U.S. NAVAL BASE, PEARL HARBOR, COAL DOCK
(U.S. Naval Base, Pearl Harbor, Naval Shipyard, Facility No. O-1, Repair Wharf)
End of South Avenue near Dry Dock No. 4
Pearl Harbor
Honolulu County
Hawaii

HABS HI-517
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN BUILDINGS SURVEY
PACIFIC GREAT BASIN SUPPORT OFFICE
National Park Service
U.S. Department of the Interior
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Oakland, CA 94607

HISTORIC AMERICAN BUILDINGS SURVEY

U.S. NAVAL BASE, PEARL HARBOR, COAL DOCK
(U.S. Naval Base, Pearl Harbor, Naval Shipyard)
(Facility No. O-1)

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Location: At the end of South Avenue near Dry Dock 4
Pearl Harbor Naval Base
City and County of Honolulu, Hawaii

The UTM coordinates for this structure are: 04.607240.2361620.

Significance: Facility O-1 is located within the Pearl Harbor National Historic Landmark. Although greatly altered by the changes made in World War II, it is significant for being the first official Naval installation in Hawaii. It was part of the first fueling station built at Pearl Harbor, when ships were powered by coal rather than diesel fuel or nuclear power. Its modifications are also significant as part of the history of the Navy's transition from coal to oil for ship's fuel and the WWII construction boom at Pearl Harbor.

Description: The Coal Dock at the Naval Station at Pearl Harbor was designed and built as part of the coaling station complex to fuel the ships. The wharf portion was completed by 1915, but the basin and other parts were not completed until 1918.[1] The wharf includes a main straight portion and curved approaches at each end. The outer face of the deck borders the ocean (about 35' depth) and the curved approach at each

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[1] The plant was comprised of the coal dock; coal storage basin on shore; standard gauge railroad tracks on steel trestle (an open-based framework for supporting the elevated train tracks) over the wharf and storage basin; two coal hoisting towers running upon rails supported on the wharf trestle; six locomotive cranes for loading coal from the stock pile into cars; three steam locomotives and fifteen air dump cars for transporting coal from the wharf to basin or the reverse; two movable coal chutes for receiving coal from dump cars and chutting it into vessels or barges; a flooding and draining system for flooding the coal to a depth of 17'-6" or draining the same.

The coal storage basin was the largest structure on the base for decades, measuring about 767' x 457'.The exterior walls are about 18' tall, with most sloped at 45 degrees, and buttressed on the outside. The basin was designed to be watertight, because flooding was necessary to reduce the danger of heating in the 25' high piles of coal. The top of the trestle was 40' above the deck of the wharf. The tracks were arranged in a loop system, always passing along the wharf, and then along anyone of six lines crossing the coal basin. The railroad lines were supported on 75 concrete piers. These six lines were in pairs, spaced 30' apart, so that the cranes with clamshell scoops could load the cars on the adjacent track. The coaling station was established at the end of the installation closest to the entrance channel, and generally downwind of the other Naval Station facilities.

end connects with the land. The deck is supported upon girders and beams which are carried by brace foundation cylinders resting upon groups of wooden piles. The deck, beams, girders, cylinders and braces are all made of reinforced concrete. The wearing surface of the deck of the wharf and approaches is 12'-0" above Mean Low Water (M.L.W.) level or about 10.8 feet above Mean High Water (M.H.W.) level.

The main straight portion of the deck is 470'-0" long by 45'-0" wide. The outer edge of the deck extends 10'-0" beyond the centerline of the supporting piers and 5'-0" beyond the centerline of the supporting piers at the inner edge. A floor beam under the deck slab (18" wide by 51" deep) that supported large moveable coal chutes was located 5'-10" from the edge of the wharf. Manhole openings, with cast-iron frames and covers were located along the outer waterfront of the deck for access to oil valves and connections (These are no longer extant).

The curved approach wharfs at each end of the main wharf has a radius of 150'-0". The curve is divided into 10 curved sections, each about 20'-0" long, with a pair of piers at each interval. The south-end curved section is supported by 18 cylinder piers, while the north-end curved section is supported by 20 piers, due to the fact that the shoreline was not stable enough to handle the load of the edge of the pier.

The construction details of the wharf are as follows. The wharf is supported upon two parallel rows of cylinder piers; the rows are spaced 30'-0" apart on-center and the 24 cylinders in each row are spaced 20'-0" apart. The cylinder piers are of a reinforced concreted shell 8"-thick with bottom depth of 29'-0" below M.L.W. Each pier is supported upon a contained group or cluster of wooden piles with heads cut off at points from 2' to 3' above the bottom of the shell; the shells are enlarged near the bottom from outside diameters of 4' and 3' feet for the outer and inner rows to 10' and 8' to encompass 13 and 7 piles respectively. The shells for the piers were all precast on shore; after placing the shells over their groups of supporting piles, the bottoms of the shells were sealed with concrete by using a tremie (A pipe or tube through which concrete is deposited under water). The end bays are braced with one longitudinal and one transverse diagonal strut, each extending from the deck beams above into the conical or enlarged portion of a cylinder pier below; these struts are 18" x 24" in section and were pre-cast on the shore. The ends of the struts are firmly embedded in the concrete piers at their lower ends and within the deck of the wharf at the upper ends. The wooden piles vary in length between 35' or 40' and 106'; the long piles were made by splicing together shorter ones, the splices were a "one-half cut away" type with the joint about 6' long with the parts secured together with through bolts and wire rope placed near the ends and drawn tight with a hoisting engine. The piles pierced a thick stratum of hard material, which serves to materially strengthen and support the piles

all of which were driven under a heavy steam hammer with a follower. No fender system was attached to the wharf. Double bollards or bitts, made of cast iron are spaced at intervals of 30h feet along the wharf.

The wharf was designed primarily for the support of a steel trestle, which holds the load of the towers and railroad equipment for handling coal. The trestle posts are located directly over the wharf cylinders. The longitudinal floor beam in the deck of the wharf supports the wheel loads of the two coal chutes when brought close together (which brings the two adjacent wheels of the chutes within 6'-0" of each other) but will not support a tower load and the coal chutes simultaneously. The deck has strength sufficient to support a uniformly distributed live load of 180 pounds per square foot, but of the wharf was seen as seldom if ever required for coaling operations and was not a principal feature in the design.

Estimated maximum loads (in tons) upon the front supporting cylinders of the wharf were as follows:

Dead load	49 tons
Uniform live load on deck at 18lbs. per SF	45 tons
Coal chutes (with coal load)	35 tons
Trestle	17 tons
Train	56 tons
Coaling towers (Two close together with wind pressure)	112 tons
Total	314 tons

In actual service it was not practicable to operate the towers and the chutes at the same point at the same time nor was it reasonable to expect that a deck load would be assembled on the wharf when heavy coaling operations were in progress. Upon these assumptions, the maximum probable load for outer cylinder pier would be less than the front supporting cylinders.

Estimated maximum loads in tons of 2000 pound upon each of the rear supporting cylinders are:

Dead load (approximately)	40 tons
Uniform live load	36 tons
Trestle (approximately)	5 tons
Coaling towers (two close together w/wind pressure)	90 tons
Total	171

The tracks for coal chutes and for railroad service were carried upon an outboard cantilever that overhung the wharf. The weight upon these tracks resulted in producing an uplifting tendency on the inner wharf cylinders, reducing the cylinder loads. A total of about 135 tons on one pier, or an average of about 19 tons on each of the seven supporting piles, was used as the maximum allowable load.

Presently, the wharf is in poor condition. The slab is cracking and spalling and the piers are cracking, exposing the re-bar to the elements at the waterline. A portion of the curved approach located

adjacent to Dry Dock No. 4 was cut to allow for the construction of the Dry Dock No. 4 in 1941. The cut end is failing with the deck sloping greatly to one side. Facility 831, a cement block storage room, sits on top of the concrete deck but is boarded up and no longer in use.

Historical Context:

In May 1899, Commander J.F. Merry arrived in Honolulu to command the Naval Coal Depot, relieving the U.S. Consul. In November 1899 this coaling station was renamed "Naval Coal Station" (Landauer and Landauer 1999: 173), reflecting a broader purpose than refueling Navy ships.

Until the entrance channel at Pearl Harbor had been dredged, which was not substantially accomplished until 1911, it was not practical to develop facilities there. Fuel structures were among the earliest facilities built. A coaling depot at Pearl Harbor with a 10,000-ton capacity had been recommended in the early 1900s. By the time this was built, it was almost obsolete, since oil was becoming more popular as a fuel source for ships. The first large oil-burning steam engine was installed in a Navy ship in 1908. However, coal remained a fuel source for some ships even during World War II (Alden 1972: 224). The construction of the coaling station was authorized March 7, 1912. The wharf portion was completed in 1915 but the basin and other parts were not completed until 1918.

The Act of August 22, 1912, "Depots for Coal" appropriated $300,000 for the construction of the Coaling Station at the U.S. Naval Station at Pearl Harbor. Then on December 3, 1912, another $313,750 was allotted by the Department of Defense. Again, through the Act of March 4, 1913, another $306,250 under the job, "To complete Coaling Plant" was allotted. Together, a total of $920,000 dollars was allocated for the construction of the huge coaling station at Pearl Harbor.

Coaling facilities remained an integral part of fleet operations well into the 1920s and 1930s and was partially used during World War II.

As the need for coal decreased and as the military continued its' build-up preceding World War II, the huge coaling facility began being dismantled and reused. In 1941, the construction of Dry Dock No. 4 necessitated the clearing of the two coal-crane structures, a portion of the wharf (a portion of the southeast curved section), and its trestles and trusses (CPNAB: n.d.). Concrete Plant No. 2 was built around the same year within the abandoned coaling plant. The erection of the new concrete plant, which supplied most of the concrete used in building Dry Dock No. 4 necessitated the removal of two coal crane structures, the trestle along the entire length of the outer wharf, and considerable portions of other trestles, as well as the transfer of some 30,000 tones of coal to the south end of the stage basins. All useable steel (some 800 tons) was salvaged from the wrecked structures and sorted and stored in segregated piles.

The steel was used in the salvage operation for the USS *Oklahoma*, which had been torpedoed on December 7, 1941, and in the construction of marine-railway ground ways. Also in 1941, the trestle along the north side of the Coal Dock was demolished and the area was used as a bulk cement dump and silo storage.

Later, after the trestles were removed from the wharf, and the end portion of the dock was cut, the 800'-0" long coaling dock was operated as a cement dock. Sewer, water, compressed air, and telephone service were supplied from the yard's systems; power was available from its 11,500-volt radial distribution system. The area of ocean between the shoreline and the wharf (approx. 100') was filled sometime between October 1941 and October 1942.

For an overview of the Naval Shipyard see HABS No. HI-483. For information on Dry Dock No. 4, see HAER No. HI-15.

Sources:

The original drawings for this building are on microfilm at NAVFACPAC Plan Files.

Admiral Furlong Collection. [Aerial photograph of coal docks], 1943. Hawaii State Archives. Folder PPFUR 2-1, Dec. 13, 1943 ASBF #23320.

Alden, John D., Commander, U.S. Navy. *American Steel Navy, A Photographic History of the U.S. Navy from the Introduction of the Steel Hull in 1883 to the Cruise of the Great White Fleet, 1907-1909,* 1972. Naval Institute Press: Annapolis, Maryland.

Contractors Pacific Naval Air Bases. *Technical Report and Project History, Contracts NOy-3550 and NOy-4173, Pacific Naval Air Bases*, n.d. Microfiche of report at Pacific Division Naval Facilities Engineering Command Library.

Gaffney, J.J.. Supply Officer. Memorandum to Commandant, Fourteenth Naval District, dated November 1941. In files of National Archives and Records Administration, San Bruno, RG 181, 14th ND District Staff Headquarters, General Correspondence [Formerly Classified] 1936-1944, Box 1, Folder A1-1, Bishop Point, Beginning Aug. 4, 1936 to end of June 3, 1943.

Helber Hastert & Fee Planners, Inc. *Pearl Harbor Naval Complex Integrated Cultural Resources Management Plan*, 2002. Prepared under Contract with Pacific Division, Naval Facilities Engineering Command for Commander, Navy Region Hawaii.

National Archives II, Still Photo Collection
Photos in group RG71CA, Box 162, "Coaling Plant Dec. 1915 to End" folder

Photos in group RG71CB, Box 99, "Dry Docks 1942" folder
Photos in group RG71CA, Box 175-E

Property Record Card. Coaling Dock Naval Shipyard, P.H., December 21, 1947. Located at the Naval Shipyard Files (held by Duane Tsuruda).

U.S. Navy, Bureau of Yards and Docks. Illustrated Reports of Construction Contracts, Report 1, Coaling Station, U.S. Naval Station, Pearl Harbor, T.H., 1916. Available at National Archives II, Still Photo Section in RG 71CR, Box 2, Vol. 3.

Weeber, C.F. Memo concerning contract Noy-8511 to all concerned, 1944. In files of Bishop Museum Archives, W.F. Dillingham Papers (letters), Box 33-7.

Likely Sources Not Yet Investigated:

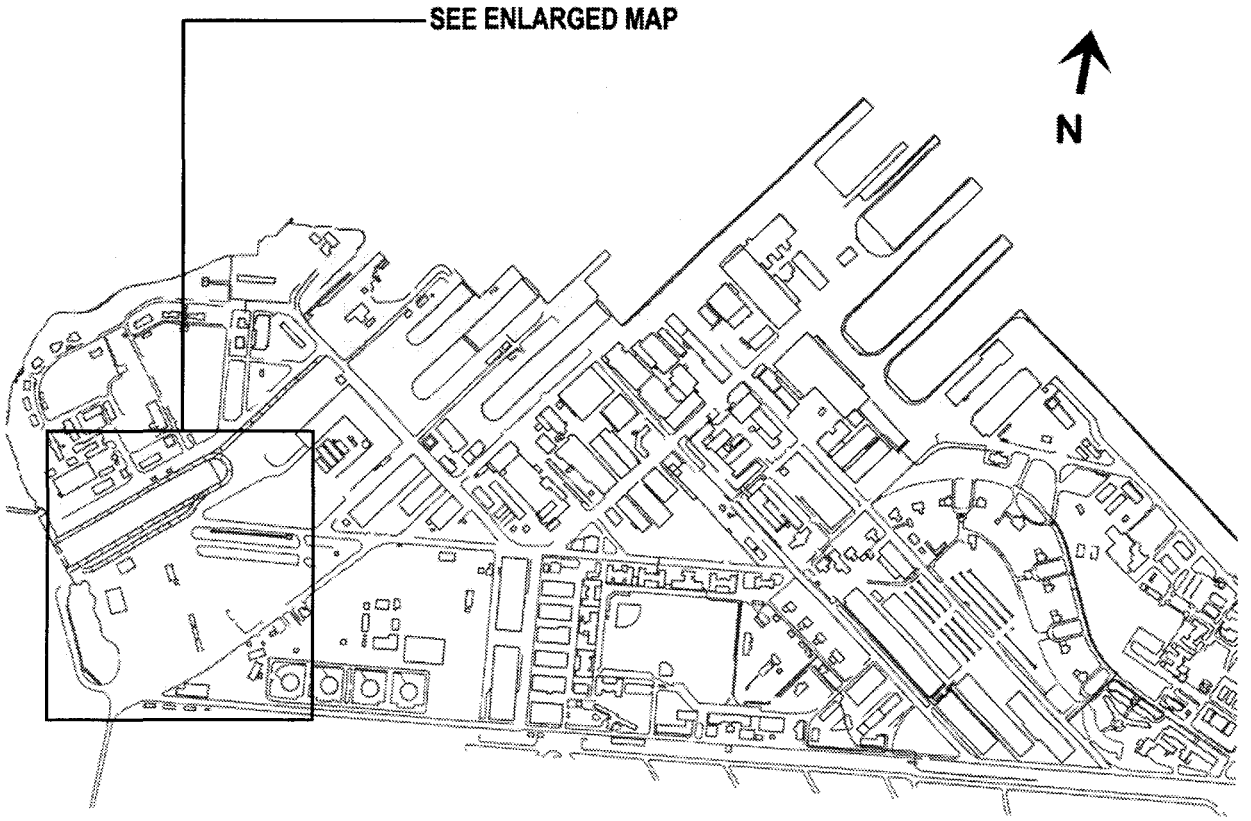
National Archives, Pacific Sierra Region, 1000 Commodore Drive, San Bruno, California 94066, ph. (415) 876-9009.

Navy Historical Center, Washington Navy Yard, 805 Kidder Breese, S.E., Washington, D.C. 20734, ph. (202) 433-4131.

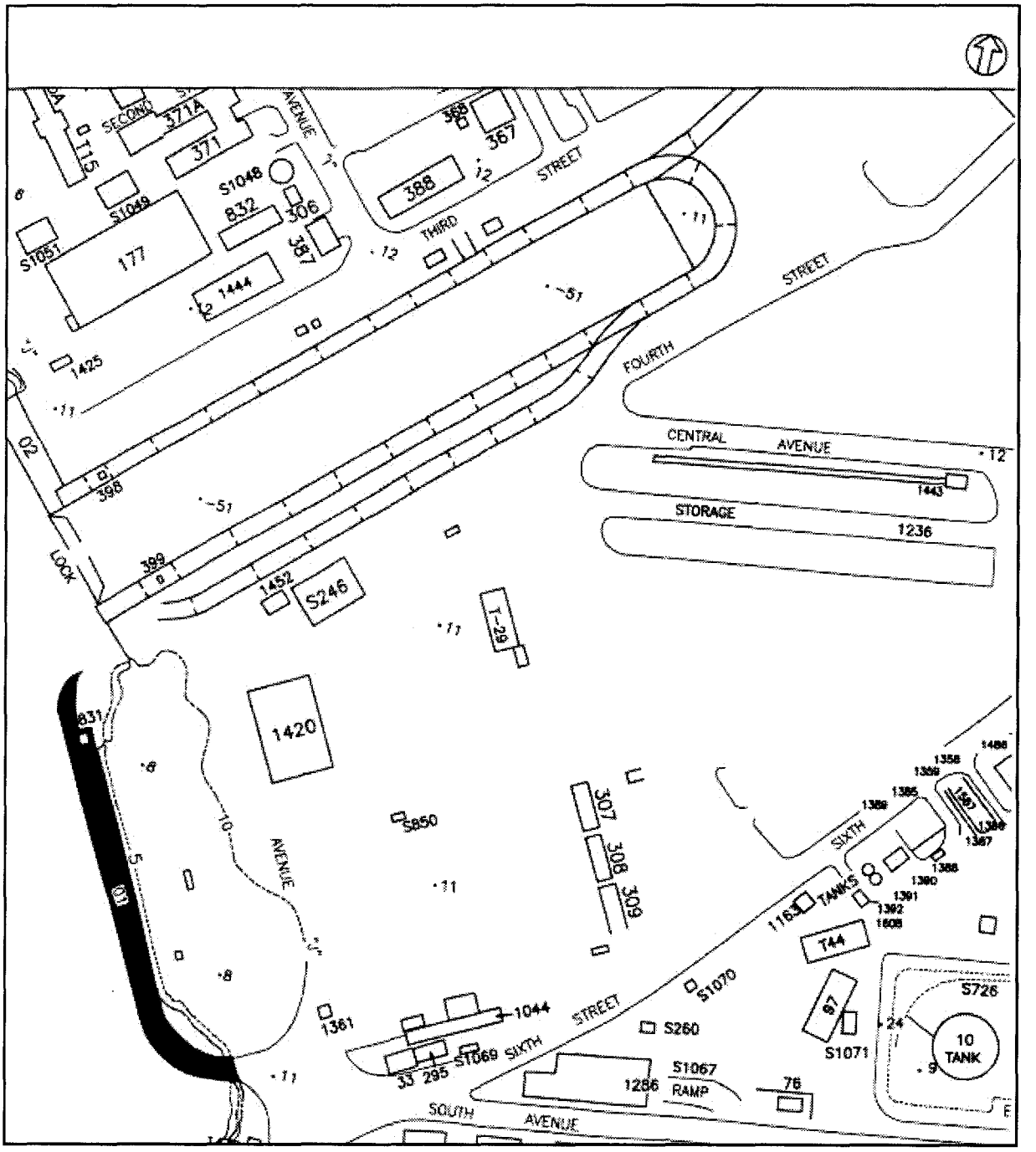
Port Hueneme NAVFAC Archives, 621 Pleasant Valley Road, Port Hueneme, California 93043, ph. (805) 982-5563.

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 A.I.A., Historical Architect NAVFAC Hawaii. The photographic documentation was undertaken by David Franzen, photographer. Lorraine M. Palumbo, Ph.D. Architectural Historian, of Mason Architects, Inc. prepared the written documentation. The field work and research was conducted for this report between July 2001 and December 2001.

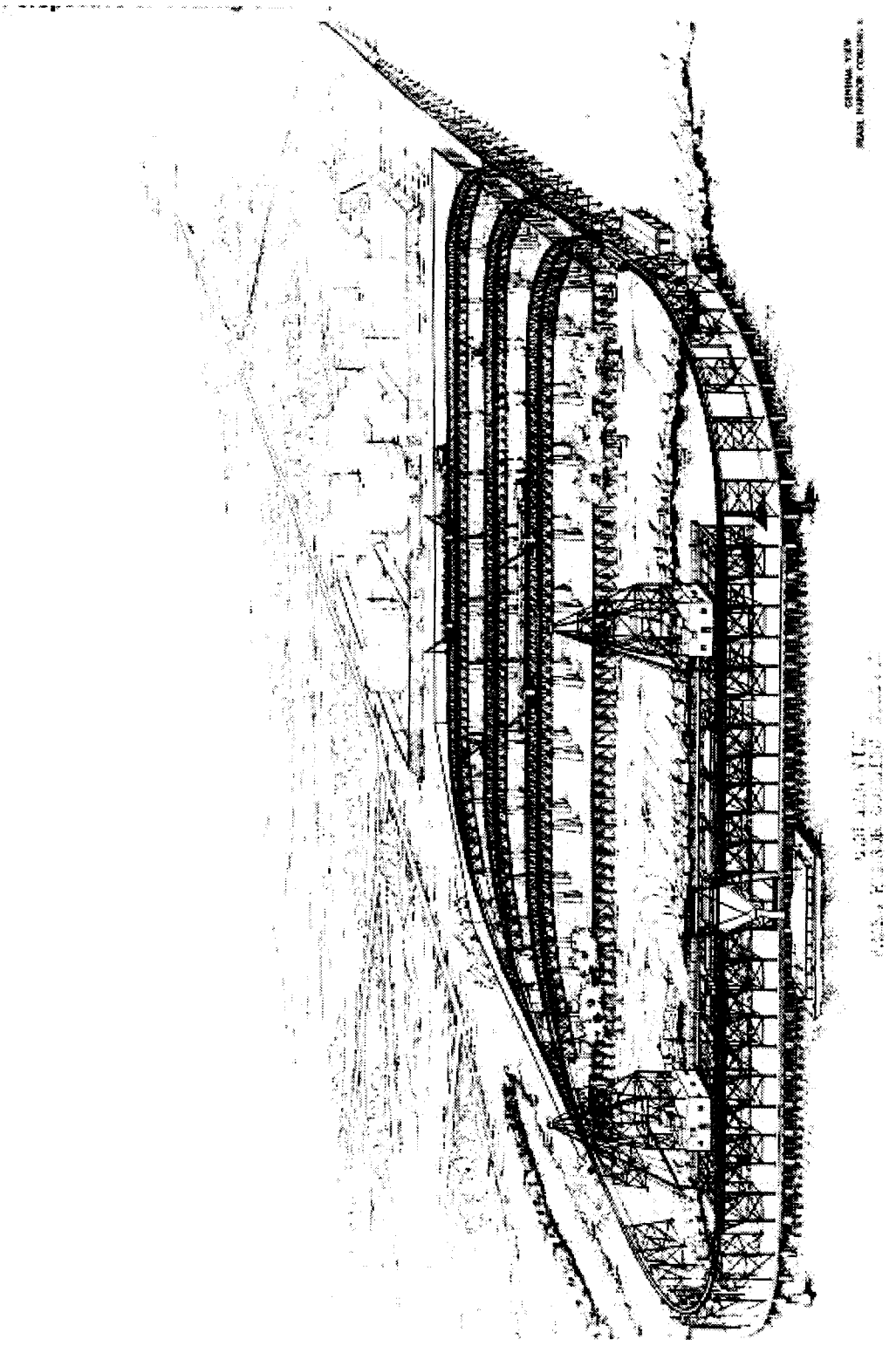
Shipyard Map



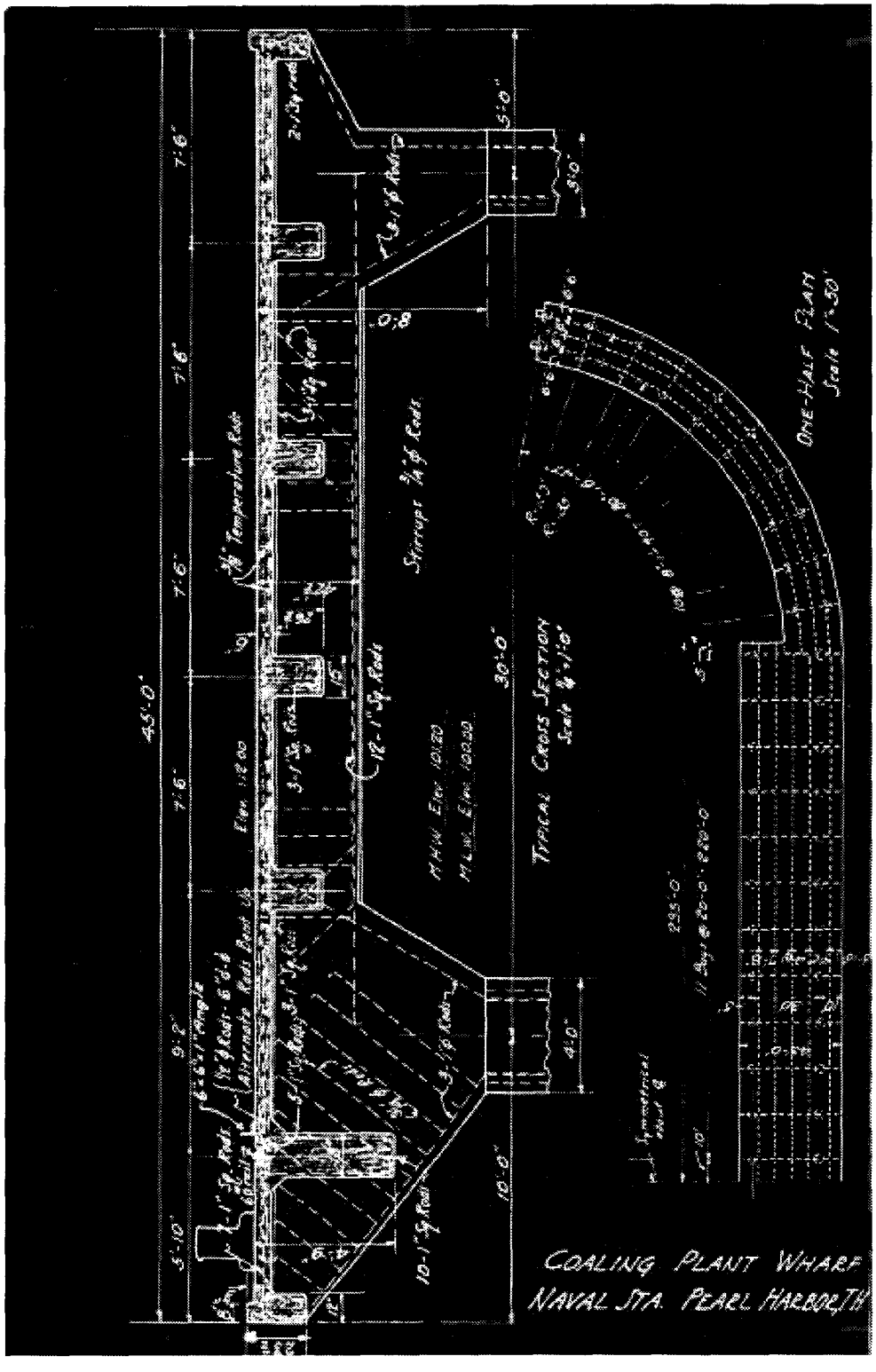
Enlarged Area Map (reduced, not to scale)



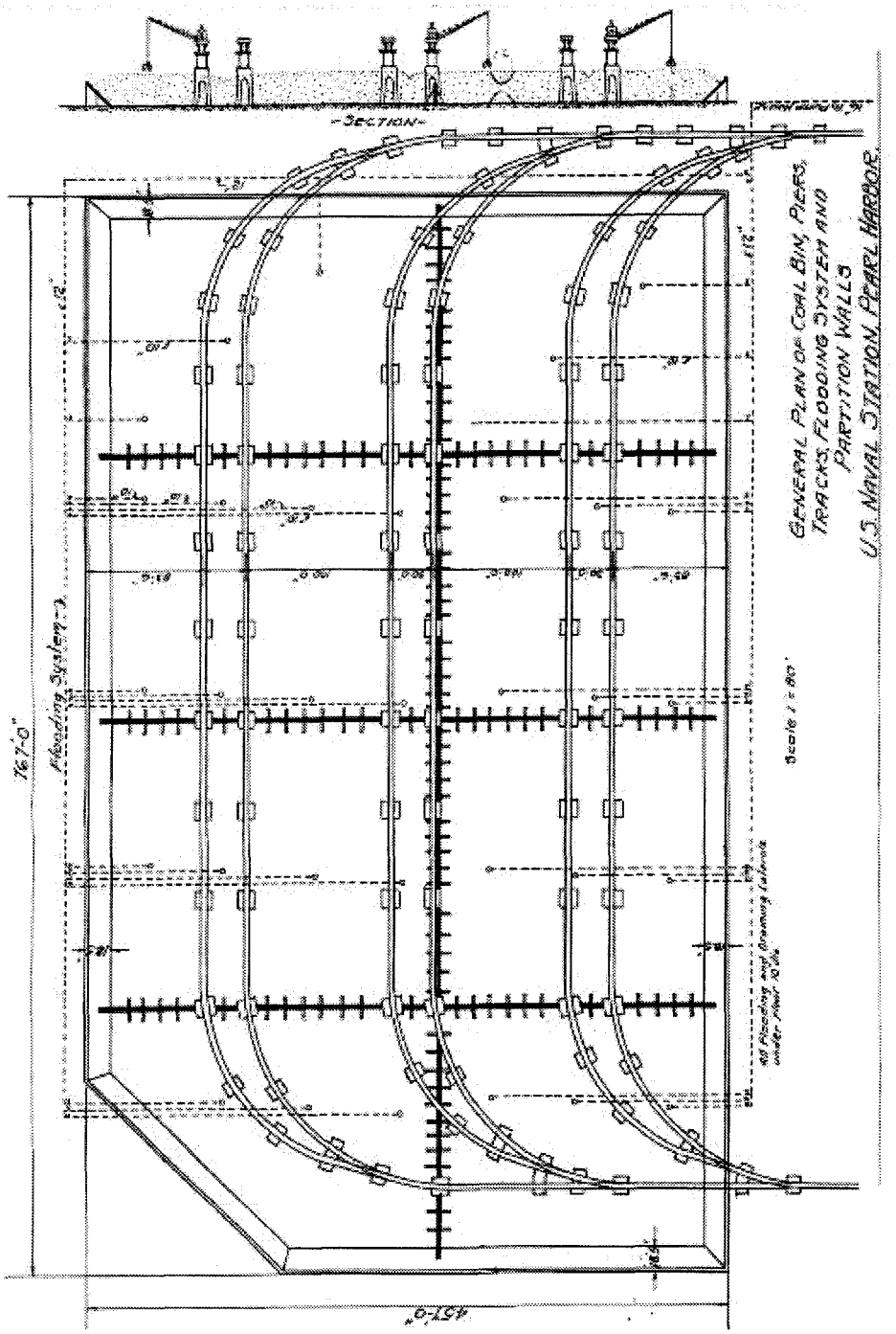
Perspective of Coaling Station, General View



Plan and Section of Coaling Plant Wharf (reduced, not to scale)



General Plan of Coal Bin, Piers, Tracks, Flooding System and Partition Walls (reduced, not to scale)



Historic view of the coaling station taken from Radio Tower No. 1 on August 1919. Source: National Park Service, U.S.S. Arizona Memorial, from the 14th Naval District Photograph Collection – PHOG No. 2984.