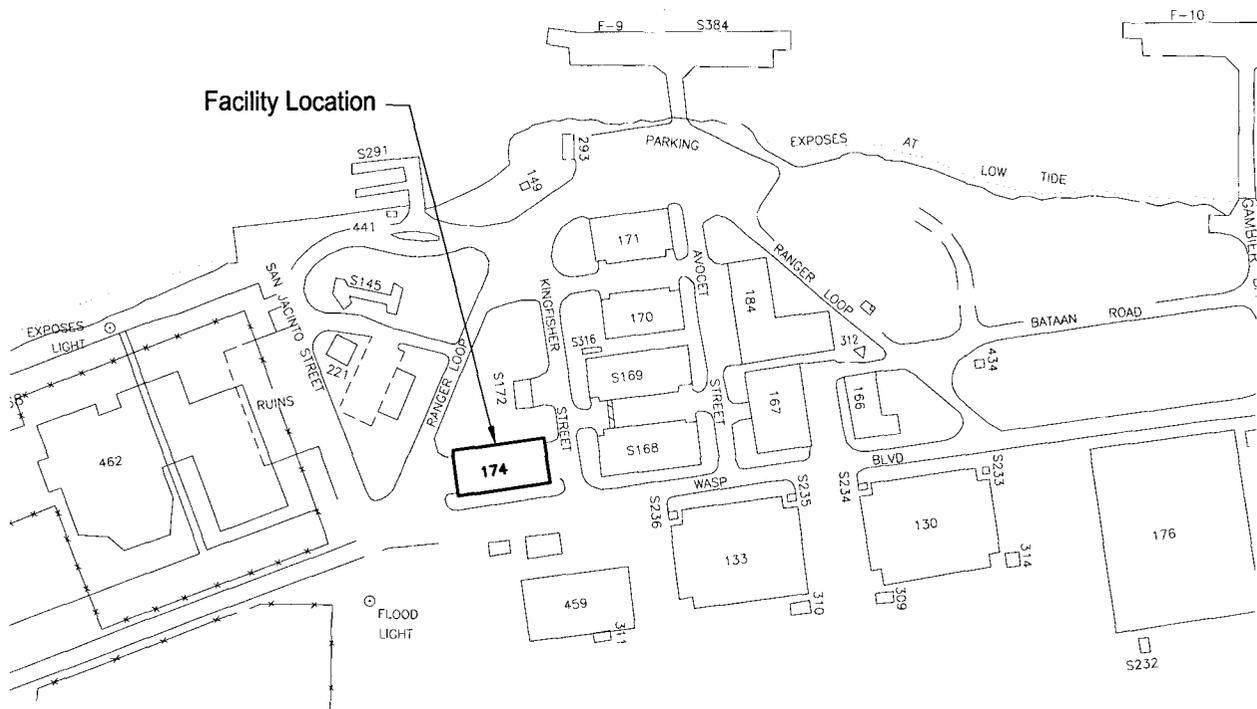


**U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-STEEL HANGAR**  
**(U.S. Naval Base, Pearl Harbor, Naval Station Ford Island)**  
**(U.S. Naval Base, Pearl Harbor, General Warehouse)**  
**(Facility No. 174)**  
**HABS No. HI-399 (Page 10)**



**Vicinity Map**

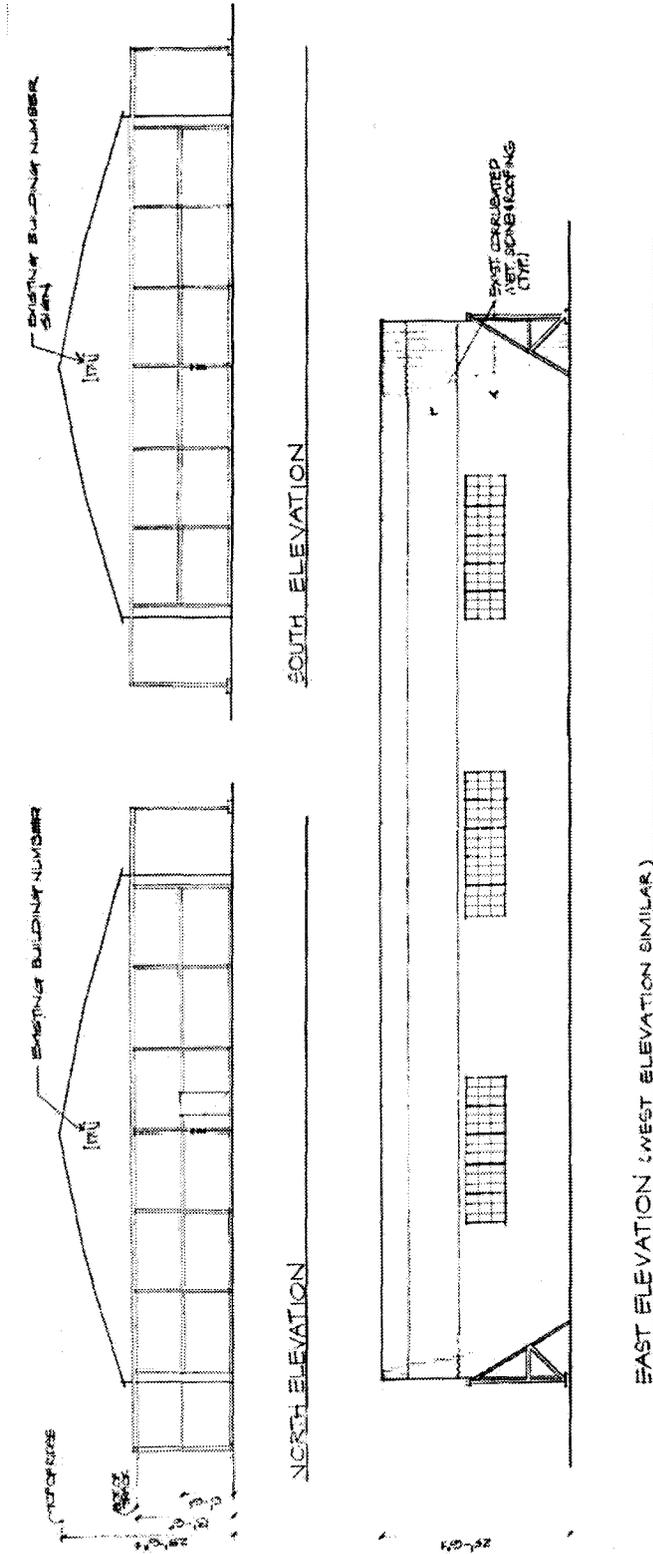
NO SCALE



**Site Map**

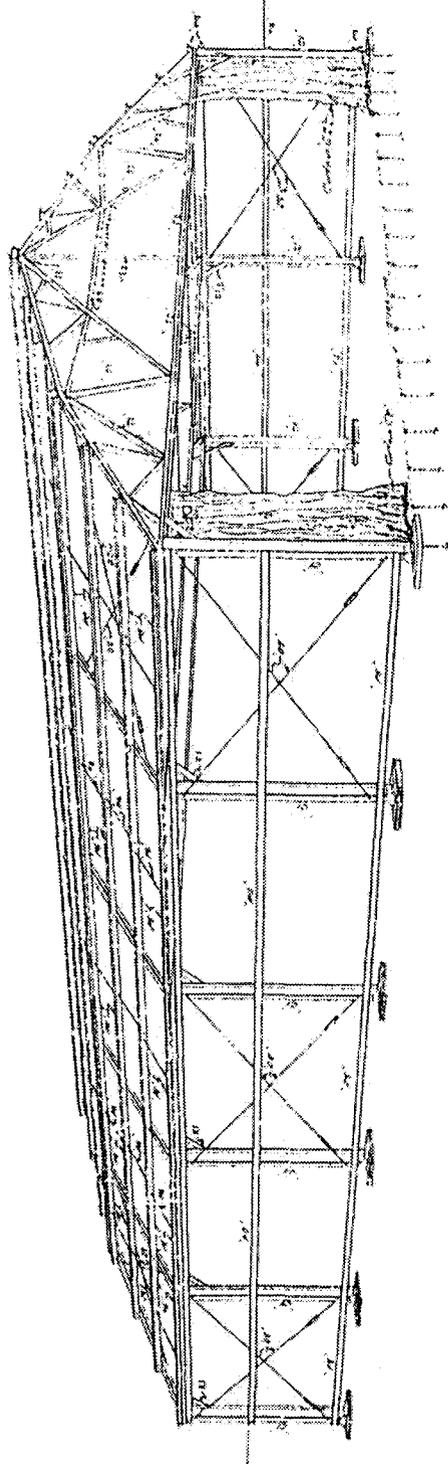
**U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-STEEL HANGAR**  
 (U.S. Naval Base, Pearl Harbor, Naval Station Ford Island)  
 (U.S. Naval Base, Pearl Harbor, General Warehouse)  
 (Facility No. 174)  
**HABS No. HI-399 (Page 11)**

Portion of Drawing No. 7463384, dated 1982 (elevations)



U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-STEEL HANGAR  
(U.S. Naval Base, Pearl Harbor, Naval Station Ford Island)  
(U.S. Naval Base, Pearl Harbor, General Warehouse)  
(Facility No. 174)  
HABS No. HI-399 (Page 12)

Department of Military Aeronautics Isometric Drawing, dated July 16, 1918  
(Source: Yatsko 1997: 21)



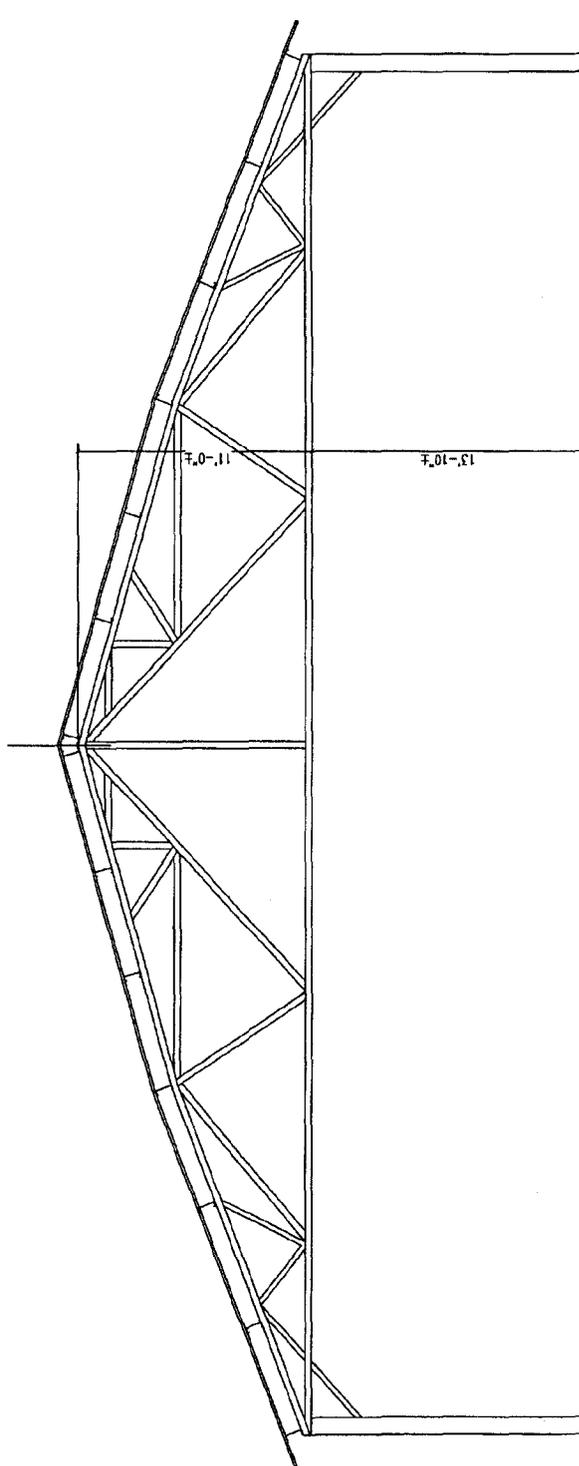
UNITED STATES ALL-STEEL HANGAR  
65'-100'

DEPT OF MILITARY AERONAUTICS  
SUPPLY DIVISION, WASHINGTON, D.C.

106-A July 16<sup>th</sup> 1918

**U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-STEEL HANGAR**  
**(U.S. Naval Base, Pearl Harbor, Naval Station Ford Island)**  
**(U.S. Naval Base, Pearl Harbor, General Warehouse)**  
**(Facility No. 174)**  
**HABS No. HI-399 (Page 13)**

**Typical Cross-Section, showing truss configuration**  
(Source: Martin, Bravo, & Chock, Inc. 1999)



**U.S. NAVAL BASE, PEARL HARBOR, UNITED STATES ALL-STEEL HANGAR  
(U.S. Naval Base, Pearl Harbor, Naval Station Ford Island)  
(U.S. Naval Base, Pearl Harbor, General Warehouse)  
(Facility No. 174)  
HABS No. HI-399 (Page 14)**

**Photo of almost-identical United States All-Steel Hangar, dated October 2, 1941**  
(Source: National Archives II, in RG71CA, Folder 154-D, photo no. 14632)

