

U.S. NAVAL BASE, PEARL HARBOR, DRY DOCK NO. 2,  
PUMPWELL  
(U.S. Naval Base, Pearl Harbor, Naval Shipyard, Facility No. 170)  
East of Dry Dock No. 3  
Pearl Harbor  
Honolulu County  
Hawaii

HABS HI-507

HI-507

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HI-507

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN BUILDINGS SURVEY  
PACIFIC GREAT BASIN SUPPORT OFFICE

National Park Service  
U.S. Department of the Interior  
1111 Jackson Street  
Oakland, CA 94607

## HISTORIC AMERICAN BUILDINGS SURVEY

### U.S. NAVAL BASE, PEARL HARBOR, PUMPWELL – DRY DOCK NO. 2 (U.S. Naval Base, Pearl Harbor, Naval Shipyard) (Facility No. 170)

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- Location:** Adjacent to the East of Dry Dock No. 3  
Pearl Harbor Naval Base  
City and County of Honolulu, Hawaii
- This building falls within the UTM coordinates of the Pearl Harbor, Naval Shipyard as defined in the location section of the overview report HABS No. HI-483. This building's UTM coordinates are: Zone 4 607760E 2361400N.
- Significance:** Facility 170 is located within the Pearl Harbor National Historic Landmark. It was constructed in 1941 in association with the expansion of the Naval Shipyard during World War II. It is specifically related to the waterfront support facility structures and functions as the main pumpwell for Dry Dock No. 2 and No. 3. This facility is of a distinctive type and period of construction and is part of a grouping of facilities that also includes Dry Dock No. 1 (HAER HI-65), Facility S17 (pumpwell – Dry Dock No. 1 HABS HI-511), Facility S17A (By-Pass Valve Chamber HABS HI-511), Facility S786 (Saltwater Pumphouse HABS HI-511), and Facility 1229 (pumpwell – Dry Dock No. 3). The entire dry dock system is a fundamental engineering component of the Naval Shipyard and its primary mission of ship maintenance and repair.
- Description:** Facility 170 is a five-story, concrete frame industrial structure. The foundation is a below grade reinforced concrete slab with 3'-0"-thick exterior walls. The building is 206' long x 26'-6" wide x 70' high. Access to the underground pumpwells is through a nautical-style, flat roof, metal enclosure. Three of the four walls are rectilinear and the south wall and roof are one continuous curvilinear form. Adjacent to the south of the enclosure is a four-sided metal structure with a gable roof and metal louvers at the east and west walls. Both of these structures are riveted to a concrete platform at the street level (roof) of the pumpwell facility. At the north wall of the enclosure is a metal, hinged door with four molded panels and filleted corners. Industrial in style, this door mimics that of a ship's door. Inside the enclosure a concrete stair descends to the first deck below grade. At the base of the stair, there is an expanded metal mesh door that opens to an entry vestibule enclosed with concrete walls and a steel door at the opposite side of the room. An original light fixture is mounted to the wall at the base of the stair.
- This floor contains four main de-watering pump motors aligned in a row from the north to the south end of the facility. Recessed in the

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concrete ceiling above each pump motor is a removable square steel plate cover. The plates are removed on the exterior and the motors are lifted out of the pumpwell by a crane for overhauls and repairs. In the concrete floor adjacent to each pump motor are also paired steel plate covers. The plates are hinged so they can be folded open allowing access to the floors below for necessary equipment repairs. A blower and duct and overhead electric motor chain hoist are located near the northwest corner of the floor. The chain hoist is a hook suspension type with a 1000lb capacity. It is welded to a 2½" steel plate cover with a 3/8" continuous fillet weld. The hoist is used to help raise and lower machinery and equipment between the floors. There is a drainage pump motor room off the east wall. Two of the four drainage pump motors are located here. The other two are located in an alternate location on this first floor. These drainage pumps are used to pump out all the seepage from the dry dock walls as well as the discharge water of the ships when they are docked. Near the south end of the floor there is the motor control center switchboard for the operation of the pump motors. There is also a steel exit door here at the south end. Other miscellaneous items on the first floor include a toilet and sink at the northwest corner as well as a freestanding desk and chair.

At the second and third floors below, concrete walls divide the spaces into four structural bays. The walls are approximately 18" thick with 6'-6" high openings over steel catwalks that span the approximately 206' long building. These catwalks are the only "floor" to speak of for both the second and third levels. Steel pipe railings to either side of the catwalk help protect individuals from falling to the pumpwell floor. The shafts from the pump motors run from the main pump motors through the steel catwalks on both these floors to the pumps on the pumpwell floor. On the second floor these shafts are the only obstructing mechanical devices so the space is completely open to the right and left of the railing giving pure visibility to the pumpwell floor. Within each bay the catwalk, supported by steel beams, extends to the east and west structural walls of Facility 170. From the second floor catwalk the overhead piping and steel and concrete floor above is visible. Located at the north end of the second floor are a small kitchen area (southwest corner), a small locker room (southeast corner), a break area, and a toilet and sink. Apart from these areas, all interior spaces are used to house pumping and mechanical equipment. The stair to the first and third floors is along the north wall of the building. There is a discharge valve and suction valve located adjacent to each pump shaft on the third floor. Six suction valves are also located at the north end of this floor. The ventilation system (and ductwork) for Facility 170 is at the south end of the building. A stair at the north and south end of the third floor ascends up to the second floor.

The bottom floor of the pumpwell contains the four main pumps with impellers. An impeller is a rotor for transmitting motion (i.e. a

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centrifugal pump). In this case, when dewatering the dry dock, the water is sucked up through the suction chamber that is below the pumpwell floor through the suction bell to the pumps and then discharged to the harbor. The drive shafts extend from the pump to the main pump motors on the first floor. Each pump has a check valve and gate valve otherwise known as double valve protection from potential flooding of the pumpwell (Facility 170). A catwalk runs along the west wall of the structure with four individual steel stairs in between each pump that provide access to the pumpwell floor. There are separate sewage pumps at the north end for the dry dock pumpwell toilets. These pump the sewage out to the harbor.

**Historical Context:**

The pumpwell (Facility 170) was a significant element of the large construction project of Dry Dock No. 2 and was completed in 1941. The dry dock installation included a dry dock (similar to No. 1) that is 53'-0" deep; a main caisson, capstans; a flooding and discharge tunnel with stop logs, and short quay walls on both sides of the dock entrance. Most of the work done during the time of intense military buildup during World War II was contracted to two firms, the Pacific Bridge Company and the Contractors Pacific Naval Air Bases. The contract for the construction of Dry Dock No. 2 and 3 was awarded to Pacific Bridge Company.

Facility 170 serves as the main pumpwell for both Dry Dock No. 2 and No. 3. The extra pumps in the small room at the east side of the pumpwell and the tunnel that runs under Dry Dock No. 2 were excavated around 1970 when the intermediate caisson was added to divide the dock in half. It now has the capability to function as a single or dual docking facility.

The operation of the pumpwells is significant to the function of Dry Dock No. 2. In general terms the system works as follows: from the harbor water passes through the flooding tunnel and the flooding sluice gates are opened to flood the dry dock. When the dock is filled the caisson is (under controlled movement) moved away from the dry dock and horizontally to in front of a quay wall and a ship moves in to dock. Once the ship is positioned, the caisson is returned to its original location to enclose the dry dock. The ship is precisely positioned over wood support blocks which conform to the ship's hull and rest on the dock floor; and the water is simultaneously pumped out until the dock is dry and the ship is properly and securely positioned. When dewatering the drainage tunnels are opened and water is forced by gravity into the suction chamber below the pumpwell (Facility 170) floor. The water via centrifugal pumps is displaced to the discharge tunnel and back into the harbor. The same process occurs when the ship leaves drydock without having to position the ship. The flooding of Dry Dock No. 3 operates in the same manner as No. 2. However to dewater this dock water passes through a drainage tunnel on the east side of the dry dock that

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connects to the suction chamber below Facility 170. Once in the suction chamber the water is pumped out by the same process as in Dry Dock No. 2. Each pump is capable of pumping 160,000 gallons a minute. The pumps' combined capacity of 640,000 gallons a minute empties the dock in approximately three hours. The total docking up usually takes around 6 hours because the ship also has to be birthed with temporary hook-ups for water, sewage, and potable water. By comparison it only requires about 2½ hours to flood the dock to sea level.

HAER HI-66 is Dry Dock No. 2  
HAER HI-67 is Dry Dock No. 3

For additional information on Facility 170 see ~~HABS No. HI-65A~~ and ~~HABS No. HI-65B~~ on Dry Dock No. 2 (Facility S-780) and Dry Dock No. 3 (Facility S-781).

For an overview of the Naval Shipyard See HABS No. HI-483.

**Sources:**

Drawings for this Facility 170 are on microfilm at NAVFACPAC Plan Files. Information about Facility 170 was obtained from a copy of a 1948 Property Record Card, Nav. S. and A. Form 277 that is on file at the Pearl Harbor Naval Shipyard Facility Files.

Fogel, Frederick. Historic Resources Inventory Forms for Facility 170, 1980. Prepared by Pearl Harbor Naval Shipyard, Facilities Planning & Programming for State Historic Preservation Office.

Pacific Bridge Company. Contract Noy-5049, for Construction of Dry Dock and Power Plant, Moorings and Additional Facilities, at the Navy Yard at Pearl Harbor, T.H., 1944. Prepared for the Navy Department, Bureau of Yards and Docks. Report is on microfilm at Pacific Division, Naval Facilities Engineering Library.

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

**Project Information:**

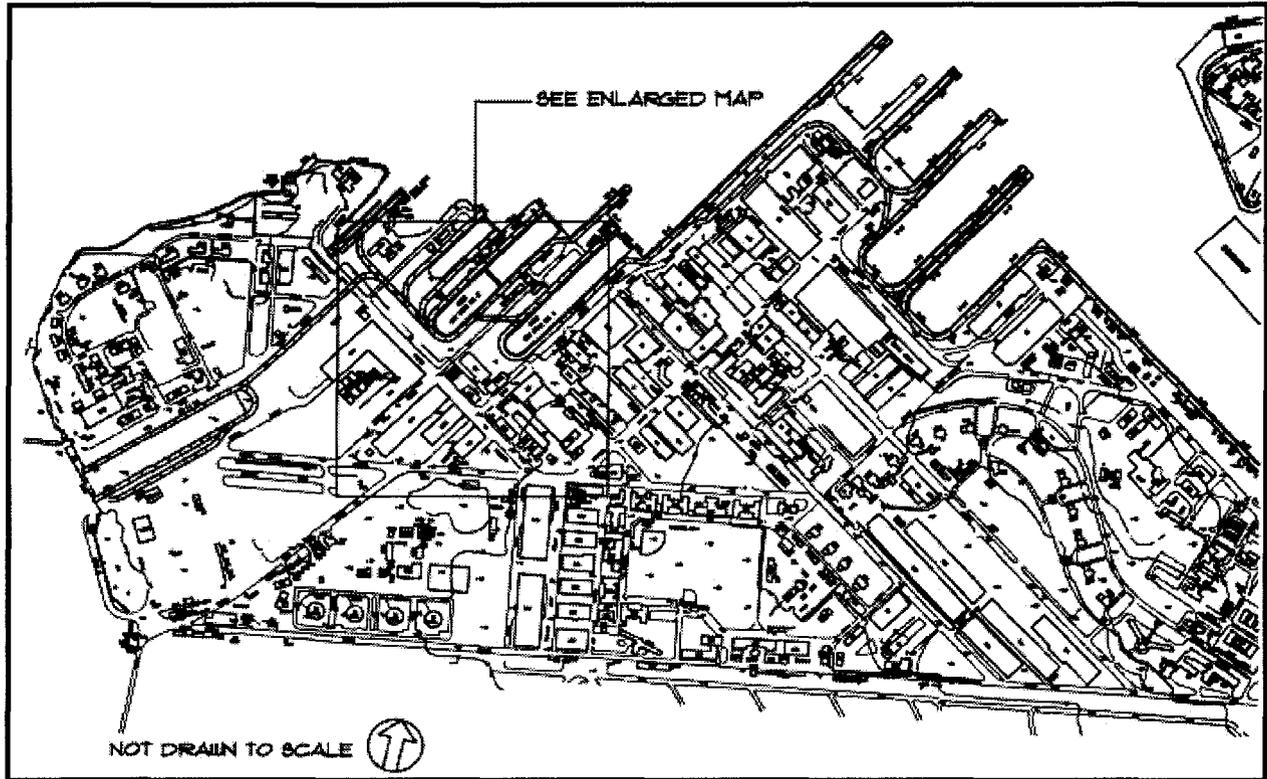
Photo documentation and recordation of this facility by the Navy has been done in anticipation of future alterations or potential demolition of the structure. Photo documentation of historic facilities by the Navy assists in expediting planned undertakings by having the documentation prepared prior to taking actions. Also, photo documentation assists the Navy in gaining more information about its historic facilities to assist in making proactive management decisions. This project is being supervised by Jeffrey Dodge, AIA, Historical Architect NAVFAC Hawaii. The photographic documentation was undertaken by David Franzen, photographer. Joanmarie N. Orlowski, Architectural Historian, of Mason Architects, Inc. prepared the written

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documentation. The field work and research was conducted for this report between July 2001 and December 2001.

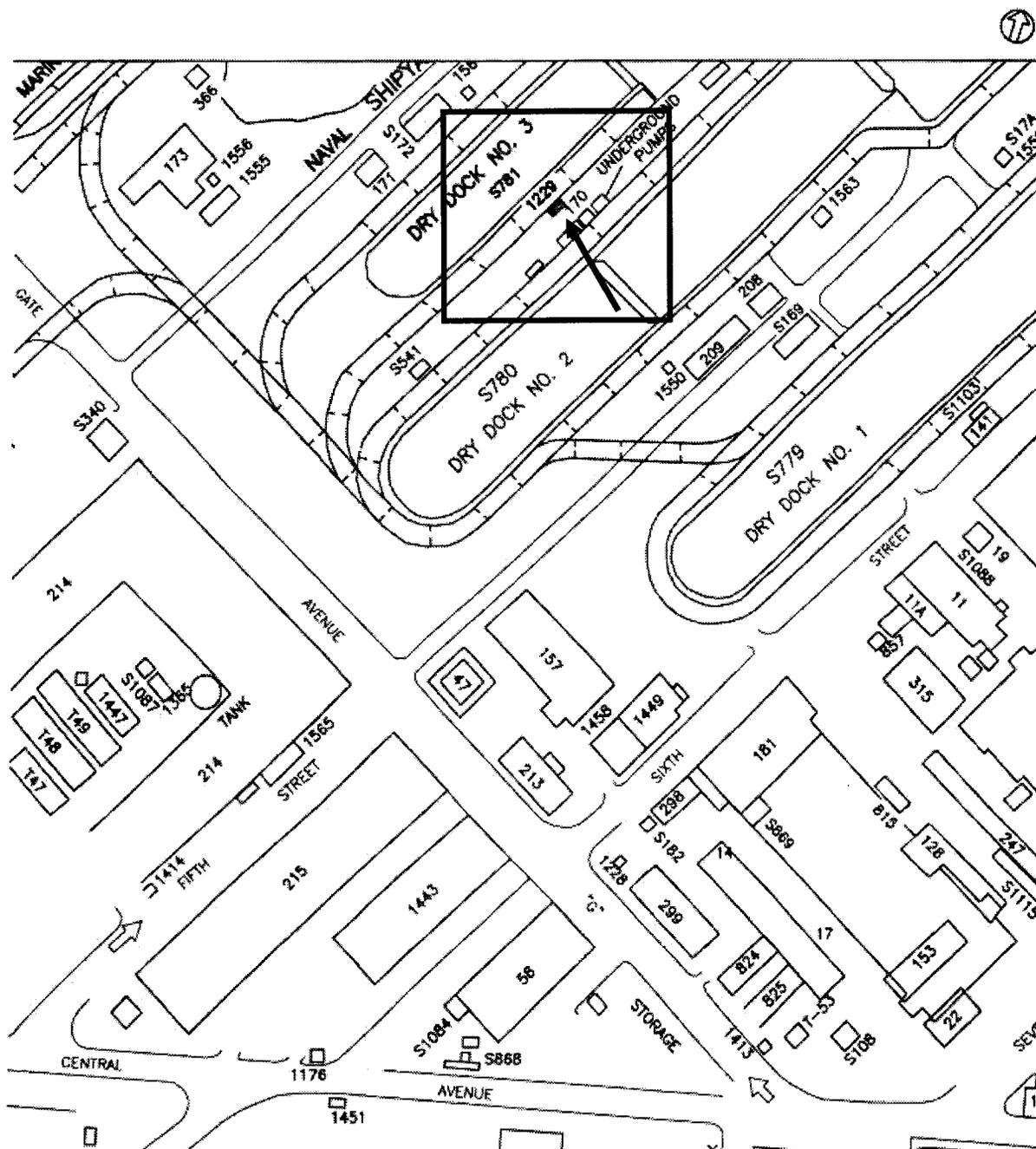
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Shipyard Map



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Enlarged Area Map (reduced, not to scale)





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Overhaul Pump No.4 and Sluice Gates No. 22 & 23 Dry Dock No. 2  
(Drawing No. 7021579, dated 5/9/1978) (reduced, not to scale)

